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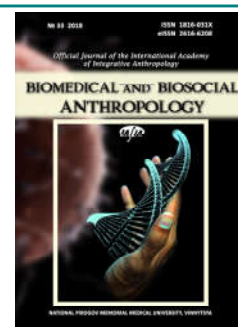
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Qualitative signs of digital dermatoglyphics as markers of diseases of atopic nature

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The lawfulness of the application of the method of dermatoglyphics in the study of atopic diseases is ensured by the polygenic inheritance of signs of dermatoglyphics, on the one hand, and the pathogenetic heterogeneity of these diseases, on the other hand, as well as high informative ability of signs of dermatoglyphics as markers of diseases of hereditary and multifactorial nature. The purpose of the study is to detect differences in qualitative signs of digital dermatoglyphics between patients with atopic dermatitis, allergic rhinitis and bronchial asthma. Primary indicators of digital dermatoglyphics of sick young men and young women of the Podillia region are taken from the data bank of the research center of the National Pirogov Memorial Medical University, Vinnytsya and were used in previous studies when compared with the practically healthy population of this region. Imprints were obtained by the method of "printing ink" by Gladkova T. D. By the method of Cummins H. and Midlo Ch. a dermatological study was performed for 320 young men and young women with allergic rhinitis (n=69), bronchial asthma (n=108) and atopic dermatitis (n=143). The frequency and location of 8 types of finger patterns were subject to analysis. Statistical processing of the obtained results was carried out in the package "Statistica 6.1" using nonparametric methods. The reliability of the difference in values between independent qualitative values was determined by the formula of Weber E. (1961). The specificity of the digital typology of atopic diseases is established, which is based on the differences in the frequency and location of the whorl, central pocket and arches between the young men, except those indicated - a random pattern between young women, patients with atopic dermatitis, bronchial asthma, allergic rhinitis. Additionally, when comparing young men, patients with allergic rhinitis with patients with bronchial asthma and atopic dermatitis - ulnar loop; for bronchial asthma with patients with allergic rhinitis and atopic dermatitis - lateral pocket loop (in young men) and ulnar, lateral pocket and double loops (in young women); when comparing young men, patients with atopic dermatitis with patients with bronchial asthma, and allergic rhinitis - a random pattern.

Keywords: types of finger patterns, atopic dermatitis, bronchial asthma, allergic rhinitis.

Introduction

Atopic march is a combination of processes that consists in the predominance of certain manifestations of allergic character in different periods of human development. The classically atopic march begins in childhood in the form of atopic dermatitis, which subsequently changes with allergic rhinitis. At the end of the atopic march there is bronchial asthma [3].

By manifestations of the atopic march are afflicted millions of people around the world and annual increases

in incidence of atopic dermatitis and allergic rhinitis and bronchial asthma are recorded [1, 22, 31].

According to Taiwanese scientists, the incidence of atopic dermatitis, allergic rhinitis and bronchial asthma for 8 years (from 2000 to 2007) is 6.7%, 26.3% and 11.9%, respectively. Children and adolescents had significantly higher rates of these diseases compared to adults [15]. Korean researchers found that the prevalence of allergic rhinitis was 24.34% for elementary school students,

13.75% for high school students and 12.17% for secondary school students [16].

It is noted that individuals of different sex, age and type of body structure are very strikingly affected by these diseases [6, 23, 25, 26, 28, 29].

Korean scientists surveyed 5202 adult Koreans aged 19 to 40 years. The prevalence of atopic dermatitis tended to be U-shaped relative to the body mass index, waist circumference and the percentage of total adipose tissue, especially in women [19].

So, scientists from the USA conducted a study of 8165 people with allergic rhinitis. Multivariate regression was used to assess the relationship between obesity and rhinitis. Excessive weight, obesity or central obesity were not associated with allergic rhinitis in adults. In children, central obesity was associated with a decrease in the chances of allergic rhinitis (0.35; 95% CI, 0.19-0.64; $p < 0.01$). After stratification by gender, this association was similar to that of girls and boys [11].

Indian scientists surveyed 100 patients with allergic rhinitis and asthma and 100 healthy individuals (mean age 30.72 ± 12.58). The odds ratio for patients with allergic rhinitis was 5.05 ($p < 0.05$). The correlation of allergic rhinitis with the sex was statistically significant ($p < 0.05$). Multiple regression analysis also showed a predisposition for allergic rhinitis with asthma ($p < 0.05$) [17].

In a study that covered 1 million people born in 1952-1959, it was found that the relative risk of asthma is associated with an increase in the body mass index of 3 points was ranging from 1.14 (95% confidence interval 1.10-1.18) in smokers to 1.27 (1.22-1.32) for those who do not smoke [24].

These data are corroborated by many other studies that have also established the link between obesity and the risk of these diseases [4, 14, 18, 30].

A promising area is the study of dermatological markers for allergic rhinitis, bronchial asthma and atopic dermatitis [13]. Dermatoglyphics studies the features of a human skin pattern formed by papillary lines, which in turn form different formations (triadius, loops, arches and whorls patterns). Thus, a unique imprint of a person allows applying this method for the needs of police, in particular, the identification of human [10].

Although dermatoglyphics is a fairly young science - from the moment when Cummins H. and Midlo Ch. presented their main work only about 50 years passed, dermatological features have been already successfully used to predict the development or predisposition to diseases such as diabetes mellitus [21], myocardial infarction [20], etc.

The *purpose* of the study is to detect differences in qualitative signs of digital dermatoglyphics between patients with atopic rhinitis, bronchial asthma and atopic dermatitis.

Materials and methods

Primary indices of digital dermatoglyphics of patients with atopic rhinitis, bronchial asthma and atopic dermatitis

of young men and young women of the Podillia region are taken from the data bank of the research center of the National Pirogov Memorial Medical University, Vinnytsya and were used in previous studies when compared with practically healthy young men and young women [2, 7, 9].

Selection and examination of patients with atopic dermatitis (AD), bronchial asthma (BA) and allergic rhinitis (AR) were performed in medical institutions of the city of Vinnytsya and the region. The skin allergic tests were performed using a piercing technique using a lancet for a rotary test with injection of mixed allergens produced by the Vinnytsya "Imunolog" Ltd. Clinical and diagnostic criteria for diagnosis of AD were in accordance with generally accepted methods [12]. The verification of the diagnosis of BA was carried out in accordance with the recommendations of the International Expert Group EPR-2, and the AR - according to the recommendations of the ISSA. Dermatoglyphs of 320 adolescents - young men and young women, patients with AR ($n = 69$: young men - 36, young women - 33), BA ($n = 108$: young men - 63, young women - 45) and AD ($n = 143$: young men - 64, young women - 79) were studied.

The dermatological study was performed using Cummins H. and Midlo Ch. method [5]. Imprints are obtained by the method of "printing ink" [8]. The frequency and location of 8 types of patterns were subject to analysis.

Statistical processing of the obtained results was carried out in the package "Statistica 6.1" using nonparametric methods. The reliability of the difference in values between independent qualitative values was determined by the Weber E. formula [27].

Results

The reliable differences or tendencies of qualitative signs of digital dermatoglyphics between patients with allergic rhinitis, bronchial asthma and atopic dermatitis have been established (Table 1-4).

In **young men**, patients with AR in comparison with patients with BA, on the right hand on the I finger in 7 times more often there observed a whorl, there is no arc, central pocket and lateral pocket loop; on the II finger is extremely rare (difference 8 times) the central pocket; the ulnar loop (more than 1.5 times) predominates on the III finger, and never observed the whorl; on the IV finger, usually, a whorl is recorded (5 times more often) and the central pocket does not appear, most often the whorl (5 times more often) or the ulnar loop (1.3 times more often) are encountered on the V finger and the central pocket is not found (see Fig. Table 1). Thus, out of 40 analyzed positions of indicators of the right hand, 12 of them obtained reliable differences between patients in the AR and BA.

In **young men**, patients with AR in comparison with patients with BA, on the left hand on the I finger almost 2 times more often observed an ulnar loop and there is no lateral pocket loop; on the II finger the arc dominates (2.5 times) and the central pocket is not found; on the III finger

Table 1. Distribution of type of finger patterns on the right hand in young men with allergic rhinitis, bronchial asthma and atopic dermatitis (%).

| Finger | Type of pattern | Patients with AR (n=36) (1) | Patients with BA (n=63) (2) | Patients with AD (n=64) (3) | P ₁₋₂ | P ₁₋₃ | P ₂₋₃ |
|--------|-----------------|-----------------------------|-----------------------------|-----------------------------|------------------|------------------|------------------|
| R-I | A | 0 | 17.46 | 4.69 | <0.01 | >0.05 | <0.05 |
| | L ^U | 51.52 | 39.68 | 35.94 | >0.05 | >0.05 | >0.05 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 24.24 | 3.17 | 12.50 | <0.01 | >0.05 | =0.053 |
| | CP | 0 | 19.05 | 21.88 | <0.01 | <0.01 | >0.05 |
| | LP | 0 | 12.70 | 0 | <0.05 | >0.05 | <0.01 |
| | DL | 18.18 | 7.94 | 21.88 | >0.05 | >0.05 | <0.05 |
| | RP | 0 | 0 | 3.12 | >0.05 | >0.05 | >0.05 |
| R-II | A | 30.30 | 20.63 | 25.00 | >0.05 | >0.05 | >0.05 |
| | L ^U | 18.18 | 23.81 | 25.00 | >0.05 | >0.05 | >0.05 |
| | L ^R | 15.15 | 12.73 | 9.37 | >0.05 | >0.05 | >0.05 |
| | W | 27.27 | 20.63 | 9.37 | >0.05 | <0.05 | =0.078 |
| | CP | 3.03 | 26.98 | 10.94 | <0.01 | >0.05 | <0.05 |
| | LP | 0 | 3.17 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 6.06 | 1.59 | 9.37 | >0.05 | >0.05 | =0.057 |
| | RP | 0 | 3.17 | 10.94 | >0.05 | <0.05 | =0.090 |
| R-III | A | 6.06 | 9.52 | 25.00 | >0.05 | <0.05 | <0.05 |
| | L ^U | 69.70 | 42.86 | 54.69 | <0.05 | >0.05 | >0.05 |
| | L ^R | 0 | 0 | 1.56 | >0.05 | >0.05 | >0.05 |
| | W | 18.18 | 17.46 | 7.81 | >0.05 | >0.05 | >0.05 |
| | CP | 0 | 15.87 | 6.25 | <0.05 | >0.05 | =0.086 |
| | LP | 0 | 6.35 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 3.03 | 0 | 3.12 | >0.05 | >0.05 | >0.05 |
| | RP | 3.03 | 7.94 | 1.56 | >0.05 | >0.05 | =0.093 |
| R-IV | A | 6.06 | 14.29 | 6.25 | >0.05 | >0.05 | >0.05 |
| | L ^U | 39.39 | 44.44 | 35.94 | >0.05 | >0.05 | >0.05 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 51.52 | 3.17 | 14.06 | <0.001 | <0.001 | <0.05 |
| | CP | 0 | 31.75 | 26.56 | <0.001 | <0.001 | >0.05 |
| | LP | 0 | 0 | 1.56 | >0.05 | >0.05 | >0.05 |
| | DL | 3.03 | 3.17 | 3.12 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 3.17 | 12.50 | >0.05 | <0.05 | =0.053 |
| R-V | A | 3.03 | 3.17 | 10.94 | >0.05 | >0.05 | =0.090 |
| | L ^U | 78.79 | 58.73 | 62.50 | <0.05 | =0.096 | >0.05 |
| | L ^R | 0 | 0 | 1.56 | >0.05 | >0.05 | >0.05 |
| | W | 15.15 | 3.17 | 4.69 | <0.05 | =0.074 | >0.05 |
| | CP | 0 | 28.57 | 6.25 | <0.001 | >0.05 | <0.01 |
| | LP | 0 | 4.76 | 0 | >0.05 | >0.05 | =0.080 |
| | DL | 3.03 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 1.59 | 14.06 | >0.05 | <0.05 | <0.05 |

Notes: here and thereafter, A - arc; L^U - ulnar loop; L^R - radial loop; W - whorl; CP - central pocket; LP - lateral pocket loop; DL - double loop; RP - random pattern.

Table 2. Distribution of type of finger patterns on the right hand in young women with allergic rhinitis, bronchial asthma and atopic dermatitis (%).

| Finger | Type of pattern | Patients with AR (n=33) (1) | Patients with BA (n=45) (2) | Patients with AD (n=79) (3) | P ₁₋₂ | P ₁₋₃ | P ₂₋₃ |
|--------|-----------------|-----------------------------|-----------------------------|-----------------------------|------------------|------------------|------------------|
| R-I | A | 2.78 | 11.11 | 8.86 | >0.05 | >0.05 | >0.05 |
| | L ^U | 36.11 | 6.67 | 49.37 | <0.01 | >0.05 | <0.001 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 36.11 | 4.44 | 10.13 | <0.001 | <0.01 | >0.05 |
| | CP | 5.56 | 48.89 | 11.39 | <0.001 | >0.05 | <0.001 |
| | LP | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 19.44 | 13.33 | 12.66 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 15.56 | 7.59 | <0.05 | >0.05 | >0.05 |
| R-II | A | 13.89 | 15.56 | 40.51 | >0.05 | <0.01 | <0.01 |
| | L ^U | 19.44 | 22.22 | 22.78 | >0.05 | >0.05 | >0.05 |
| | L ^R | 11.11 | 6.67 | 1.27 | >0.05 | <0.05 | >0.05 |
| | W | 38.89 | 28.89 | 10.13 | >0.05 | <0.001 | <0.01 |
| | CP | 5.56 | 22.22 | 17.72 | <0.05 | =0.095 | >0.05 |
| | LP | 0 | 6.67 | 0 | >0.05 | >0.05 | <0.05 |
| | DL | 11.11 | 4.44 | 3.80 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 0 | 3.80 | >0.05 | >0.05 | >0.05 |
| R-III | A | 11.11 | 6.67 | 24.05 | >0.05 | >0.05 | <0.05 |
| | L ^U | 44.44 | 46.67 | 51.90 | >0.05 | >0.05 | >0.05 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 30.56 | 31.11 | 3.80 | >0.05 | <0.001 | <0.001 |
| | CP | 5.56 | 13.33 | 10.13 | >0.05 | >0.05 | >0.05 |
| | LP | 2.78 | 2.22 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 5.56 | 0 | 2.53 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 0 | 7.59 | >0.05 | >0.05 | =0.061 |
| R-IV | A | 5.56 | 6.67 | 17.72 | >0.05 | =0.095 | =0.088 |
| | L ^U | 25.00 | 57.78 | 34.18 | <0.01 | >0.05 | <0.05 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 55.56 | 11.11 | 17.72 | <0.001 | <0.001 | >0.05 |
| | CP | 11.11 | 24.44 | 13.92 | >0.05 | >0.05 | >0.05 |
| | LP | 2.78 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 0 | 0 | 1.27 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 0 | 15.19 | >0.05 | <0.05 | <0.01 |
| R-V | A | 0 | 6.67 | 17.72 | >0.05 | <0.05 | =0.088 |
| | L ^U | 75.00 | 80.00 | 62.03 | >0.05 | >0.05 | <0.05 |
| | L ^R | 2.78 | 1.27 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 5.56 | 0 | 2.53 | >0.05 | >0.05 | >0.05 |
| | CP | 16.67 | 2.22 | 6.33 | <0.05 | =0.090 | >0.05 |
| | LP | 0 | 8.89 | 0 | =0.083 | >0.05 | <0.01 |
| | DL | 0 | 0 | 1.27 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 2.22 | 10.13 | >0.05 | =0.060 | >0.05 |

there no whorl; and on the IV finger - the central pocket, on this finger, usually (more than 6 times more often), a whorl

Table 3. Distribution of type of finger patterns on the left hand in young men with allergic rhinitis, bronchial asthma and atopic dermatitis (%).

| Finger | Type of pattern | Patients with AR (n=36) (1) | Patients with BA (n=63) (2) | Patients with AD (n=64) (3) | p_{1-2} | p_{1-3} | p_{2-3} |
|--------|-----------------|-----------------------------|-----------------------------|-----------------------------|-----------|-----------|-----------|
| L-I | A | 3.03 | 12.70 | 9.37 | >0.05 | >0.05 | >0.05 |
| | L ^U | 75.76 | 41.27 | 54.69 | <0.01 | <0.05 | >0.05 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 12.12 | 3.17 | 6.25 | =0.084 | >0.05 | >0.05 |
| | CP | 0 | 7.94 | 14.06 | =0.086 | <0.05 | >0.05 |
| | LP | 0 | 15.87 | 0 | <0.05 | >0.05 | <0.01 |
| | DL | 9.09 | 14.29 | 6.25 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 4.76 | 9.37 | >0.05 | =0.061 | >0.05 |
| L-II | A | 36.36 | 14.29 | 35.94 | <0.05 | >0.05 | <0.01 |
| | L ^U | 33.33 | 25.40 | 29.69 | >0.05 | >0.05 | >0.05 |
| | L ^R | 3.03 | 4.23 | 3.12 | >0.05 | >0.05 | >0.05 |
| | W | 21.21 | 25.40 | 9.37 | >0.05 | >0.05 | <0.05 |
| | CP | 0 | 22.22 | 6.25 | <0.01 | >0.05 | <0.05 |
| | LP | 0 | 3.17 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 6.06 | 6.35 | 10.94 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 3.17 | 4.69 | >0.05 | >0.05 | >0.05 |
| L-III | A | 6.06 | 6.35 | 17.19 | >0.05 | >0.05 | =0.061 |
| | L ^U | 72.73 | 58.73 | 59.38 | >0.05 | >0.05 | >0.05 |
| | L ^R | 0 | 1.11 | 1.56 | >0.05 | >0.05 | >0.05 |
| | W | 18.18 | 7.94 | 4.69 | >0.05 | <0.05 | >0.05 |
| | CP | 0 | 14.29 | 10.94 | <0.05 | <0.05 | >0.05 |
| | LP | 0 | 4.76 | 0 | >0.05 | >0.05 | =0.080 |
| | DL | 3.03 | 0 | 3.12 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 7.94 | 3.12 | =0.086 | >0.05 | >0.05 |
| L-IV | A | 6.06 | 15.87 | 4.69 | >0.05 | >0.05 | <0.05 |
| | L ^U | 57.58 | 46.03 | 45.31 | >0.05 | >0.05 | >0.05 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 30.30 | 4.76 | 7.81 | <0.001 | <0.01 | >0.05 |
| | CP | 0 | 23.81 | 20.31 | <0.01 | <0.01 | >0.05 |
| | LP | 0 | 9.52 | 0 | =0.059 | >0.05 | <0.05 |
| | DL | 3.03 | 0 | 1.56 | >0.05 | >0.05 | >0.05 |
| | RP | 3.03 | 0 | 20.31 | >0.05 | <0.05 | <0.001 |
| L-V | A | 6.06 | 0 | 6.25 | =0.051 | >0.05 | <0.05 |
| | L ^U | 78.79 | 63.49 | 68.75 | >0.05 | >0.05 | >0.05 |
| | L ^R | 0 | 1.54 | 3.12 | >0.05 | >0.05 | >0.05 |
| | W | 15.15 | 1.59 | 3.12 | <0.01 | <0.05 | >0.05 |
| | CP | 0 | 20.63 | 4.69 | <0.01 | >0.05 | <0.01 |
| | LP | 0 | 9.52 | 0 | =0.059 | >0.05 | <0.05 |
| | DL | 0 | 0 | 1.56 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 4.76 | 12.50 | >0.05 | <0.05 | >0.05 |

is placed; on the V finger, the whorl is most often located (almost 10 times more often) and the central pocket is not

Table 4. Distribution of type of finger patterns on the left hand in young women with allergic rhinitis, bronchial asthma and atopic dermatitis (%).

| Finger | Type of pattern | Patients with AR (n=33) (1) | Patients with BA (n=45) (2) | Patients with AD (n=79) (3) | p_{1-2} | p_{1-3} | p_{2-3} |
|--------|-----------------|-----------------------------|-----------------------------|-----------------------------|-----------|-----------|-----------|
| L-I | A | 22.22 | 11.11 | 10.13 | >0.05 | =0.093 | >0.05 |
| | L ^U | 44.44 | 64.44 | 55.70 | =0.083 | >0.05 | >0.05 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 13.89 | 2.22 | 2.53 | =0.052 | <0.05 | >0.05 |
| | CP | 2.78 | 15.56 | 6.33 | =0.069 | >0.05 | =0.097 |
| | LP | 2.78 | 2.22 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 13.89 | 4.44 | 18.99 | >0.05 | >0.05 | <0.05 |
| | RP | 0 | 0 | 6.33 | >0.05 | >0.05 | =0.087 |
| L-II | A | 11.11 | 0 | 40.51 | <0.05 | <0.01 | <0.001 |
| | L ^U | 33.33 | 20.00 | 24.05 | >0.05 | >0.05 | >0.05 |
| | L ^R | 8.33 | 7.68 | 5.06 | >0.05 | >0.05 | >0.05 |
| | W | 30.56 | 33.33 | 11.39 | >0.05 | <0.05 | <0.01 |
| | CP | 16.67 | 24.44 | 5.06 | >0.05 | <0.05 | <0.01 |
| | LP | 0 | 4.44 | 0 | >0.05 | >0.05 | =0.061 |
| | DL | 0 | 17.78 | 8.86 | <0.05 | =0.080 | >0.05 |
| | RP | 0 | 0 | 5.06 | >0.05 | >0.05 | >0.05 |
| L-III | A | 8.33 | 8.89 | 25.32 | >0.05 | <0.05 | <0.05 |
| | L ^U | 50.00 | 62.22 | 56.96 | >0.05 | >0.05 | >0.05 |
| | L ^R | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 22.22 | 20.00 | 3.80 | >0.05 | <0.01 | <0.01 |
| | CP | 19.44 | 0 | 6.33 | <0.05 | <0.01 | =0.087 |
| | LP | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 0 | 6.67 | 1.27 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 2.22 | 6.33 | >0.05 | >0.05 | >0.05 |
| L-IV | A | 8.33 | 15.56 | 21.52 | >0.05 | =0.098 | >0.05 |
| | L ^U | 25.00 | 44.44 | 34.18 | =0.082 | >0.05 | >0.05 |
| | L ^R | 0 | 0 | 1.27 | >0.05 | >0.05 | >0.05 |
| | W | 55.56 | 15.56 | 10.13 | <0.001 | <0.001 | >0.05 |
| | CP | 11.11 | 0 | 13.92 | <0.05 | >0.05 | <0.01 |
| | LP | 0 | 17.78 | 0 | <0.05 | >0.05 | <0.001 |
| | DL | 0 | 6.67 | 3.80 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 0 | 15.19 | >0.05 | <0.05 | <0.01 |
| L-V | A | 2.78 | 0 | 20.25 | >0.05 | <0.05 | <0.01 |
| | L ^U | 63.89 | 86.67 | 62.03 | <0.05 | >0.05 | <0.01 |
| | L ^R | 2.78 | 1.08 | 0 | >0.05 | >0.05 | >0.05 |
| | W | 22.22 | 0 | 3.80 | <0.01 | <0.01 | >0.05 |
| | CP | 8.33 | 11.11 | 10.13 | >0.05 | >0.05 | >0.05 |
| | LP | 0 | 2.22 | 0 | >0.05 | >0.05 | >0.05 |
| | DL | 0 | 0 | 0 | >0.05 | >0.05 | >0.05 |
| | RP | 0 | 0 | 3.80 | >0.05 | >0.05 | >0.05 |

found (see Table 2). Thus, out of 40 analyzed positions of indicators of the left hand, 9 of them received reliable

differences between patients in the AR and BA. In total, 80 analyzed positions of the indicators of both hands, 21 of them received significant differences between the young men, patients with AR and BA.

In **young men**, patients with AR in comparison with patients with AD, on the right hand there is no whorl on the I finger; on II finger 3 times more often there is a whorl; on the III finger 4 times less common arc; on IV finger, as a rule, a whorl is recorded (almost 4 times more often); on the V finger, a random pattern is never localized (see Table 1). Thus, out of 40 analyzed positions of indicators of the right hand, 7 of them received reliable differences between young men, patients with AR and AD.

In **young men**, patients with AR in comparison with patients with BA, on the left hand on the I finger, almost 1.4 times more often, there is an ulnar loop and the central pocket is not found; on the II finger localization of patterns without differences; on the III and IV fingers never observed the central pocket and 4 times more often the whorl is detected; on the V finger, the whorl is most often located (almost 5 times more often) and there is no random pattern (see Table 2). Thus, out of 40 analyzed positions of indicators of the left hand, 9 of them received reliable differences between patients in the AR and BA. In total of 80 analyzed positions of indicators of both hands, 16 of them received reliable differences between young men, patients with AR and AD.

In **young men**, patients with AD in comparison with patients with BA, on the right hand there is a prevalence of double loop on the I finger (3 times more often), an arc is extremely rare (4 times) and the lateral pocket loop is never found; on the II finger 2.5 times less is the central pocket; on the III finger 2.6 times the arc is more common; on IV finger, as a rule, a whorl is recorded (more than 4 times more often); on the V finger, the central pocket is 4.5 times less likely to be localized and the random pattern appears more often (almost 9 times) (see Table 1). Thus, out of 40 analyzed positions of indicators of the right hand, 8 of them received reliable differences between young men, patients with AD and BA.

In **young men**, patients with AD compared to patients with BA, on the left hand on the I finger never encounter a lateral pocket loop; on the II finger, the arc dominates (2.5 times), the whorl is less frequently (2.7 times) and the central pocket (3.6 times); on the III finger the differences were not recorded; on the IV finger, usually, a random pattern is placed, an arc rarely occurs (3.3 times) and a lateral pocket loop does not occur; on the V finger there is an arc, the central pocket is less common (4.4 times), and the lateral pocket loop is never localized (see Table 2). Thus, out of 40 analyzed positions of the indicators of the left hand, 10 of them received reliable differences between patients with AD and BA. In total of 80 analyzed positions of indicators of both hand, 18 of them received reliable differences between young men, patients with AD and BA.

In **young women**, patients with AR in comparison with

patients with BA, on the right hand on the I finger more than 8 times more often there is a whorl, 6 times - ulnar loop, extremely rare (the difference is almost 9 times) - the central pocket is found and does not occur random pattern; on the II finger rarely (difference in 4 times) the central pocket is detected; no difference was found on the III finger; on the IV finger the whorl is dominant (5 times more often), the ulnar loop is more likely to occur (2 times); the central pocket is more often located on the V finger (7.5 times more often) (see Table 3). Thus, out of 40 analyzed positions of indicators of the right hand, 8 of them obtained reliable differences between patients in the AR and BA.

In young women, patients with AR in comparison with patients with BA, on the left hand on the I finger no significant differences were found; on the II finger there is an arc and the double loop is not localized (11.11% and 0%), in contrast to patients with BA (0% and 17.78%); the central pocket appears on the III finger, and it never happens here in patients with BA; on IV finger, 3.6 times more often, a whorl is recorded, or a central pocket is detected that does not occur in patients with BA and, on the contrary, never the lateral pocket loop observed when it is present in patients with BA; a whorl is placed on the V finger (in the absence of patients with BA) and the ulnar loop is less common. Thus, out of 40 analyzed positions of indicators of the left hand, 8 of them received reliable differences between patients in the AR and BA (see Table 4). In total, 80 analyzed positions of indicators of both hands, 16 of them received reliable differences between young women, patients with AR and BA.

In **young women**, patients with AR in comparison with patients with AD, on the right hand on the I finger 3.6 times more often localized whorl; on the II finger 3 times more often there is a whorl and 3 times less arc; on a III finger 8 times more often there is a whorl; on IV finger, as a rule, a whorl is recorded (3 times more often) and there is no accidental pattern; on the V finger never observed an arc (see Table 3). Thus, out of 40 analyzed positions of indicators of the right hand, in 7 of them, there were significant differences between young women, patients with AR and AD.

In **young women**, patients with AR in comparison with patients with AD, on the left hand on I finger whorl is 5.5 times more likely to be encountered; on the II finger, the whorl and the central pocket (2.7 and 3.3 times respectively) and 3.6 times less often - arc are localized; on the III finger, the whorls and central pockets (5.8 and 3.1 times, respectively) are localized and 3 times less often - the arc; on the IV finger, the random pattern is never localized and the whorl is detected 5.5 times more often; whorls are often placed on the V finger (5.8 times more often) and the arch is less common (7 times) (see Table 4). Thus, out of 40 analyzed positions of indicators of the left hand, 11 of them received reliable differences between patients in the AR and AD. In total of 80 analyzed positions of indicators of both hands, 18 of them received reliable differences between young women, patients with AR and AD.

In **young women**, patients with AD, in comparison with patients with BA, the ulnar loop (7 times more often) and the central pocket (4 times) are more common on the right hand on the I finger; on the II finger, the arch is registered 2.6 times more often and almost 3 times less often - whorl and never a lateral pocket loop; on the III finger - 3.6 times arc is more often encountered and 8 times less frequently - a whorl; on the IV finger a random pattern appears, unlike patients with BA, in which it never localizes on this finger and less often the ulnar loop (1.7 times); on the V finger, the ulnar loop is detected (in patients with asthma, it never locates on this finger), and never, unlike BA patients, the lateral pocket loop does not appear (see Table 3). Thus, out of 40 analyzed positions of indicators of the right hand, by 11 of them received reliable differences between patients with AD and BA.

In **young women**, patients with AD compared to patients with BA, on the left hand on the I finger dominates the double loop (4.3 times more often); on the II finger often observed arc (in patients with BA is not localized), rarely there is a whorl and central pockets (in 3 and 4.8 times respectively); on the III finger also the arc dominates (2.8 times) and the whorl is less common (5 times); a central pocket and a random pattern are recorded on the IV finger (in patients with BA they never localize on this finger) and the lateral pocket loop is not detected (in patients with BA is detected); on the V finger is observed an arc (in patients with asthma is not detected), rarely, the ulnar loop is observed (1.4 times) (see Table 4). Thus, out of 40 analyzed positions of indicators of the left hand, 11 of them received reliable differences between patients with AD and BA. In total, 80 analyzed positions of indicators of both hands, by 22 of them received reliable differences between young women, patients with AD and BA.

Discussion

In studies of a number of authors, by comparing the qualitative indexes of digital dermatoglyphics of healthy and sick people, associations of an atopic phenotype with typological features of papillary skin have been established. Gara A. V. and others [7] shows that the dermatoglyphic picture of patients with AD is characterized by simplicity of finger patterns with predominance of arches and random patterns. Work of Gunas I. V. and others [9] shows that dermatotype of adolescents with BA, is characterized by a reduced frequency of ulnar loops and increased - lateral pocket loops. The associative association of AR with signs of dermatoglyphics manifests itself in deviations in the frequency and localization of whorls, central pockets, ulnar loops and arches both in young men and in young women [2].

The results of our study showed that finger dermatoglyphics in young men, patients with AD, AR and BA, in the first place, differ in frequency and localization of whorls, central pockets and arches. Additionally, patients with AR differ from patients both with BA and AD by frequency and localization of the ulnar loop. Patients with BA are additionally

different from patients with AR and AD in frequency and localization of the lateral pocket loop. Patients with AD are additionally different from patients with BA and AR in frequency and localization of random patterns. The share of these differences is about a quarter of all the analyzed indicators. The greatest number of differences was found when comparing qualitative indicators of digital dermatoglyphics in young men, patients with AR and BA (26.25%), the smallest - patients with AR and AD (20.0%), the differences between patients with AD and BA cover 22.5% of all analyzed. It should be noted that when comparing the dermatoglyphics of patients with AR and BA, more differences were found on the fingers of the right hand compared with the left (30.0% versus 22.5%). On the contrary, when comparing dermatoglyphics of patients with AD with dermatoglyphics of patients with AR and BA, more differences were found on the fingers of the left hand compared to the right (22.5% vs. 17.5% and 25.0% vs. 20.0% respectively).

Finger dermatoglyphics of young women, patients with AD, AR and BA, in the first place, differ in frequency and localization of whorls, central pockets, arches and random patterns. Additionally, patients with asthma differ from patients both in AR, and AD in frequency and localization of ulnar loops, lateral pocket loops and double loops. In young women, as in young men, the part of these differences is also about a quarter of all analyzed indicators. However, the greatest number of differences was found when comparing qualitative indicators of digital dermatoglyphics in young women, patients with AD and BA (27.5%), the smallest - patients with AR and BA (20.0%), the differences between patients with AD and AR cover 22.5% of all analyzed. It should be noted that when comparing dermatoglyphics of patients with AR and AD, more differences were found on the fingers of the left hand compared to the right (27.5% versus 15.5%). The same number of differences is found on the fingers of both the left and right hand when comparing young women, patients with BA and AR, as well as - BA and AD (by 20.0% and 27.5% respectively).

The presence of a general trend of changes in digital dermatoglyphics when comparing the differences between patients with AD, BA and AR (in young men: whorl, central pocket and arc; in young women: whorl, central pocket, arc and random pattern) indicates the common "roots" of the formation of atopic phenotype, additional differences found (in young men: when comparing AR and with BA, and with AD - ulnar loop; when comparing BA with and with AR, and with AD - lateral pocket loop; when comparing AD and with BA, and with AR - random pattern; in young women: when comparing BA with and with AR, and with AD - ulnar loop, lateral pocket loop and double loop) indicate the pathogenetic heterogeneity of atopic diseases.

Detected associations of atopic diseases with typological peculiarities of papillary skin of sick young men and young women can be used as marker signs of probability in the further launch of the "atopic march".

Conclusions

1. Differences in qualitative signs of digital dermatoglyphics between young men, patients with AD, BA and AR, are observed by the frequency and localization of whorl, central pocket and arch, in addition when comparing patients with allergic rhinitis with patients with bronchial asthma and atopic dermatitis - ulnar loop, with comparison of patients with bronchial asthma with allergic rhinitis and atopic dermatitis - lateral pocket loop; when comparing

patients with atopic dermatitis with patients with bronchial asthma, and allergic rhinitis - a random pattern.

2. Differences in qualitative signs of digital dermatoglyphics between young women, patients with AD, BA and AR, are observed by the frequency and localization of whorl, central pocket, arch and random pattern, in addition when comparing patients with bronchial asthma with patients with allergic rhinitis and atopic dermatitis - ulnar, lateral pocket and double loops.

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ЯКІСНІ ОЗНАКИ ПАЛЬЦЕВОЇ ДЕРМАТОГЛІФІКИ ЯК МАРКЕРИ ЗАХВОРЮВАНЬ АТОПІЧНОЇ ПРИРОДИ

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Правомірність застосування методу дерматогліфіки у вивченні atopічних захворювань забезпечується полігенністю успадкування ознак дерматогліфіки, з одного боку і патогенетичною гетерогенністю даних захворювань, з іншого боку, а також високою інформативною здатністю ознак дерматогліфіки як маркерів захворювань спадкової та мультифакторіальної природи. Мета дослідження - виявити розбіжності якісних ознак пальцевої дерматогліфіки між хворими на atopічний дерматит, алергічний риніт та бронхіальну астму. Первинні показники пальцевої дерматогліфіки хворих юнаків і дівчат Подільського регіону взяті з банку даних науково-дослідного центру Вінницького національного медичного університету ім. М. І. Пирогова та були використані в попередніх дослідженнях при порівнянні з практично здоровим населенням даного регіону. Відбитки отримані методом "типографської фарби" за Гладковою Т. Д. За методикою Cummins H. і Midlo Ch. проведено дерматогліфічне дослідження 320 юнаків і дівчат, хворих на алергічний риніт (n=69), бронхіальну астму (n=108) та atopічний дерматит (n=143). Аналізу підлягали частота та локалізація 8 типів пальцевих візерунків. Статистична обробка отриманих результатів проведена в пакеті "Statistica 6.1" з використанням непараметричних методів. Достовірність різниці значень між незалежними якісними величинами визначали за формулою Weber E. (1961). Встановлена специфіка пальцевої типології atopічних захворювань, яка полягає у відмінностях за частотою і локалізацією завитка, центральної кишені і дуги між юнаками, крім зазначених - випадкового візерунку між дівчатами, хворими на atopічний дерматит, бронхіальну астму, алергічний риніт. Додатково при порівнянні юнаків, хворих на алергічний риніт з хворими на бронхіальну астму і atopічний дерматит - ульнарної петлі; на бронхіальну астму з хворими на алергічний риніт і atopічний дерматит - латеральної кишенькової петлі (у юнаків) та ульнарної, латеральної кишенькової та подвійної петель (у дівчат); при порівнянні юнаків, хворих на atopічний дерматит з хворими на бронхіальну астму, і алергічний риніт - випадкового візерунка.

Ключові слова: типи пальцевих візерунків, atopічний дерматит, бронхіальна астма, алергічний риніт.

КАЧЕСТВЕННЫЕ ПРИЗНАКИ ПАЛЬЦЕВОЙ ДЕРМАТОГЛИФИКИ КАК МАРКЕРЫ ЗАБОЛЕВАНИЙ АТОПИЧЕСКОЙ ПРИРОДЫ

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Правомерность применения метода дерматоглифики в изучении atopических заболеваний обеспечивается полигенностью наследования признаков дерматоглифики, с одной стороны и патогенетической гетерогенностью данных заболеваний, с другой стороны, а также высокой информативной способностью признаков дерматоглифики как маркеров заболеваний наследственной и мультифакториальной природы. Цель исследования - выявить различия качественных признаков пальцевой дерматоглифики между больными atopическим дерматитом, аллергическим ринитом и бронхиальной астмой. Первичные показатели пальцевой дерматоглифики больных юношей и девушек Подольского региона взяты из банка данных научно-исследовательского центра Винницкого национального медицинского университета им. Н. И. Пирогова и были использованы в предыдущих исследованиях при сравнении с практически здоровым населением данного региона. Отпечатки получены методом "типографской краски" по Гладковой Т. Д. По методике Cummins H. и Midlo Ch. проведено дерматоглифическое исследование 320 юношей и девушек, больных аллергическим ринитом (n=69), бронхиальной астмой (n=108) и atopическим дерматитом (n=143). Анализ подлежали частота и локализация 8 типов пальцевых узоров. Статистическая обработка полученных результатов проведена в пакете "Statistica 6.1" с использованием непараметрических методов. Достоверность различий значений между независимыми качественными величинами определяли по формуле Weber E. (1961). Установлена специфика пальцевой типологии atopических заболеваний, которая заключается в различиях по частоте и локализации завитка, центрального кармана и дуги между юношами, кроме указанных - случайного узора между девушками, больными atopическим дерматитом, бронхиальной астмой, аллергическим ринитом. Дополнительно при сравнении юношей, больных аллергическим ринитом с больными бронхиальной астмой и atopическим дерматитом - ульнарной петли; бронхиальной астмой с больными аллергическим ринитом и atopическим дерматитом - латеральной карманной петли (у юношей) и ульнарной, латеральной карманной и двойной петель (у девушек), при сравнении юношей, больных atopическим дерматитом с больными бронхиальной астмой, и аллергическим ринитом - случайного узора.

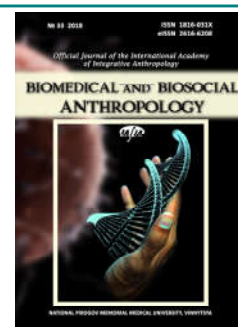
Ключевые слова: типы пальцевых узоров, atopический дерматит, бронхиальная астма, аллергический ринит.



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Indicators of subjective control level of pupils and students of modern education institutions of different types

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In-depth study of criterial characteristics of the level of subjective control, establishment of the leading tendencies of their changes in the dynamics of the time of training, the implementation of clearly defined features of the organization of the educational process of comparative evaluation of the tendencies of the changes, depending on the type of institution of education, how to determine the individual features of the location of the locus of subjective control in accordance with the nature of the course of situations caused by the influence of educationally significant factors, and to predict the changes in the stereotype of educationally-determined actions that will take place in the future. The purpose of the work is to carry out a comprehensive physiological and hygienic assessment of the indicators of the level of subjective control of the personality of pupils and students of modern educational institutions of different types. The research, which included the definition of indicators of the level of subjective control of pupil and student youth (300 pupils and students), based on the use of the personal questionnaire of Rotter, was conducted on the basis of five educational institutions in Ivano-Frankivsk. The prognostic evaluation of the data obtained involves the use of descriptive statistics procedures using the licensed standardized application package of multivariate statistical analysis "Statistica 6.1 for Windows" (license number BXXR901E245722FA). The results of the conducted research testify to the significant advantage among pupils and students of modern educational institutions of various types of external manifestations in the personal sphere. In assessing the indicators of the level of subjective control of the identity of pupils and students of educational institutions of various types, it should be noted their extremely stable character, with the lowest degree of expression was inherent in indicators of the level of subjective control over the characteristics of the general internality, as well as in the field of educational relations and in sectors of failures. In most cases were no gender-related differences ($p(t)b-g > 0.05$) and statistically significant differences between representatives of individual educational institutions ($p(t) > 0.05$). It should also be noted that during the entire observation period, significantly higher values of the level of subjective control in the field of failures was in young men in all educational institutions that were subject to study were noted. The given data should be further considered as diagnostic (development of methods for the integrated assessment of the state of adaptive resources of the body of boys and girls), as well as in the preventive (introduction of effective health-saving technologies and measures of psychophysiological effects on the body and psycho-hygienic correction of existing changes in the functional state of the organism) sense.

Keywords: pupils, students, modern institutions of education of different types, level of subjective control, comparative evaluation.

Introduction

The issue of prevention and prophylaxis the adverse impact of the learning environment on the functional state and adaptive capacity of the body of pupils and students at

the present stage of development of the education system is one of the priority directions of modern preventive medicine [3, 20, 23, 24, 25]. Therefore, solving the problems

associated with the objective identification of the leading trends in development and the formation of individual correlates of the functional capabilities and personality traits of young men and young women is an urgent issue of modern medical science and practice in the context of the introduction of effective health-saving technologies in the educational process of educational institutions of different types [4, 5, 9, 12, 13, 16].

That is why, considering issues aimed at adequate scientific support of the socio-psychological, psychophysiological and psychological support of the processes of effective implementation of educational activity of pupils and students, particular attention should be paid to the peculiarities of the development processes of individual psychophysiological functions and personality traits, including processes the formation of criterion indicators of the level of subjective control (LSC), which clearly and specifically mark the various personality-significant indications the location of the so-called locus of control (internality - externality) in relation to the events and situations inherent in the time of obtaining a specialty in modern educational institutions of different types [20, 23, 24, 27, 29]. First of all, due to the fact that the LSC is a person's significant ability to control one's own behavior, to develop their own behavioral strategies, based on the need to take or not to take responsibility for events occurring both directly with and around it, is characteristic, which determines the level of human autonomy and the degree of its activity in achieving specific person-significant problems [1, 2, 6, 7, 8, 14, 15, 17, 26, 28, 30].

The *purpose* of the work is to carry out a comprehensive physiological and hygienic assessment of the indicators of the level of subjective control of the personality of pupils and students of modern educational institutions of different types.

Materials and methods

The research, which included the definition of LSC indicators for the pupils and students (300 pupils and students, including 150 young women and 150 young men), was conducted on the basis of five educational institutions in Ivano-Frankivsk, namely: Ivano-Frankivsk school (lyceum boarding school) for gifted children from rural areas, Ivano-Frankivsk professional lyceum of motor transport and construction № 15, Ivano-Frankivsk music school named after Denis Sichynsky, Ivano-Frankivsk financial and commercial cooperative college named after S. Granat and Vasyl Stefanyk Precarpathian National University.

The evaluation of the leading characteristics of the LSC, including the indicators of general internality and indicators of the level of subjective control in the field of achievements and failures, family, educational and interpersonal relations, as well as in the field of treatment of health and illness, included the use of personal questionnaire by Rotter [21].

The prognostic evaluation of the data obtained involves the use of descriptive statistics procedures based on the application of the licensed standardized application package

of multivariate statistical analysis "Statistica 6.1 for Windows" (license number BXXR901E245722FA).

Results

In assessing the results of the study, first of all, it should be noted that the significance of the characteristics of signs that determined the level of general internality of LSC and, as a consequence, the value of general personal control over all significant at a particular stage of the survey by circumstances, amounted to 4.274 ± 0.183 points in young men and 3.432 ± 0.191 points ($p(t)_{ym-yw} < 0.05$) for young women enrolled in the university (hereafter - young men and young women from university), 4.033 ± 0.185 points for young men and 3.834 ± 0.201 points ($p(t)_{ym-yw} > 0.05$) for young women who study in college (hereinafter - young men and young women from college), 4.000 ± 0.161 points in young men and 3.602 ± 0.195 points ($p(t)_{ym-yw} > 0.05$) for young women in specialized school (hereafter - young men and young women from specialized school), 3.805 ± 0.184 points in young men and 3.635 ± 0.217 points ($p(t)_{ym-yw} > 0.05$) for young women enrolled in the lyceum (further - young men and young women of lyceum), as well as 4.202 ± 0.206 points in young men and 3.571 ± 0.193 points ($p(t)_{ym-yw} > 0.05$) for young women who are in school (hereafter - young men and young women from school) (Table 1).

The largest indicators of the overall internality of the LSC, which indicate the presence of such a phenomenon as the high degree of individual responsibility of pupils and students for achieving a certain level of academic performance, were recorded in young men from university and young women from college, the lowest - in young men from lyceum and young women from university. The gender differences between the two groups were observed only among the young men and young women from university ($p(t)_{ym-yw} < 0.05$); results typical for young men exceeding the similar results that are characteristic of young women. There were no statistically significant differences between representatives of separate educational institutions ($p(t) > 0.05$).

In the process of conducting a psycho-hygienic assessment of the values of the LSC in the field of achievements, the leading feature of which is the implementation of adequate control of the individual over all the important positive and emotional events that occur under certain conditions, the following values are set: 5.472 ± 0.326 points for young men and 5.274 ± 0.256 points ($p(t)_{ym-yw} > 0.05$) for young women from university, 5.234 ± 0.364 points for young men and 5.101 ± 0.285 points for young women ($p(t)_{ym-yw} > 0.05$) from college, 5.335 ± 0.351 for young men and 5.372 ± 0.256 points ($p(t)_{ym-yw} > 0.05$) for young women from specialized school, 5.507 ± 0.302 points in young men and 5.105 ± 0.285 points ($p(t)_{ym-yw} > 0.05$) in young women from lyceum and 5.371 ± 0.338 points for young men and 5.133 ± 0.266 points ($p(t)_{ym-yw} > 0.05$) in young women from schools.

The highest values in terms of the degree of manifestation of the values of the LSC in the field of achievements, which

Table 1. Indicators of the level of subjective control of the personality of pupils and students of modern educational institutions of different types based on the results of the personal questionnaire of Rotter (points).

| Types of subjective control | Educational institution | Groups of pupils and students | | | | p(t) _{ym-yw} |
|---|-------------------------|-------------------------------|-------------|-------------|-------------|-----------------------|
| | | Young men | | Young women | | |
| | | N | M±m | n | M±m | |
| General internality | University | 30 | 4.274±0.183 | 30 | 3.432±0.191 | <0.05 |
| | College | 30 | 4.033±0.185 | 30 | 3.834±0.201 | >0.05 |
| | Specialized school | 30 | 4.000±0.161 | 30 | 3.602±0.195 | >0.05 |
| | Lyceum | 30 | 3.805±0.184 | 30 | 3.653±0.217 | >0.05 |
| | School | 30 | 4.202±0.206 | 30 | 3.571±0.193 | >0.05 |
| In the field of achievements | University | 30 | 5.472±0.326 | 30 | 5.274±0.256 | >0.05 |
| | College | 30 | 5.234±0.364 | 30 | 5.101±0.285 | >0.05 |
| | Specialized school | 30 | 5.335±0.351 | 30 | 5.372±0.256 | >0.05 |
| | Lyceum | 30 | 5.507±0.302 | 30 | 5.105±0.285 | >0.05 |
| | School | 30 | 5.371±0.338 | 30 | 5.133±0.266 | >0.05 |
| In the field of failures | University | 30 | 4.273±0.225 | 30 | 3.832±0.212 | >0.05 |
| | College | 30 | 4.204±0.286 | 30 | 3.971±0.249 | >0.05 |
| | Specialized school | 30 | 4.173±0.251 | 30 | 3.771±0.236 | >0.05 |
| | Lyceum | 30 | 4.106±0.268 | 30 | 3.873±0.277 | <0.05 |
| | School | 30 | 4.300±0.234 | 30 | 3.872±0.228 | >0.05 |
| In the field of family relations | University | 30 | 5.404±0.283 | 30 | 5.174±0.314 | >0.05 |
| | College | 30 | 5.207±0.296 | 30 | 5.405±0.377 | >0.05 |
| | Specialized school | 30 | 5.231±0.242 | 30 | 5.371±0.328 | >0,05 |
| | Lyceum | 30 | 5.433±0.294 | 30 | 4.772±0.333 | >0.05 |
| | School | 30 | 5.135±0.235 | 30 | 5.502±0.293 | >0.05 |
| In the field of educational relations | University | 30 | 4.103±0.234 | 30 | 3.305±0.200 | >0.05 |
| | College | 30 | 3.705±0.244 | 30 | 3.405±0.207 | >0.05 |
| | Specialized school | 30 | 4.035±0,257 | 30 | 3.273±0.191 | >0.05 |
| | Lyceum | 30 | 3.933±0.288 | 30 | 3.472±0.216 | >0.05 |
| | School | 30 | 3.805±0.226 | 30 | 3.403±0.205 | >0.05 |
| In the field of interpersonal relations | University | 30 | 5.703±0.274 | 30 | 5.176±0.282 | >0.05 |
| | College | 30 | 5.772±0.276 | 30 | 5.671±0.318 | >0.05 |
| | Specialized school | 30 | 5.973±0.285 | 30 | 5.404±0.267 | >0.05 |
| | Lyceum | 30 | 5.571±0.235 | 30 | 5.174±0.235 | >0.05 |
| | School | 30 | 5.831±0.296 | 30 | 5.533±0.285 | >0.05 |
| In the field of health and disease | University | 30 | 5.604±0.315 | 30 | 5.405±0.267 | >0.05 |
| | College | 30 | 5.535±0.328 | 30 | 5.203±0.272 | >0.05 |
| | Specialized school | 30 | 5.63 ±0.284 | 30 | 5.235±0.246 | >0.05 |
| | Lyceum | 30 | 5.302±0.355 | 30 | 4.875±0.324 | >0.05 |
| | School | 30 | 5.406±0.294 | 30 | 5.106±0.278 | >0.05 |

allowed to reveal the highest degrees of internal manifestations, were recorded among the young men from lyceum and young women from specialized school, the lowest values were observed among young men from college, as well as young women from college and lyceums.

There were no statistically significant differences between the representatives of separate educational institutions ($p(t) > 0.05$) and gender-related differences among the surveyed categories ($p(t)_{ym-yw} > 0.05$). Particular attention is drawn to the fact that the magnitude of the studied quantities

among pupils and students of all types of modern educational institutions was higher among young men.

As even more immaterial, it was necessary to measure the results that noted the manifestations of LSC in the field of failures, which mark the individual's ability to control emotionally significant life events of negative content. Indicators of their degree of expression were 4.273 ± 0.225 points in young men and 3.832 ± 0.212 points ($p(t)_{ym-yw} > 0.05$) in young women from university, 4.204 ± 0.286 points in young men and 3.971 ± 0.249 points ($p(t)_{ym-yw} > 0.05$) for young women from college, 4.173 ± 0.251 points for young men and 3.771 ± 0.236 points for young women ($p(t)_{ym-yw} > 0.05$) from specialized school, 4.106 ± 0.268 points for young men and 3.873 ± 0.277 points for young women ($p(t)_{ym-yw} > 0.05$) from lyceum, as well as 4.300 ± 0.234 points for young men and 3.872 ± 0.228 points ($p(t)_{ym-yw} > 0.05$) for young women from school.

The highest rates of LSC indicators in the field of failures, which are indicative of the degree of personal responsibility of pupils and students for solving the inconvenient for them, mostly conflicts, situations in the daily living environment were more common to young men from school and young women from college, the lowest rates were characteristic of young men of the lyceum and young women of the university. There were no gender-related discrepancies among the surveyed categories ($p(t)_{ym-yw} > 0.05$) and statistically significant differences between the representatives of separate educational institutions ($p(t) > 0.05$). Throughout the observation period, significantly higher values of LSC indicators in the field of failure were noted in young men of all educational institutions of various types that were subject to research.

The data of estimations of LSC values in the field of family relations, which reveal the presence of attempts by pupils and students to take responsibility for their actions and behavior or to divert them to other responsibilities for the events occurring in their lives, were characterized by the following values: 5.404 ± 0.283 points in young men and 5.174 ± 0.314 points ($p(t)_{ym-yw} > 0.05$) for young women from university, 5.207 ± 0.296 points in young men and 5.405 ± 0.377 points ($p(t)_{ym-yw} > 0.05$) in young women from college, 5.231 ± 0.242 points in of young men and 5.371 ± 0.328 points ($p(t)_{ym-yw} > 0.05$) in young women from specialized school, 5.433 ± 0.294 points in young men and 4.772 ± 0.333 points ($p(t)_{ym-yw} > 0.05$) in young women from lyceum, 5.135 ± 0.235 points in young men and 5.502 ± 0.293 points ($p(t)_{ym-yw} > 0.05$) in young women from schools.

The highest values of the LSC indicators in the field of family relations, which characterized its internal degree of manifestation, were recorded among the young men of the lyceum and young women of the school, the lowest among the young men of the school and young women of the lyceum. There were no statistically significant differences between the representatives of separate educational institutions ($p(t) > 0.05$) and gender-related differences among the surveyed categories ($p(t)_{ym-yw} > 0.05$).

By conducting a psycho-hygienic assessment of the values of the LSC among pupils and students, it is extremely important to consider the focus on such an indicator as the value of the LSC in the field of educational relations, in assessing which the leading indicators of the ratio of studied young men and young women for the performance of tasks in educational activities are determined, and the level is determined their responsibility for the results obtained. The results of the above-mentioned researches were noted by the presence of the following values of the studied indicators, namely: 4.103 ± 0.234 points in young men and 3.305 ± 0.200 points ($p(t)_{ym-yw} > 0.05$) in young women of the university, 3.705 ± 0.244 points in young men and 3.405 ± 0.207 points ($p(t)_{ym-yw} > 0.05$) for young women from college, 4.035 ± 0.257 points for young men and 3.273 ± 0.191 points ($p(t)_{ym-yw} > 0.05$) for young women from specialized school, 3.933 ± 0.288 points for young men and 3.472 ± 0.216 points ($p(t)_{ym-yw} > 0.05$) for young women of the lyceum, 3.805 ± 0.226 points for young men and 3.403 ± 0.205 points ($p(t)_{ym-yw} > 0.05$) for young women from school.

It is necessary to draw attention to the fact that, unfortunately, the level of manifestation of internals in terms of the characteristics that were researched in the evaluation of the LSC in the field of educational relations was one of the smallest among all the studied variables. Moreover, higher values of the values of indicators were observed among young people in all educational institutions of different types without exception. There were no gender-related discrepancies among the surveyed categories ($p(t)_{ym-yw} > 0.05$) and statistically significant differences between the representatives of separate educational institutions ($p(t) > 0.05$).

Indicators obtained in the study of LSC values in the field of interpersonal relations are usually characterized as one of the most interned and those that provide an adequate assessment of the leading characteristics of the behavior of pupils and students in the form of formal or informal relationships with their peers. Thus, the degree of manifestation of the criterial values of their indicators was 5.703 ± 0.274 points in young men and 5.176 ± 0.282 points ($p(t)_{ym-yw} > 0.05$) in young women of the university, 5.772 ± 0.276 points in young men and 5.671 ± 0.318 points ($p(t)_{ym-yw} > 0.05$) for young women from college, 5.973 ± 0.285 points in young men and 5.404 ± 0.267 points ($p(t)_{ym-yw} > 0.05$) in young women from specialized school, 5.571 ± 0.235 points in young men and 5.174 ± 0.235 points ($p(t)_{ym-yw} > 0.05$) in young women of the lyceum, as well as 5.831 ± 0.296 points in young men and 5.533 ± 0.285 points ($p(t)_{ym-yw} > 0.05$) in young women from school.

The highest values of the LSC indicators in the field of interpersonal relations, which marked the internal degree of its manifestation and were found in the young men from specialized school and young women from college, the lowest values in young men from school and young women from university and lyceum. There were no statistically significant differences between the representatives of separate educational institutions ($p(t) > 0.05$) and gender-

related differences among the surveyed categories ($p(t)_{ym-yw} > 0.05$). However, the degree of manifestation of LSC indicators in the field of interpersonal relations was higher among young men than among young women in all study groups.

One of the most significant features of the overall structure of personalized subjective control of personality is the LSC in the area of human attitude to their own health and illness, which allows one to determine the characteristic features or inclination of an individual to perceive responsibility for his or her health or to assume full responsibility for his or her own condition health solely on the experience and actions of doctors. The obtained values are characterized by the following values among the studied categories of young people, amounting respectively 5.604 ± 0.315 points to young men and 5.405 ± 0.267 points ($p(t)_{ym-yw} > 0.05$) for young women of the university, 5.535 ± 0.328 points for young men and 5.203 ± 0.272 points ($p(t)_{ym-yw} > 0.05$) for young women from college, 5.631 ± 0.284 points in young men and 5.235 ± 0.246 points ($p(t)_{ym-yw} > 0.05$) in young women from specialized school, 5.302 ± 0.355 points in young men and 4.875 ± 0.324 points ($p(t)_{ym-yw} > 0.05$) for young women from lyceum, as well as 5.406 ± 0.294 points for young men and 5.106 ± 0.278 points ($p(t)_{ym-yw} > 0.05$) for young women from school.

The highest values of the studied values were observed among the young men from specialized school and the young women from university, the smallest - among the young men and young women from lyceum. There were no gender-related discrepancies among the surveyed categories ($p(t)_{ym-yw} > 0.05$) and statistically significant differences between the representatives of separate educational institutions ($p(t) > 0.05$). However, higher values of the values of the studied indicators in all types of modern educational institutions were recorded among young men.

Discussion

In-depth study of criterion characteristics of the LSC on the scale of externality-internality, establishment of the leading tendencies of their changes in the dynamics of training time, the implementation of clearly defined features of the organization of the educational process of comparative assessment of the tendencies of the changes, depending on the type of institution of education, allow how to determine the individual features of the location of the subjective control locus, respectively to the nature of the situation caused by the influence of national-ethnic, social, professional and educational factors, and predict changes in the stereotype of educationally predetermined actions that will take place in the future [1, 2, 6, 7, 8, 14, 15, 17, 20, 26, 27, 28, 29, 30].

The results obtained during the research showed a significant advantage among the persons belonging to the groups of comparison, external manifestations in the personal sphere and, consequently, the presence of numerous personally-conditioned manifestations of inadequate level of subjective control over any social and

educational-significant situations, which arose during the time spent by pupils and students in educational establishments, due to the belief that the overwhelming majority of the events that are taking place, as well as the actions that are being carried out, are direct result of impact or people around them, or acts of random phenomena, and not the result of their own activities. The above results are consistent with the data obtained in recent years in a number of studies conducted and determine the urgent need to take into account the peculiarities of the formation of the LSC in the development of health-saving technologies, which create the prerequisites for adequate stay in educational institutions for pupils and students, solve the issues of rational organization of educational and extracurricular activities of young men and young women with the obligatory consideration of age-sexual, functional, individual-typological, adaptation-significant features of their body and personality, providing a stable and complete compliance training and physical activity opportunities of subjects of education, etc. [10, 11, 18, 19, 20, 22, 23, 24, 25].

At the same time, it should be noted that during the assessment of the LSC indicators of the personality of pupils and students of educational institutions of various types it should be noted extremely stable character, with the slightest degree of their expression was inherent in the indicators of the LSC on the characteristics of general internality, as well as in the field of educational relations and in the field of failures. There were no gender-related differences ($p(t)_{ym-yw} > 0.05$) and statistically significant differences between the representatives of individual educational institutions ($p(t) > 0.05$). One could not ignore the fact that during the whole observation period, significantly higher values of LSC indicators in the area of failure in young men were noted in all educational institutions of various types that were subject to research. It is these provisions that should be further taken into account both in the diagnostic (the development of methods for assessing the state of the adaptive resources of the body of young men and young women) and in the preventive (introduction of effective health-saving technologies and measures of psycho-physiological influence on the body and psycho-hygienic correction of the changes in the functional state of the organism) sense.

Conclusions

1. The results of the conducted research testify to the significant advantage among pupils and students of the modern educational institutions of different types of external manifestations in the personal sphere and, consequently, the presence of numerous personally-conditioned manifestations of inadequate level of subjective control over any social and educational-significant situations, arising during the period due to the belief that the overwhelming majority of the events that occur as well as the actions that are carried out are the direct result of the influence of or the surrounding people, or the effects of random phenomena, and not as a consequence of their own activities.

2. When assessing LSC indicators of pupils and student's personality of educational institutions of different types should be noted extremely stable, with the lowest degree of expression they were characteristic of LSC indicators on the characteristics of general internality, as well as in the field of educational relations and in the field of failures. Gender-related differences $(p(t)_{ym-yw} > 0.05)$ as well as statistically significant differences between representatives of individual educational institutions $(p(t) > 0.05)$ were not found in the vast majority of cases. One could not ignore the fact that during the entire observation

period, higher values of LSC indicators in the field of young men failure were noted in all educational institutions of various types that were subject to research.

3. The given data should be further taken into account as a diagnostic (development of methods for the integrated assessment of the state of adaptive resources of the body of young men and young women), as well as in the preventive (introduction of effective health-saving technologies and measures of psycho-physiological effects on the body and psycho-hygienic correction of existing changes in the functional state of organism) sense.

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ПОКАЗНИКИ РІВНЯ СУБ'ЄКТИВНОГО КОНТРОЛЮ УЧНІВ ТА СТУДЕНТІВ СУЧАСНИХ ЗАКЛАДІВ ОСВІТИ РІЗНИХ ТИПІВ

Тимошук О. В., Школьников В. С., Гжегоцький М.Р., Марчук І. А., Козань Н. М.

Поглиблене вивчення критеріальних характеристик рівня суб'єктивного контролю, встановлення провідних тенденцій їх змін в динаміці часу навчання, здійснення чітко окресленої особливостями організації навчального процесу порівняльної оцінки тенденцій зрушень залежно від типу закладу освіти дозволяють як визначити індивідуальні особливості розташування локусу суб'єктивного контролю відповідно до характеру перебігу ситуацій, зумовлених впливом навчально-значущих чинників, так і прогнозувати зміни стереотипу навчально-зумовлених дій, котрі складатимуться в майбутньому. Мета роботи - здійснення комплексної фізіолого-гігієнічної оцінки показників рівня суб'єктивного контролю особистості учнів та студентів, які перебувають в умовах сучасних закладів освіти різних типів. Дослідження, що передбачали визначення показників рівня суб'єктивного контролю учнівської та студентської молоді (300 учнів і студентів), на підставі використання особистісного опитувальника Роттера, проводились на базі п'ятих освітніх закладів м. Івано-Франківська. Прогностична оцінка одержаних даних передбачала використання процедур описової статистики із використанням ліцензійного стандартизованого пакету прикладних програм багатовимірної статистичного аналізу "Statistica 6.1 for Windows" (ліцензійний № BXXR901E245722FA). Результати проведених досліджень засвідчують суттєву перевагу серед учнів і студентів сучасних закладів освіти різних типів екстернальних проявів в особистісній сфері. Під час оцінки показників рівня суб'єктивного контролю особистості учнів та студентів закладів освіти різних типів слід відзначити їх надзвичайно стабільний характер, причому найменший ступінь вираження був властивий для показників рівня суб'єктивного контролю за характеристиками загальної інтернальності, а також в галузі навчальних відносин та в галузі невдач. Як статевозумовлених розбіжностей ($p(t)_{\alpha} > 0,05$), так і статистично-значущих відмінностей між представниками окремих закладів освіти ($p(t) > 0,05$) у переважній більшості випадків виявлено не було. Необхідно відзначити і той факт, що впродовж усього періоду спостережень відмічались вищі значення показників рівня суб'єктивного контролю у галузі невдач серед юнаків в усіх закладах освіти, які підлягали дослідженню. Наведені дані повинні в подальшому урахувуватися як у діагностичному (розроблення методик комплексної оцінки стану адаптаційних ресурсів організму юнаків і дівчат), так і у превентивному (запровадження ефективних здоров'язберігаючих технологій та заходів психофізіологічного впливу на організм і психогігієнічної корекції наявних змін у функціональному стані організму) сенсі.

Ключові слова: учні, студенти, сучасні заклади освіти різних типів, рівень суб'єктивного контролю, порівняльна оцінка.

ПОКАЗАТЕЛИ УРОВНЯ СУБЪЕКТИВНОГО КОНТРОЛЯ УЧАЩИХСЯ И СТУДЕНТОВ СОВРЕМЕННЫХ УЧЕБНЫХ ЗАВЕДЕНИЙ РАЗЛИЧНЫХ ТИПОВ

Тимошук О. В., Школьников В. С., Гжегоцкий М.Р., Марчук И. А., Козань Н. Н.

Углубленное изучение критериальных характеристик уровня субъективного контроля, установление ведущих тенденций их изменений в динамике времени обучения, осуществление четко очерченной особенностями организации учебного процесса сравнительной оценки тенденций изменений в зависимости от типа учебного заведения позволяют как определить индивидуальные особенности расположения локуса субъективного контроля в соответствии с характером ситуаций, обусловленных воздействием учебно-значимых факторов, так и прогнозировать изменения стереотипа учебно-обусловленных действий в будущем. Цель работы - осуществление комплексной физиолого-гигиенической оценки показателей уровня субъективного контроля личности учащихся и студентов, находящихся в условиях современных учебных заведений разных типов. Исследования, предусматривающие определение показателей уровня субъективного контроля ученической и студенческой молодежи (300 учащихся и студентов), на основе использования личностного опросника Роттера, проводились на базе пяти учреждений образования г. Ивано-Франковск. Прогностическая оценка полученных данных предусматривала использование процедур описательной статистики с применением лицензионного стандартизованного пакета прикладных программ многомерного статистического анализа "Statistica 6.1 for Windows" (лицензионный № BXXR901E245722FA). Результаты проведенных исследований свидетельствуют об существенном преобладании среди учащихся и студентов современных учебных заведений различных типов экстернальных проявлений в личностной сфере. При оценке показателей уровня субъективного контроля личности учащихся и студентов учебных заведений различных типов следует отметить их чрезвычайно стабильный характер, причем наименьшая степень выраженности была присуща для показателей уровня субъективного контроля в соответствии с характеристиками общей интернальности, а также в области учебных отношений и в области неудач. Статистически значимых различий как обусловленных половыми различиями ($p(t)_{\alpha} > 0,05$), так и между представителями отдельных учебных заведений ($p(t) > 0,05$) в большинстве случаев выявлено не было. Необходимо отметить и тот факт, что на протяжении всего периода наблюдений отмечались существенно более высокие значения показателей уровня субъективного контроля в области неудач среди юношей во всех учебных заведениях, подлежащих исследованию. Приведенные данные должны в дальнейшем учитываться как в диагностическом (разработка методик комплексной оценки состояния адаптационных ресурсов организма юношей и девушек), так и в превентивном (внедрение эффективных здоровьесберегающих технологий и мероприятий психофизиологического воздействия на организм и психогигиенической коррекции изменений в функциональном состоянии организма) плане.

Ключевые слова: учащиеся, студенты, современные учебные заведения различных типов, уровень субъективного контроля, сравнительная оценка.



Correlations of indices of personality traits with indexes of finger and palmar dermatoglyphics of practically healthy Ukrainian men

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The search for new psychodermatoglyphic correlations will greatly increase the possibilities of this method and will accelerate the introduction of scientific developments into the daily practice of clinicians, criminologists, police and other specialties. The purpose of the work is to establish the peculiarities of the relationship between the indexes of the finger and palmar dermatoglyphics and the characteristics of the personality traits of practically healthy Ukrainian men. From the data bank of the materials of the research center of National Pirogov Memorial Medical University, Vinnytsya were taken the primary questionnaires of indicators of personality characteristics and dermatoglyphic indicators of 92 practically healthy men residents of Podillia region of Ukraine in the third generation. Processing of indicators of finger and palmar dermatoglyphics was performed according to the method of Cummins H. and Midlo Ch. (1961) in the statement by Gladkova T. D. (1966). To assess the characteristics of personality characteristics we determined properties of temperament (according to Eysenck), anxiety (according to Spielberger), accentuated personality traits (according to Shmishek), motivational orientation of the personality (according to Rotter), as well as features of the emotional organization of personality, aggressiveness, level of personality manifestations (according to Luscher). Correlation analysis was performed in the "Statistica 6.1" license package using Pearson statistics. It has been established that in the majority of cases, indicators of personality traits and dermatoglyphic indices of almost healthy men show single direct and inverse, mostly weak forces ($r=0.21 - 0.29$ and $r=-0.21 - -0.28$, respectively) correlations. The multiple nature of such correlations is established only between the Luscher gray color index and the left hand I, III and IV fingers and the left hand I and II fingers ridge count, the total ridge count of both hands, the total ridge count and the left hand delta index ($r=-0.23 - -0.28$) and between most indicators by Rotter subjective scale and the presence of a pattern on the thenar of the corresponding palm (on the right hand - $r=0.31 - 0.37$ and on the left hand - $r=0.22 - 0.29$). The results of quantitative analysis of significant correlations showed that between the indexes of the finger dermatoglyphics and the indicators of personality traits according to Eysenck and Luscher, most relationships are inverse, and with Spielberger, Shmishek and Rotter - direct; between the indexes of the palmar dermatoglyphics and the indicators of personality traits according to Spielberger and Luscher, most reliable relationships are inverse, and with the indicators according to Eysenck, Shmishek and Rotter - direct. The results of the correlation analysis allowed us to determine the most significant relationships between the indexes of the finger and palmar dermatoglyphics and the characteristics of the personality traits of practically healthy Ukrainian men.

Keywords: dermatoglyphic indices, indicators of personality traits, practically healthy men, correlations.

Introduction

Psychodermatoglyphics has been widely used in recent decades to identify a predisposition to many mental illnesses and to create a psychological portrait of criminals,

drug addicts or other similar groups of the population [3, 11, 12].

S. N. Akbarova and G. A. Azimova [2] conducted studies

to identify dermatoglyphical and psychological features of drug users. Among the psychic features such qualities as lack of kindness, inability to determine one's own benefit, lack of desire to engage in dialogue, poor tolerance of difficulties, etc. are noted. Specific dermatological and psychological markers were also identified in the analysis of fingerprints, namely, the predominance of the arch type on the first finger of the right hand, the first, third and fifth fingers of the left hand, and the whorls on the thenar of both the left and right palms.

O. M. Zoroastrov, A. N. Chistykin, and I. S. Efremov [22] investigated the features of a skin pattern in 231 persons who were in prison for murder or grievous bodily harm. Specific features were found that are characteristic of this category of persons, such as an increase in the number of whorls on the fourth finger of the right hand, the second and third fingers of the left hand, and a decrease in the number of ulnar loops on the third finger of the left hand. There was also an increase in the ridge count on the fourth finger of the right hand and the fifth and fourth fingers of the left hand. The findings will help create risk groups, among which preventive measures can be taken to reduce the number of serious crimes. The same group of authors [7] revealed the features of skin pattern in persons convicted of rape, namely, the reduction of the frequency of ulnar loops on the second finger of the right hand, the increase in the number of whorls and the ridge count on the fourth finger of the right hand, the reduction of the ridge count of the c-d line on the right hand, increase in the number of whorls on the second-fifth fingers of the left hand, decrease in the frequency of ulnar loops on the first and fourth fingers of the left hand, decrease in the number of radial loops on the second finger of the left hand, increasing the ridge count on the third and fourth fingers of the left hand, reducing of ridge count a-b on the left hand. In this way, it is possible to identify potential risk groups and preventive measures.

It has been found that specific features of a person's skin pattern can be used to detect a tendency for antisocial behavior related to social isolation, depressive mentality, lack of emotions and negativity [21].

I. Oron [16] aimed to identify specific dermatoglyphic markers in persons who were intentionally injured. A total of 160 dermatoglyphs were investigated during the study for the first time to intentionally injure a body in age of 13-16 years. The results of the analysis of the data obtained revealed 16 dermatoglyphic features that can be further used to identify risk groups.

The *purpose* of the work is to establish the peculiarities of the relationship between the indexes of the finger and palmar dermatoglyphics and the characteristics of the personality traits of practically healthy Ukrainian men.

Materials and methods

From the data bank of the materials of the research center of National Pirogov Memorial Medical University, Vinnytsya taken the primary questionnaires of personality

characteristics and indexes of finger and palmar dermatoglyphics of 92 practically healthy men aged from 22 to 35 years, residents of Podillia region of Ukraine in the third generation (representatives of Vinnytsia, Khmelnitsky, part of Ternopil and Zhytomyr regions).

Processing of indicators of finger and palmar dermatoglyphics was performed according to the method of Cummins H. and Midlo Ch. [5] in the statement by Gladkova T. D. [9].

To evaluate the characteristics of personality characteristics based on the use of personal questionnaires and test methods were identified a number of properties of temperament (according to Eysenck), anxiety (according to Spielberger), accentuated personality traits (according to Shmishek), motivational orientation of the personality (according to Rotter), as well as the peculiarities of psycho-emotional organization of personality, aggression, the level of distribution of asthenic and depressive personality manifestations (by the Luscher color test) [6, 8, 10, 13, 15, 17, 18, 20].

Correlations were estimated using a "Statistica 6.1" license package using Pearson statistics.

Results

The following significant correlations were found between personality traits and *finger dermatoglyphics* of healthy men: the *Eysenck neuroticism scale* has a mean feedback force ($r = -0.31$) correlation with the pattern type on the IV finger of the right hand and the mean direct force ($r = 0.30$) correlation with the pattern type on the III finger of the left hand; *Eysenck indiscretion score* - only weak force feedback ($r = -0.27$) correlation with pattern type on the second finger of the right hand; *Spielberger's personal anxiety score* - average direct link strength correlation ($r = 0.33$) with the pattern on the III left hand finger pattern and weak direct link strength correlation ($r = 0.21$) with the pattern on the left V finger pattern; *an indicator of accentuation of the character of the hyperthymic type according to Shmishek* - only a weak force of a direct correlation ($r = 0.21$) with a delta index of the left hand; *an indicator of accentuation of the character of the sticking type according to Shmishek* - only weak force feedback ($r = -0.26$) correlation with the pattern type on the IV fingers of the right hand; *an indicator of accentuation of the character of the emotional type according to Shmishek* - only a weak force direct correlation ($r = 0.23$) with the pattern type on the V finger of the left hand; *cyclothymic type accentuation index by Shmishek* - only weak force direct correlation ($r = 0.22$) with pattern type on the III finger of the left hand; *an indicator of accentuation of the character of the demonstrative type according to Shmishek* - only a weak force direct correlation ($r = 0.23$) with the ridge count V of the finger of the right hand; *an indicator of accentuation of the nature of the exciting type by Shmishek* - weak force feedback ($r = -0.22$ and -0.23) correlation with a ridge count of the III finger of the right and left hands; *an indicator of the accentuation of the character of the exalted type by*

Shmishek - average direct link strength ($r=0.35$) correlation with pattern type on the III finger of the left hand and weak direct link strength ($r=0.24$) correlation with pattern type on the V finger of the right hand; *an indicator of the level of subjective control in the field of family relations according to Rotter* - only a weak force direct correlation ($r=0.21$) with the pattern type on the II finger of the right hand; *blue color by Luscher* - only weak force feedback ($r=-0.21$) correlation with pattern type on the third finger of the right hand; *blue-green color by Luscher* - straight weak correlation ($r=0.23-0.27$) lines with pattern type on the III finger of the right hand, a ridge count of the second finger of the left hand and delta index of the left hand; *brown color by Luscher* - only weak force direct correlation ($r=0.26$) with the type of pattern on the I finger of the right hand; *black color by Luscher* - only weak force direct correlation ($r=0.23$) with pattern type on the third finger of the right hand; *gray color by Luscher* - medium feedback strength ($r=-0.39$) correlation with pattern type on the left finger of the left hand, as well as reliable feedback of weak correlation force ($r=-0.23$ - -0.28) with a ridge count and the right finger and left hand, a left-hand ridge count of II finger, a right-hand ridge count of III finger, a right-hand ridge count of IV finger, a left-hand delta index, a summary right-left hand, and a total ridge count.

The following significant correlations were found between personality traits indices and *palmar dermatoglyphics* of practically healthy men: *the Eysenck extraversion-introversion score* has a weak direct link strength ($r=0.28$) correlation with the right-hand angle dat value and a low direct link strength ($r=0.23$) correlation with the presence of a pattern in the I inter-finger gap of the right hand; *Eysenck neuroticism score* - weak force direct correlation ($r=0.24$ in both cases) with a frequency of carpal axial tri-radii of the right and left hand, as well as reliable weak force feedback ($r=-0.24$) correlation with an intermediate frequency axial tri-radii of the left hand; *Eysenck indiscretion index* - weak force feedback ($r=-0.22$ in both cases) correlation with the magnitude of the angle atd and the length of the line ad of the right hand and weak force of the direct correlation ($r=0.22$) with the frequency of the central axial tri-radii of the right hand; *Spielberger situational (reactive) anxiety index* - reverse medium and low correlation forces ($r=-0.34$ and $r=-0.25$) with left and right hands atb angles; *Spielberger's personal anxiety score* - inverse of weak correlation force ($r=-0.22$ in both cases) with the length of the ct line of the left hand and the magnitude of the dat angle of the right hand, as well as the weak direct correlation force ($r=0.23$) with the frequency of carpal axial tri-radii of the right hand and weak force feedback ($r=-0.24$) correlation with the presence of a pattern on the hypothenar of the right hand; *the indicator of the accentuation of the character of the hyperthymic type according to Shmishek* - inverse of medium and weak correlation force ($r = -0.30$ and $r = -0.23$ and -0.28) with the ridge count of the line a-b and the length of the line ad of the right hand and the ridge count of the line c-d of the left hand, as well as weak force feedbacks ($r=$

-0.24 - -0.28) correlation with the presence of a pattern in the I interdigital gap of the right and left hands and with the presence of a pattern on the thenar of the left hand; *the indicator of accentuation of the character of the sticking type according to Shmishek* - straight weak correlation forces ($r=0.25$ in both cases) with magnitude btc of the right and left hand, as well as weak direct correlation forces ($r=0.24$ and $r=0.26$) with frequency any combination of right and left hand tri-radii; *an indicator of accentuation of the character of the emotional type according to Shmishek* - weak force feedback ($r=-0.26$) correlation with ridge count of the line c-d of the right hand and weak force direct correlation ($r=0.22$) with the presence of a pattern on the hypotenar of the left hand;

an indicator of the accentuation of the character of the pedantic type according to Shmishek - average direct correlation strength ($r=0.32$) with the presence of a pattern in the III inter-finger gap of the left hand and weak direct correlation strength ($r = 0.22$) with the frequency of the intermediate axial tri-radii of the left hand; *cyclothymic accentuation rate by Shmishek type* - direct medium and weak correlation forces ($r=0.30$ and $r=0.24-0.26$) with the ridge count of the b-c line of the right and left hand, the ridge count of the line a-b of the right hand and the angle btc of the left hand, as well as weak feedback force ($r=-0.25$) correlation with the presence of a pattern on the hypotenar of the right hand; *indicator of accentuation of the character of the demonstrative type according to Shmishek* - weak force feedback ($r=-0.28$) correlation with a ridge count of line c-d of the left hand, weak force feedbacks ($r=-0.23$ and $r=-0.24$) correlation with frequency of any combination of right-hand tri-radii and with the frequency of the left axial central axial tri-radii, as well as the reliable weak force of the direct correlation ($r=0.23$) with the frequency of the left-hand carpal axial tri-radii; *an indicator of the accentuation of the character of the exalted type according to Shmishek* - weak force of direct correlation ($r=0.22$) with magnitude of angle atb of the left hand, weak force feedback ($r=-0.27$ and $r=-0.28$) correlation with frequency of intermediate axial tri-radii of right and left hand, as well as reliable weak forces of direct correlation ($r=0.27-0.28$) with the index value of the main palmar lines of the left hand and with the frequency of the carpal axial tri-radii of the right and left hand; *the indicator of the scale of the general internality of the level of subjective control over Rotter* - weak force feedback ($r=-0.22$) correlation with the magnitude of the angle ctd of the left hand, as well as medium and weak force direct correlation ($r=0.37$ and $r=0.28$) with the presence of a pattern on the thenar of the right and left hand and a weak force, a direct correlation ($r=0.22$) with the presence of a pattern in the I inter-finger gap of the right hand; *an indicator of the level of subjective control in the field of Rotter's achievements* - only a reliable weak force of direct correlation ($r=0.27$) with the presence of a pattern on the thenar of the right hand;

indicator of the level of subjective control in the field of failures according to Rotter - weak force direct correlation ($r=0.23$) with the length of the line ct of the right hand, as well

as medium and weak force direct correlation ($r=0.35$ and $r=0.29$) with the presence of a pattern on the thenar of the right and left hand, weak direct force ($r=0.25$) correlation with the presence of the pattern in the IV inter-finger gap of the left hand and weak force feedback ($r=-0.24$) correlation with the presence of the pattern in the III inter-finger gap of the left hand; *indicator of the level of subjective control in the field of family relations according to Rotter* - weak force feedback ($r=-0.22$) correlation with the magnitude of the angle atb of the right hand, as well as medium and weak force direct correlation ($r=0.37$ and $r=0.25$) with the presence of a pattern on the thenar of the right and left hand; *indicator of the level of subjective control in the field of interpersonal relations according to Rotter* - weak force feedbacks ($r=-0.24$ and $r=-0.26$) correlation with the ridge count of the line c-d and the magnitude of the ctd angle of the left hand, medium and weak force direct correlation ($r=0.31$ and $r=0.28$) with the presence of a pattern on the thenar of the right and left hand, weak force direct correlation ($r=0.28$ and $r=0.25$) with the presence of a pattern in the I inter-finger gap of the right hand and IV inter-finger gap of the left hand, as well as the weak force feedback ($r=-0.25$) correlation with the presence of a pattern in the III between the left gap of the left hand; *the subjective level of subjective control in the field of health and illness according to Rotter* - only reliable weak force direct correlation ($r=0.22$) with the presence of a pattern on the thenar of the left hand; *blue color by Luscher* - only reliable weak force direct correlation ($r=0.22$) with the frequency of any combination of tri-radial right hand; *blue-green color by Luscher* - inverse of weak correlation force ($r = -0.22 - -0.26$) with line length ct and dat angle value of right and left hand; *orange-red color by Luscher* - weak force feedback ($r=-0.23 - -0.28$) correlation with the frequency of the central axial tri-radial of the right and left hand and with the presence of a pattern on the thenar of the right hand; *light yellow color by Luscher* - weak force feedback ($r=-0.25$ and $r=-0.28$) correlation with the frequency of the central axial tri-radial and the presence of a pattern in the second inter-finger gap of the left hand and weak force direct correlation ($r=0.22$) with the presence of a pattern in the I inter-finger gap of the right hand; *violet color by Luscher* - reliable weak force feedback ($r=-0.24$) correlation with the magnitude of the ctd angle of the right hand and weak force feedback ($r=-0.24$) correlation with the index value of the main palmar lines of the right hand.

Discussion

According to a number of studies it is known that specific dermatoglyphic signs are diagnostic markers of the mental state of a person [1, 4, 14, 19]. Therefore, the search for new psychodermatoglyphic correlations will greatly increase the possibilities of this method and will accelerate the introduction of scientific developments into the daily practice of clinicians, criminologists, bodies of inquiry and other specialties.

In the *analysis of reliable correlations* of indices of

personality characteristics with dermatoglyphic indices of practically healthy men of Podillia region of Ukraine, in most cases single and inverse, mostly weak correlations strengths are established. Multiple nature of the reliable correlations is established only: mainly weak force inverse correlation ($r=-0.23 - -0.28$) of the *gray color by Luscher and the indexes of the ridge count I, III and IV fingers of the right hand and I and II fingers of the left hand, summary ridge count of the fingers of both hands, the total ridge count and the deltaic index of the left hand*; on the right hand, mainly medium strength direct correlation ($r=0.31 - 0.37$); and on the left hand weak strength direct correlation ($r=0.22 - 0.29$) between most indicators of the Rotter subjective scale and the presence of a pattern on the thenar of the corresponding palm.

Quantitative analysis of significant correlations of personality characteristics with dermatoglyphic indices of healthy men showed the following distribution:

extraversion-introversion, neuroticism, and sincerity indicators according to Eysenck - with indexes of finger dermatoglyphics (5.56 % of the total number of these indicators on the *right hand*, 2.78 % of the average force of the inverse and 2.78 % of the weak force of the inverse; on the *left hand* 1 - 1.39 %, medium straight); with indexes of palmar dermatoglyphics (on the *right hand* 6 - 9.52 % of the total number of these indicators, of which 6.35 % of the weak force of the direct and 3.17 % of the weak force of the opposite; on the *left hand* 2 - 3.18 %, of which 1.59 % of the weak force of the direct and 1.59 % weak strength of the inverse);

indicators of situational (reactive) and personal anxiety according to Spielberger - with indexes of finger dermatoglyphics (on the *left hand* 2 - 8.34% of the total amount of these indicators, of which 4.17 % average strength of straight and 4.17 % weak strength of straight); with indexes of palmar dermatoglyphics (on the *right hand* 4 - 9.52 % of the total number of these indicators, of which 2.38 % of the weak force of the direct and 7.14 % of the weak force of the opposite; on the *left hand* 2 - 4.76 % of the total amount of these indicators, of which 2.38 % of the average reverse force and 2.38 % weak reverse force);

indices of accentuation of the character of hypertensive, stuck, emotional, pedantic, anxious, cyclothymic, demonstrative, excitable, dysthymic and exalted types according to Shmishek - with indexes of finger dermatoglyphics (on the *right hand* 4 - 3.34 % of total, straight and 1.67 % of weak force of the inverse; on the *left hand* 5 - 4.16 % of the total number of these indicators, of which 0.83 % of the average strength of the straight, 2.50 % of the weak force of the straight and 0.83 % of the weak force of the inverse); with indexes of palmar dermatoglyphics (on the *right hand* 12 - 5.72 % of the total number of these indicators, of which 2.38 % of the weak force of the direct, 0.48 % of the average force of the reverse and 2.86 % of the weak force of the reverse; on the *left hand* 17 - 8.10 % of the total amount of these indicators, of which 0.95 % of the average force of the straight, 4.29 % of the weak force of the straight and 2.86 % of the weak force of the reverse);

indicators of the scale of general internality of the level of subjective control, subjective control in the fields of achievements, failures, family relations, educational (professional) relations, interpersonal relations and health and illness according to Rotter - with indexes of finger dermatoglyphics (on the *right hand* 1 - 1.19 % of the total number of these indicators, weak direct power); with indexes of palmar dermatoglyphics (on the *right hand* 9 - 6.12 % of the total number of these indicators, of which 2.72 % of the average strength of the straight, 2.72 % of the weak force of the straight and 0.68 % of the weak force of the opposite; on the *left hand* 12 - 8.16 % of the total amount of these indicators, of which 4.76 % of the weak force of the straight and 3.40 % of the weak force of the return);

indicators of blue, blue-green, orange-red, light yellow, purple, brown, black and gray colors by Luscher - with indexes of finger dermatoglyphics (on the *right hand* 8 - 8.34 % of the total amount of these indicators, of which 3.13 % of weak power direct and 5.21 % of weak force of the inverse; on the *left hand* 7 - 7.29% of the total number of these indicators, of which 2.08 % of the weak force of the inverse, 1.04% of the average force of the inverse and 4.17 % of the weak force of the inverse); with indexes of palmar dermatoglyphics (on the *right hand* 8 - 4.76 % of the total number of these indicators, of which 1.19 % of the weak force of the direct and 3.57 % of the weak force of the inverse; on the *left hand* 5 - 2.98 % of the total amount of these indicators, all the weak force of the reverse).

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Dermatoglyphic features of the skin patterns of persons convicted of serious crimes. *Bulletin of Forensic Medicine*, 3(2), 9-11.

КОРЕЛЯЦІЯ ПОКАЗНИКІВ ОСОБЛИВОСТЕЙ ОСОБИСТОСТІ З ПОКАЗНИКАМИ ПАЛЬЦЕВОЇ ТА ДОЛОННОЇ ДЕРМАТОГЛІФІКИ ПРАКТИЧНО ЗДОРОВИХ УКРАЇНСЬКИХ ЧОЛОВІКІВ

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Пошуки нових психодерматогліфічних зв'язків значно підвищують можливості даного методу і прискорять впровадження наукових розробок в повсякденну практику клініцистів, криміналістів, органів дізнання та інших спеціальностей. Мета роботи - встановити особливості зв'язків між показниками пальцевої і долонної дерматогліфіки та показниками особливостей особистості практично здорових українських чоловіків. Із банку даних матеріалів науково-дослідного центру Вінницького національного медичного університету ім. М. І. Пирогова взяті первинні анкети показників особливостей особистості та дерматогліфічні показники 92 практично здорових чоловіків у третьому поколінні мешканців Подільського регіону України. Обробку показників пальцевої і долонної дерматогліфіки проводили за методикою Cummins H. і Midlo Ch. (1961) у викладі Гладкової Т. Д. (1966). Для оцінки показників особливостей особистості визначали властивості темпераменту (за Айзенком), тривожності (за Спілбергером), акцентуованих рис особистості (за Шмішеком), мотиваційної спрямованості особистості (за Роттером), а також особливостей психоемоційної організації особистості, агресивності, рівня поширення астеничних і депресивних особистісних проявів (за Люшером). Кореляційний аналіз проведено в ліцензійному пакеті "Statistica 6.1" із використанням статистики Пірсона. Встановлено, що між показниками особливостей особистості та дерматогліфічними показниками практично здорових чоловіків, у більшості випадків, спостерігаються поодинокі прямі та зворотні, переважно слабкої сили (відповідно $r=0,21 - 0,29$ та $r=-0,21 - -0,28$) зв'язки. Множинний характер подібних кореляцій встановлений лише між показником сірого кольору за Люшером та показниками гребінцевого рахунку I, III і IV пальців правої кисті і I та II пальців лівої кисті, сумарним гребінцевим рахунком пальців обох кистей, тотальним гребінцевим рахунком і дельтовим індексом лівої кисті ($r=-0,23 - -0,28$) та між більшістю показників шкали суб'єктивного контролю за Роттером та наявністю візерунка на тенарі відповідної долоні (на правій кисті - $r=0,31 - 0,37$, а на лівій кисті - $r=0,22 - 0,29$). Результати кількісного аналізу достовірних кореляцій показали, що між показниками пальцевої дерматогліфіки та показниками особливостей особистості за Айзенком і Люшером більшість зв'язків мають зворотній характер, а з показниками за Спілбергером, Шмішеком і Роттером - прямий; між показниками долонної дерматогліфіки та показниками особливостей особистості за Спілбергером і Люшером більшість достовірних зв'язків мають зворотній характер, а з показниками за Айзенком, Шмішеком і Роттером - прямий. Результати кореляційного аналізу дозволили визначити найбільш значущі зв'язки між показниками пальцевої і долонної дерматогліфіки та показниками особливостей особистості практично здорових українських чоловіків.

Ключові слова: дерматогліфічні показники, показники особливостей особистості, практично здорові чоловіки, кореляції.

КОРЕЛЯЦИИ ПОКАЗАТЕЛЕЙ ОСОБЕННОСТЕЙ ЛИЧНОСТИ С ПОКАЗАТЕЛЯМИ ПАЛЬЦЕВОЙ И ЛАДОННОЙ ДЕРМАТОГЛИФИКИ ПРАКТИЧЕСКИ ЗДОРОВЫХ УКРАИНСКИХ МУЖЧИН

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Поиски новых психодерматоглифических связей значительно повысят возможности данного метода и ускорят внедрение научных разработок в повседневную практику клиницистов, криминалистов, органов дознания и других специальностей. Цель работы - установить особенности связей между показателями пальцевой и ладонной дерматоглифики и показателями особенностей личности практически здоровых украинских мужчин. Из банка данных материалов научно-исследовательского центра Винницкого национального медицинского университета им. Н. И. Пирогова взяты первичные анкеты показателей особенностей личности и дерматоглифические показатели 92 практически здоровых мужчин в третьем поколении жителей Подольского региона Украины. Обработку показателей пальцевой и ладонной дерматоглифики проводили по методике Cummins H. и Midlo Ch. (1961) в изложении Гладковой Т. Д. (1966). Для оценки показателей особенностей личности определяли свойства темперамента (по Айзенку), тревожности (по Спилбергеру), акцентуированных черт личности (по Шмишеку), мотивационной направленности личности (по Роттеру), а также особенностей психозомоциональной организации личности, агрессивности, уровня распространения астенических и депрессивных личностных проявлений (по Люшеру). Корреляционный анализ проведен в лицензионном пакете "Statistica 6.1" с использованием статистики Пирсона. Установлено, что между показателями особенностей личности и дерматоглифическими показателями практически здоровых мужчин, в большинстве случаев, наблюдаются единичные прямые и обратные, преимущественно слабой силы (соответственно $r=0,21 - 0,29$ и $r=-0,21 - -0,28$) связи. Множественный характер подобных корреляций установлен только между показателем серого цвета по Люшеру и показателями гребешкового счёта I, III и IV пальцев правой кисти и I и II пальцев левой кисти, суммарным гребешковым счётом пальцев обеих кистей, тотальным гребешковым счётом и дельтовым индексом левой кисти ($r=-0,23 - -0,28$) и между большинством показателей шкалы субъективного контроля по Роттеру и наличием узора на тенаре соответствующей ладони (на правой кисти - $r=0,31 - 0,37$, а на левой кисти - $r=0,22 - 0,29$). Результаты количественного анализа достоверных корреляций показали, что между показателями пальцевой дерматоглифики и показателями особенностей личности по Айзенку и Люшеру большинство связей имеют обратный характер, а с показателями за Спилбергером, Шмишеком и Роттером - прямой; между показателями ладонной дерматоглифики и показателями особенностей личности по Спилбергеру и Люшеру большинство достоверных связей имеют обратный характер, а с показателями за Айзенком, Шмишеком и Роттером - прямой. Результаты корреляционного анализа позволили определить наиболее значимые связи между показателями пальцевой и ладонной дерматоглифики и показателями особенностей личности практически здоровых украинских мужчин.

Ключевые слова: дерматоглифические показатели, показатели особенностей личности, практически здоровые мужчины, корреляции.



Features of emotional burnout of students in the conditions of pre-examination and examination academic stress

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An important place in the structure of personality traits of student youth, who possesses a certain specialty and is in the conditions of pre-examination and examination academic stress, belongs to the leading characteristics of the level of expression of emotional burnout, which is an indisputable factor of formation of high level of emotional instability of young women and young men to the effects of environmental factors and social and professional living conditions. The aim of the study is to study the peculiarities of emotional burnout of students of higher medical education institutions, who are in the conditions of pre-examination and examination academic stress. The studies were conducted at the National Pirogov Memorial Medical University among 67 students of the 3rd year of the Faculty of Medicine, respectively, 1 month before the preparation and immediately before the period of differentiated tests and the examination session with the use of a personal Boyko questionnaire. The statistical analysis of the data obtained, which involved the use of descriptive statistics procedures, was carried out on the basis of using the standard statistical analysis application package "Statistica 6.1" (license number AXX910A374605FA). The results show a significant increase in the level of expression of all the leading phases of emotional burnout of students during the pre-examination and examination periods, and most of all this phenomenon relates to the most unfavorable in its content of phases of resistance and exhaustion. It is established that the level of expression of the leading characteristics of emotional burnout in the highest proportion of young women and young men is characterized by being in the phase of resistance. The highest level of expression of emotional burnout phase indicators in both young women and young men is characteristic for the period of 1 month before the examination session, however, the highest level of expression of phase indicators depletion in both young women and young men is observed immediately before the examination session. Young women have a more significant degree of expression of values that mark the leading components of the resistance phase, among young men - values that mark the leading indicators of the phases of stress and exhaustion. The determined data are of significant importance both from the standpoint of determining the features of the formation of adaptation resources of the organism, and from the standpoint of establishing practically significant approaches to the formation of students' personality, which provide the necessary for successful mastering of the future profession of the working dynamic stereotype of the teaching and professional activity prevention of unwanted emotional reactions in response to the factors of educational or work process.

Keywords: students, institutions of higher medical education, emotional burnout, pre-examination and examination academic stress.

Introduction

Admission to higher education institutions of various profiles, including institutions of higher medical education, and the further process of education and gaining medical profession, based on a number of objective reasons, as evidenced by the data of research conducted in recent

years, related with the influence on the body of young women and young men of a multifaceted complex of stressful factors, which include, first of all, the following: intensive training load, a sharp change in the closest social microenvironment and the need to establish new social

contacts, insufficient time for adequate sleep and low motor activity, significant financial burden on the family budget, the need for contact with suffering patients, etc. [3, 7, 11, 20, 24-28].

Another, no less important in its content, is the problem of overcoming pre-examination and exam training stress, which, undoubtedly, should be considered as a very powerful factor that causes the emergence of pronounced psycho-emotional stress of the body and the phenomena of psychological discomfort of student youth and disorders, processes of psychophysiological and mental adaptation, since it represents a kind of critical situation, the result of which can produce an immediate, as well as the negative impact on the position of individual young women and young men in a particular higher education institution, their social status, and, without exaggeration, changing their future destiny [4, 5, 12].

In addition to the additional circumstances that significantly exacerbate the stressful impact of pre-exam and exam periods on the student body, it is necessary to emphasize the need to maximize their knowledge and skills over a very short period of time, as well as the element of chance associated with obtaining the exam task takes place. Such factors become a real test for future specialists in stress resistance, which, to date, is no less important indicator of professional suitability and professional competence than the level of qualification, the degree of communication skills and the ability to continuous self-improvement [2, 5, 6, 9, 13].

Moreover, a special place in the structure of personality traits of student youth, who possesses a certain specialty and is in the conditions of pre-examination and exam training stress, belongs to the leading characteristics of the level of expression of emotional burnout, which is an indisputable factor of formation of a high level of emotional instability of the investigated persons to the influence of environmental factors and social and professional living conditions, as well as the tendency to develop various disorders of the characteristics of the mental sphere of their organism due to the influence of psycho-traumatic factors, which are actually considered similar situations [5, 8, 18, 21].

The *purpose* of the work is to investigate the peculiarities of emotional burnout of students of higher medical education institutions, who are in the conditions of pre-exam and exam training stress.

Materials and methods

The studies were conducted at the National Pirogov Memorial Medical University, Vinnytsya among the students of the 3rd year of the Faculty of Medicine, respectively, 1 month before the preparation and immediately before the period of differentiated tests and the examination session. In total, 67 students, including 35 young women and 32 young men, were observed in the dynamics of observations.

In order to determine the indicators of emotional

burnout, a personal Boyko questionnaire, widely used in the practice of psychodiagnostic research, was used, which allowed to identify 12 symptoms that form 3 phases of emotional burnout, namely: the phase of alarm voltage, which includes the symptoms of experiencing psycho-traumatic trauma, feeling "caged", anxiety and depression, a phase of resistance that includes in its structure symptoms of inadequate selective emotional burnout, emotional and moral disorientation, expansion of emotions saving and reduction of professional duties and exhaustion phase consisting of symptoms of emotional deficits, emotional and personal detachment and psychosomatic and psycho-vegetative disorders [22].

For each of the symptoms were distinguished 3 stages of development - a symptom that is unformed (up to 9 points), a symptom that is forming (10-15 points) and a symptom that has been already formed (more than 16 points). Accordingly, each phase of development of emotional burnout was defined as unformed (up to 37 points on the set of symptoms that make up it), forming (37-60 points on the set of symptoms that make up it), and already formed (more than 60 points on the set of symptoms that make up it).

Statistical analysis of the obtained data, which included the use of descriptive statistics procedures and comparison of the obtained results on the basis of statistical criteria of parametric statistics (Student's t-test), was carried out on the basis of using the standard package of multidimensional statistical analysis "Statistica 6.1" (license number AXX910A374605FA belongs to National Pirogov Memorial Medical University, Vinnytsya).

Results

During the researches and the analysis of indicators of the degree of expression of such phase of development of emotional burnout, as the phase of alarm voltage (the first, initial, phase of emotional burnout), which certifies the appearance and further spread of certain psychophysiological and psycho-significant manifestations of certain exhaustiveness of personality and personality feeling of being in a state of constant tension and psychological discomfort, it should be noted that the level of her indicators in young women 1 month before the exam session was 42.82 ± 3.38 points, in young men - amounted to 45.09 ± 3.65 points, at the same time, just before the exam session - in both cases, there was a tendency for their growth, which, however, was not marked by the presence of statistically significant differences, reaching respectively 51.54 ± 4.04 points (20.3 %; $p(t)_{1-e} > 0.05$) among the first and 46.93 ± 4.30 points (4.0 %; $p(t)_{1-e} > 0.05$) - among the second (Table 1). A higher level of expression of indicators of the phase of stress at the beginning and at the end of the observation period was typical for young men. No gender-related differences were recorded ($p(t)_{w-m} > 0.05$).

While conducting an in-depth assessment of the degree of expression of the individual components of the alarm

Table 1. Indicators of the level of emotional burnout of students in the pre-exam and exam periods of study in a higher medical institution according to the personal questionnaire by Boyko (points).

| Indicators of the main phases of emotional burnout | Research period | Groups of students | | | | p(t) _{w-m} |
|---|---------------------------------|--------------------|------------|-----------|------------|---------------------|
| | | Young women | | Young men | | |
| | | n | M±m | n | M±m | |
| The level of expression of the indicators of the phase of alarm voltage | 1 month before the exam session | 35 | 42.82±3.38 | 32 | 45.09±3.65 | >0.05 |
| | Before the exam session | 35 | 51.54±4.04 | 32 | 46.93±4.30 | >0.05 |
| | p(t) _{1-e} | >0.05 | | >0.05 | | |
| The level of expression of resistance phase indicators | 1 month before the exam session | 35 | 50.25±5.38 | 32 | 46.09±4.82 | >0.05 |
| | Before the exam session | 35 | 64.62±3.06 | 32 | 57.15±3.42 | >0.05 |
| | p(t) _{1-e} | <0.05 | | >0.05 | | |
| The level of expression of the exhaustion phase indicators | 1 month before the exam session | 35 | 40.45±3.58 | 32 | 42.59±3.90 | >0.05 |
| | Before the exam session | 35 | 51.54±2.04 | 32 | 54.12±3.90 | >0.05 |
| | p(t) _{1-e} | <0.05 | | <0.05 | | |

voltage phase, it should be noted that both young women and young men 1 month before the exam session were the most significant, which reflected the experiences of psycho-traumatic circumstances (respectively 24.97±3.38 points and 24.90±2.93 points) and dissatisfaction with oneself (respectively 15.20±2.93 points and 18.81±3.27 points), followed by the characteristics of anxiety and depression (respectively 13.68±1.59 points and 13.59±1.50 points) and the feeling of being "caged" (respectively 6.80±1.10 points and 9.15±1.41 points), at the same time, immediately before the examination session - data that reflected the characteristics of anxiety and depression (respectively 17.74±1.60 points and 15.31±1.66 points) and experiences of psycho-traumatic circumstances (respectively 14.48±1.38 and 14.34±1.63 points), followed by characteristics regarding dissatisfaction with themselves (respectively 9.97±1.07 points and 11.31±1.27 points) and the feeling of being "caged" (9.00±1.49 points and 9.12±1.50 points, respectively).

Considering the indicators of the level of development of such a component of emotional burnout, as the degree of expression of the phase of resistance (the second, intermediate, phase of emotional burnout), which testifies to the presence of signs of the development of natural-conditioned resistance of the organism to the influence of various types of emotional load inherent in life, characteristic of the modern student life, it should be noted that the level of expression of it indicators in young women 1 month before the exam session was 50.25±5.38 points, in young men - 46.09±4.82 points, however, just before the examination session - its values increased statistically and significantly, reaching 64.62±3.06 points (28.5 %; $p(t)_{1-e} < 0.05$) in the first case and showing a trend towards growth, which, however, did not statistically significant features, reaching respectively the level of 57.15±3.42 points (23.9 %; $p(t)_{1-e} > 0.05$) - in the second. In contrast to the previous case, a higher level of expression of resistance phase indicators at the beginning and at the end of the observation period was typical for young women. No

gender-related differences were recorded ($p(t)_{w-m} > 0.05$).

When assessing the degree of expression of the individual components of the resistance phase, it should be noted that 1 month before the exam session, the most significant were the data that reflected inadequate selective emotional response (respectively 19.28±1.23 points and 16.15±1.27 points) and reduction of vocationally-oriented teaching responsibilities (respectively 15.71±1.50 points and 15.53±1.44 points), followed by the characteristics of expanding the sphere of saving emotions (respectively 15.14±1.61 points and 13.62±1.40 points) and emotional and moral disorientation (respectively 11.22±1.23 b and 13.78±1.43 points), at the same time, immediately before the exam session - data that reflected inadequate selective emotional response (respectively 19.62±1.27 points and 15.62±1.44 points) and reduction of vocationally-oriented teaching responsibilities (respectively 18.80±1.09 points and 16.25±1.44 points), followed by the characteristics of expanding the sphere of emotions saving (respectively 17.48±1.45 points and 13.06±1.25 points) and, in particular, emotional and moral disorientation (respectively 8.71±1.14 points and 12.68±1.20 points).

After all, during the evaluation of the peculiarities of the spread of personal manifestations inherent in such a phase of emotional burnout development as the exhaustion phase (the third, the last, the emotional burnout phase), the remarkable characteristics of which are a significant reduction in the level of functional resources and quite real exhaustion of adaptation organisms found that the level of it indicators for young women 1 month before the exam session was 40.45±3.58 points, for young men - 42.59±3.90 points, at the same time, just before the exam session - in both cases, there were statistically significant differences, reaching respectively 51.54±2.04 points (27.4 %; $p(t)_{1-e} < 0.05$) among the first and 54.12±3.90 points (27.0 %; $p(t)_{1-e} < 0.05$) - among second. A higher level of expression of the exhaustion phase indices at the beginning and at the end of the observation period was typical for young men. No gender-

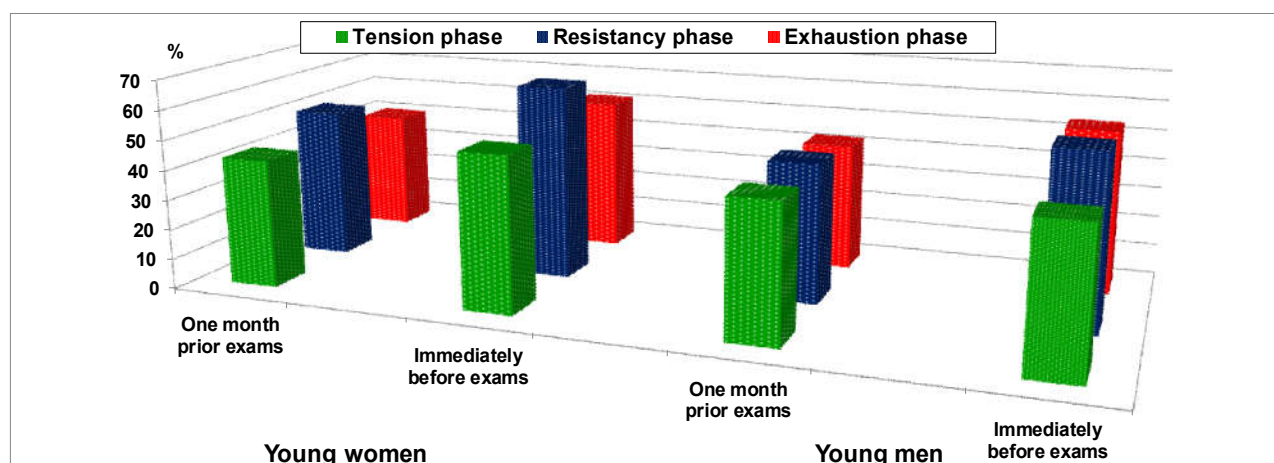


Fig. 1. Features of students' distribution according to the degree of expression of the leading phases of indicators of emotional burnout of students in pre-examination and examination periods of study at a higher medical education institution according to the personal Boyko questionnaire.

related differences were recorded ($p(t)_{w-m} > 0.05$).

Analyzing the degree of expression of the individual components of the exhaustion phase, it should be noted that among young women and young men 1 month before the exam session among young women, the most significant were the data reflecting the presence of emotional deficit (13.20 ± 1.28 points) and the level of personal distance (11.68 ± 1.68 points), followed by characteristics regarding the level of emotional distance (10.28 ± 1.08 points) and the level of expression of psychosomatic and psycho-vegetative shifts (10.00 ± 1.17 points), among young men - data that reflected the level of personal distance woundedness (14.37 ± 1.14 points) and the presence of emotional deficiency (13.78 ± 1.29 points), followed by characteristics regarding the level of personal distance (12.75 ± 1.66 points) and the level of expression of psychosomatic and psycho-autonomic shifts (8.06 ± 1.19 points). At the same time, immediately before the exam session, the observed pattern was the same for young women and young men - data that reflected the presence of emotional deficit (respectively 13.60 ± 1.20 points and 14.59 ± 1.14 points) and the level of personal distance (respectively 15.80 ± 2.89 points and 14.56 ± 1.86 points), followed by characteristics regarding the level of emotional detachment (respectively 13.54 ± 1.12 points and 13.87 ± 1.23 points) and, in particular, the expression level of psychosomatic and psycho-autonomic shifts (respectively 13.48 ± 1.26 points and 9.84 ± 1.12 points).

Data on the characteristics of student distribution according to the degree of expression of the leading phases of the indicators of emotional burnout of students in the pre-examination and examination periods based on the use of a personal Boyko questionnaire are shown in Figure 1.

The obtained results indicate an increase in the proportion of indicators of the expression of all leading phases of emotional burnout of the students to be studied during the pre-examination and examination periods (1 month before the beginning of the examination session and

immediately before the beginning of the exam) and most of all this phenomenon concerns the most unfavorable in its content such phases as the phases of resistance and exhaustion. In young women recorded a more significant degree of expression, which noted the leading components of the resistance phase, among young men - the leading indicators of the phases of alarm voltage and exhaustion.

It should be noted that the level of expression of the leading characteristics of emotional burnout of the largest part of subjects was characterized by being in the resistance phase, respectively, 50.25 ± 5.38 points in young women and 46.09 ± 4.82 points in young men 1 month before the exam session, respectively 64.62 ± 3.06 points ($p(t)_{1-e} < 0.05$) in young women and 57.15 ± 3.42 points ($p(t)_{1-e} > 0.05$) in young men - immediately before the exam session. However, the highest level of expression of the indicators of the phase of alarm voltage among both young women and young men was characteristic for the period 1 month before the examination session (51.54 ± 2.04 points ($p(t)_{1-e} > 0.05$) respectively in the first case and 54.12 ± 3.90 points ($p(t)_{1-e} > 0.05$) - in the second), instead, the highest level of expression of indicators of the exhaustion phase in both young women and young men was characteristic for the period immediately before the examination session (51.54 ± 2.04 points, respectively ($p(t)_{1-e} < 0.05$) in the first case and 54.12 ± 3.90 points ($p(t)_{1-e} < 0.05$) in the second).

Discussion

According to the current scientific literature, medical students in various countries of the world tend to have relatively high levels of anxiety, asthenia, and depression and necessarily exhibit the initial signs of emotional burnout [10-12, 14, 15, 19, 23, 28, 29].

The phenomena identified can serve as an important prerequisite for a decline in academic performance, a decrease in the level of motivation to develop the necessary professional skills and qualities, a decrease in the capacity

for empathy, and therefore a sympathy, even leading to the development of so-called "professional cynicism" which has peculiar manifestations and is marked by a kind of "coloration" [7, 16, 27, 30].

In this regard, it is extremely important and urgent task to develop methods for assessing and predicting the features of the course of psychophysiological adaptation, which form a certain degree of anxiety, depressive and asthenic states, aggressive manifestations, as well as a number of other personality characteristics in the context of establishing the general level stress of young women and young men who study and are in the stage of preparation for the exams (situational component of educational stress), and indirectly - the stress resistance of their organs in general, moreover, determining the level of emotional burnout and the degree of formation of its individual phases, namely: phases of alarm voltage, resistance and exhaustion [1, 5, 10, 22] play an important role in the implementation of this process.

Our studies have established evidence of an increase in the expression of all the leading phases of emotional burnout of students to be studied during the pre-examination and examination periods (1 month before the beginning of the examination session and immediately before the beginning of the exam respectively) and most of all this phenomenon concerns the most unfavorable in its content of phases of resistance and exhaustion. In particular, it was found that among young women, a more significant degree of expression of values that mark the leading components of the resistance phases is recorded, among young men - values that mark the leading indicators of the phases of alarm voltage and exhaustion.

Of particular note is the fact that the level of expression of the leading characteristics of emotional burnout of the largest part of subjects was characterized by being in the phase of resistance and 1 month before the exam session, and immediately before the exam session. However, the highest level of expression of the indicators of the phase of stress among both young women and young men was characteristic for the period of 1 month before the examination session, instead, the highest level of

expression of indicators of the phase of exhaustion among both young women and young men was characteristic for the period immediately before exam session.

The determined data are of considerable importance both from the standpoint of determining the features of formation of adaptive resources of the organism of young women and young men studying in institutions of higher education of medical profile, and from the standpoint of establishing practically significant approaches to the formation of students' personality, ensuring the formation of the necessary for successful mastering the future specialty of the working dynamic stereotype of performing educational and professional activities and preventing the occurrence of unwanted emotional reactions in response to the action of factors educational or work process.

Conclusions

1. The results obtained indicate a increase in the degree of expression of all the leading phases of emotional burnout of students during the pre-exam and exam periods (1 month before the beginning of the exam session and immediately before the beginning of the exam session respectively) and most of all this phenomenon concerns the most unfavorable in its content of phases of resistance and exhaustion.

2. It is established that the level of expression of the leading characteristics of emotional burnout in the highest proportion of young women and young men is characterized by being in the phase of resistance. The highest level of expression of emotional burnout phase indicators in both young women and young men is characteristic for the period of 1 month before the exam session, however, the highest level of expression of indicators of the phase of exhaustion both in young women and young men are observed immediately before the exam session.

3. Young women have more significant degree of expression of values that mark the leading components of the resistance phase, among young men - values that mark the leading indicators of the phases of stress and exhaustion.

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ОСОБЛИВОСТІ ЕМОЦІЙНОГО ВИГОРАННЯ СТУДЕНТІВ В УМОВАХ ПЕРЕДЕКЗАМЕНАЦІЙНОГО ТА ЕКЗАМЕНАЦІЙНОГО НАВЧАЛЬНОГО СТРЕСУ

Серебреннікова О. А., Макаров С. Ю.

Важливе місце у структурі особливостей особистості студентської молоді, яка оволодіває певним фахом і перебуває в умовах передекзаменаційного та екзаменаційного навчального стресу, належить провідним характеристикам рівня вираження емоційного вигорання, що є незаперечним чинником формування високого рівня емоційної нестійкості дівчат і юнаків до дії чинників довкілля та соціальних і професійних умов життя. Метою роботи є дослідження особливостей емоційного вигорання студентів закладів вищої медичної освіти, які перебувають в умовах передекзаменаційного та екзаменаційного навчального стресу. Дослідження проводились на базі Вінницького національного медичного університету ім. М. І. Пирогова серед 67 студентів 3 курсу медичного факультету відповідно за 1 місяць до складання та безпосередньо перед періодом складання диференційованих заліків і проведенням екзаменаційної сесії із використанням особистісного опитувальника Бойка. Статистичний аналіз одержаних даних, що передбачав застосування процедур описової статистики, здійснювався на основі використання стандартного пакету прикладних програм статистичного аналізу "Statistica 6.1" (ліцензійний № АХХ910А374605FA). Отримані результати засвідчують суттєве збільшення показників ступеня вираження усіх провідних фаз емоційного вигорання студентів протягом передекзаменаційного та екзаменаційного періодів, причому

в найбільшій мірі це явище стосується найбільш несприятливих за своїм змістом фаз резистентності та виснаження. Встановлено, що рівень вираження провідних характеристик емоційного вигорання у найбільшій частки дівчат і юнаків характеризується перебуванням у фазі резистентності. Найбільш високий ступінь вираження показників фази напруження емоційного вигорання і у дівчат, і у юнаків властивий для періоду за 1 місяць до екзаменаційної сесії, разом з тим, найбільш високий рівень вираження показників фази виснаження і у дівчат, і у юнаків спостерігається безпосередньо перед екзаменаційною сесією. Серед дівчат реєструється більш значущий ступінь вираження величин, які відзначають провідні складові фази резистентності, серед юнаків - величин, які відзначають провідні показники фаз напруження та виснаження. Одержані результати мають суттєву значущість як з позицій визначення особливостей формування адаптаційних ресурсів організму, так і з позицій встановлення практично-значущих підходів до формування особистості студентів, що забезпечують становлення необхідного для успішного засвоєння майбутнього фаху робочого динамічного стереотипу виконання навчальної і професійної діяльності та запобігання виникненню небажаних емоційних реакцій у відповідь на дію чинників навчального або трудового процесу.

Ключові слова: студенти, заклади вищої медичної освіти, емоційне вигорання, передекзаменаційний та екзаменаційний навчальний стрес.

ОСОБЕННОСТИ ЭМОЦИОНАЛЬНОГО ВЫГОРАНИЯ СТУДЕНТОВ В УСЛОВИЯХ ПРЕДЭКЗАМЕНАЦИОННОГО И ЭКЗАМЕНАЦИОННОГО УЧЕБНОГО СТРЕССА

Серебренникова О. А., Макаров С. Ю.

Важное место в структуре личностных особенностей студенческой молодежи, овладевающей определенной специальностью и находящейся в условиях предэкзаменационного и экзаменационного учебного стресса, принадлежит ведущим характеристикам степени выраженности эмоционального выгорания, являющегося неотъемлемым фактором формирования высокого уровня эмоциональной неустойчивости девушек и юношей к воздействию факторов окружающей среды, социальных и профессиональных условий жизни. Целью работы является исследование особенностей эмоционального выгорания студентов учреждений высшего медицинского образования, находящихся в условиях предэкзаменационного и экзаменационного учебного стресса. Исследования проводились на базе Винницкого национального медицинского университета им. Н. И. Пирогова среди 67 студентов 3 курса медицинского факультета соответственно за 1 месяц до сдачи и непосредственно перед сдачей дифференцированных зачетов и проведением экзаменационной сессии с использованием личностного опросника Бойко. Статистический анализ полученных данных, предусматривающий применение процедур описательной статистики, осуществлялся на основе использования стандартного пакета прикладных программ статистического анализа "Statistica 6.1" (лицензионный № АХХ910А374605FA). Полученные результаты свидетельствуют о существенном увеличении показателей степени выраженности ведущих фаз эмоционального выгорания студентов на протяжении предэкзаменационного и экзаменационного периодов, причем в наибольшей степени данное явление касалось наиболее неблагоприятных по своему содержанию фаз резистентности и истощения. Установлено, что уровень выраженности ведущих характеристик эмоционального выгорания у наибольшей части девушек и юношей характеризуется пребыванием в фазе резистентности. Наиболее высокая степень выраженности показателей фазы напряжения эмоционального выгорания и у девушек, и у юношей свойственна для периода за 1 месяц до экзаменационной сессии, вместе с тем, наиболее высокий уровень выраженности показателей фазы истощения и у девушек, и у юношей наблюдается непосредственно перед экзаменационной сессией. У девушек регистрируется более значимая степень выраженности величин, характеризующих ведущие составляющие фазы резистентности, среди юношей - величин, характеризующих ведущие составляющие фазы напряжения и истощения. Полученные данные имеют существенную значимость как с позиций определения особенностей формирования адаптационных ресурсов организма, так и с позиций установления практически значимых подходов к формированию личности студентов, обеспечивающих становление необходимого для успешного овладения будущей профессии рабочего динамического стереотипа, адекватного выполнения учебной и профессиональной деятельности, а также предупреждения возникновения неблагоприятных эмоциональных реакций в ходе воздействия факторов учебного либо трудового процесса.

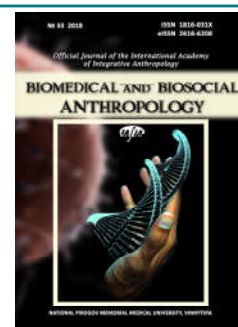
Ключевые слова: студенты, учреждения высшего медицинского образования, эмоциональное выгорание, предэкзаменационный и экзаменационный учебный стресс.



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Ovarian characteristics in the fetal period: topographic and morphometric parallels

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Defects of the urinary system take the 3rd place by their occurrence including 6% of developmental defects of the female reproductive organs. Therefore modern studies in the field of perinatal anatomy are of a special importance. Objective of the study was to determine age peculiarities in the structure and topography of the fetal ovaries as well as similar and different tendencies in changes of the ovarian morphological parameters of the two groups of fetuses, remote in time. The study was conducted in the two groups of human fetuses, 4-10 months of development, 161.0-500.0 mm of the parietal-calcanal length. The first group consisting of 35 specimens divided into 7 subgroups according to the month of development (4, 5, 6, 7, 8, 9 and 10), was formed with fetuses died during 2017-2019 years. The second group included specimens of fetuses collected during 1970-1990. The obtained results were statistically processed in the licensed statistical package "Statistica 6.0". The character of distribution for every obtained variation lines, mean values for every sign, standard quadratic deviation, percentile scope of the parameters were evaluated. Reliability of differences in the indices between independent quantitative values was determined by means of Mann-Whitney U-criterion. The conducted study determined that the ascending position of the ovaries in the early fetuses can be considered normal for the given age group, though the topography is indicative of developmental retardation at the late stages of perinatal development. The length of the ovary in both groups increases gradually from the 4th to the 10th month with a certain delay during the 6th month. It might be associated with intensified growth of its parenchyma, and intensive increase of its width and length respectively. The majority of the ovarian parameters of 9-10 month fetuses do not differ reliably, which is indicative of a complete development of the ovarian definite structure at the 9th month of the intrauterine development. Comparison of the parameters of the two groups of fetal specimens, remote in time, is indicative of the fact that in the majority of the parameters they do not differ. Although in modern studies the length of the right ovary in 8-month fetuses, and the length of the left ovary in 7-month fetuses is shorter than that of the archival specimens. Similarly the width of the left ovary in 4-month fetuses appears to be reliably shorter than that of the archival specimens. The thickness of the right ovary of 7 and 10-month modern fetuses is reliably less than that of the appropriate groups of the archival specimens. The thickness of the left ovary of modern fetuses is reliably less than that of the archival specimens during the 10th month. Therefore, a reliable difference was found only in 2 pairs of the parameters included in 42 pairs of the examined morphometric parameters of both groups. It is indicative of inconsiderable changes of these parameters during the period of 27-49 years.

Keywords: ovaries, fetus, anatomy, human.

Introduction

Female reproductive health depends on a normal development of the ovary - one of the most important organs of the reproductive system. Dynamic processes in ovarian topography changes during the perinatal period play an important role as a cause promoting deviations in the

sexual development of girls. The causes and the major stages of development of such wide-spread diseases, as ovarian cystic disease, ovarian exhaustion syndrome etc., nowadays is considered to occur during the period of intrauterine development. Therefore, examinations of

structural peculiarities and organ topography during perinatal period are of special value. Moreover, the results of such studies form the basis for the development of new and improvement of the existing methods of surgical correction of congenital pathology [2, 13, 17, 20, 21].

Every year according to the available data of medical-genetic service of the Ministry of Health of Ukraine about 3000 cases of congenital defects of different organs and systems are registered. Defects of the urinary system take the 3rd place by their occurrence including 6 % of developmental defects of the female reproductive organs. It should be noted that these data are subjective to some extent as a certain percentage of female reproductive pathology is found only when a woman is in her fertile age, and it makes the choice of methods and efficacy of treatment complicated [1, 10, 12, 19, 24].

The majority of scientific publications do not contain a comprehensive approach to the study of the issue of perinatal morphogenesis and development of ovarian topography. As a rule, studies are fragmentary and conducted on an inconsiderable amount of objects without consideration of correlative interrelations of the internal female reproductive organs with the adjacent organs at different terms of perinatal period. Therefore, the study within the frame of perinatal anatomy of ovaries is topical and timely [3-6, 8].

Objective of the study was to determine age peculiarities in the structure and topography of the fetal ovaries as well as similar and different tendencies in changes of the ovarian morphological parameters of the two groups of fetuses, remote in time.

Materials and methods

The study is a fragment of a planned scientific-research work of M.G. Turkevych Department of Human Anatomy and the Department of Anatomy, Clinical Anatomy and Operative Surgery at the Higher State Educational Establishment of Ukraine "Bukovinian State Medical University" (BSMU) "Peculiarities of Morphogenesis and Topography of the Systems and Organs during Prenatal and Postnatal Periods of Human Ontogenesis" (state registration № 0115U002769). The materials of the study are approved by the BSMU Biomedical Ethics Board. It determined that the study was conducted according to the requirements of the Council of Europe Convention for the Protection of Vertebrate Animals used for Experimental and other Scientific Purposes (18.03.1986), World Medical Association Declaration of Helsinki "Ethical principles for medical research involving human subjects" (1964-2013), ICH GCP (1996), EEC Directive № 609 (24.11.1986), the Orders of the Ministry of Health of Ukraine № 690 (23.09.2009), № 944 (14.12.2009), № 616 (03.08.2012).

The study was conducted in the two groups of human fetuses, 4-10 months of development, 161.0-500.0 mm of the parietal-calcaral length. The first group consisting of 35 specimens divided into 7 subgroups according to the

Table 1. Age of the examined objects.

| Modern specimens | | | | | | | |
|-------------------------------|--------------------|-------|-------|-------|-------|-------|-------|
| Months | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Parietal-calcaral length (mm) | 165.0 | 210.0 | 260.0 | 310.0 | 355.0 | 405.0 | 455.0 |
| | 170.0 | 220.0 | 260.0 | 310.0 | 360.0 | 420.0 | 455.0 |
| | 170.0 | 220.0 | 270.0 | 325.0 | 360.0 | 430.0 | 460.0 |
| | 180.0 | 230.0 | 280.0 | 340.0 | 370.0 | 430.0 | 465.0 |
| | 180.0 | 240.0 | 300.0 | 340.0 | 380.0 | 445.0 | 470.0 |
| | Archival specimens | | | | | | |
| | 170.0 | 210.0 | 260.0 | 310.0 | 355.0 | 410.0 | 455.0 |
| | 170.0 | 210.0 | 260.0 | 310.0 | 355.0 | 410.0 | 455.0 |
| | 170.0 | 210.0 | 260.0 | 310.0 | 355.0 | 410.0 | 455.0 |
| | 170.0 | 220.0 | 265.0 | 320.0 | 360.0 | 420.0 | 460.0 |
| | 170.0 | 220.0 | 265.0 | 320.0 | 360.0 | 420.0 | 460.0 |
| | 170.0 | 220.0 | 270.0 | 320.0 | 360.0 | 425.0 | 460.0 |
| | 170.0 | 225.0 | 270.0 | 330.0 | 360.0 | 430.0 | 460.0 |
| | 170.0 | 230.0 | 275.0 | 335.0 | 365.0 | 430.0 | 465.0 |
| | 180.0 | 230.0 | 275.0 | 340.0 | 365.0 | 430.0 | 465.0 |
| | 180.0 | 235.0 | 290.0 | 340.0 | 370.0 | 440.0 | 465.0 |
| | 180.0 | 240.0 | 290.0 | 340.0 | 370.0 | 440.0 | 465.0 |
| | 180.0 | 240.0 | 300.0 | 340.0 | 370.0 | 440.0 | 470.0 |
| | 180.0 | 245.0 | 300.0 | 345.0 | 380.0 | 445.0 | 470.0 |
| | 180.0 | 250.0 | 300.0 | 345.0 | 380.0 | 445.0 | 470.0 |
| | 185.0 | 250.0 | 300.0 | 350.0 | 380.0 | 445.0 | 470.0 |

month of development (4, 5, 6, 7, 8, and 10), was formed with fetuses died during 2017-2019 years. They were examined in a prosectorium of Chernivtsi Regional Municipal Medical Institution "Autopsy Bureau" during planned dissections. The second group was formed with fetal specimens taken from the Museum of BSMU Department of Anatomy, Clinical Anatomy and Operative Surgery collected during 1970-1990. The age of fetuses and neonates was determined immediately after they were obtained before fixation by means of measuring the parietal-coccygeal length and parietal-calcaral length according to the tables by A.A. Zavarzin, A.G. Knorre, B.M. Petten, recommendations issued by B.P. Khvatov, Yu.N. Shapovalov, A.I. Brusilovsky, L.S. Georgiyevskaya, and G.G. Avtandilov. The age of the examined objects is presented in Table 1. Neutral formaldehyde solution as a fixing solution was chosen because V.I. Proniayev et al [15] indicated it as the one least changing the size of a specimen. First, fetal specimens were measured and then fixed in 5-7 % formaldehyde solution during 2-3 weeks. Then they were kept in 3-5 % formaldehyde solution.

The obtained results were statistically processed in the licensed statistical package "Statistica 6.0" applying nonparametric assessment methods. The character of distribution for every obtained variation lines, mean values for every sign, standard quadratic deviation, percentile scope of the parameters were evaluated. Reliability of

differences in the indices between independent quantitative values was determined by means of Mann-Whitney U-criterion [7, 18].

Results

The ovaries in 4-5-month fetuses (161.0-250.0 mm of parietal-calcanal length) are of an elongated triangle regular shape (they do not form folds). Topographic peculiarities of the fetal ovaries on particular examples typical for a certain age period are demonstrated in the Figure 1. The ovaries are located in an ascending position. They closely adjoin to the lateral walls of the rectum. The uterine tubes extend on both sides of the ovaries and adjoin to them: the right uterine tube - to the dorsal side, and the left one - to the ventral. The left ovary touches the loop of the sigmoid by its tubular extremity. The uterine extremity of the left ovary is located on the uterine fundus. In the majority of cases it is concave in shape which is peculiar for this age period. The uterine extremity of the right ovary is immersed into the rectouterine (Douglas') pouch. An ascending position of the ovaries in this case is peculiar for this age group.

The fetus 360 mm of parietal-calcanal length is characterized by the ovary with a curved hook-like shape (Fig. 2). The uterine extremity is immersed into the rectouterine (Douglas') pouch. The tubular extremity is curved and touches the sheathing of the right uterine tube. The base and dorsal side adjoin to the iliac vessels and right ureter covered with the parietal layer of the peritoneum of the dorsal abdominal wall. The ovary is of a segmental structure. The uterine and tubular portions are visible separated by a shallow sulcus. It should be noted that segmental structure of the ovaries peculiar for fetuses is found less commonly in adults. In our opinion, it is associated with an increased volume of the parenchyma followed by smoothing the sulci that divide ovaries into the lobes. Thus, division of the ovaries into the lobes is an arbitrary age feature of their structure.

The left ovary has a curved tubular extremity. 2/3 of the ovarian base closely adjoins to the left uterine tube. The dorsal surface touches the parietal peritoneum of the posterior abdominal wall covering ureters and iliac vessels. The ventral surface touches the sigmocolic segment and the sigmoid.

Analyzing the dynamics of changes of the right ovarian length in 4-10-month fetuses from the first group (Fig. 3 A), it should be noted that its length is reliably shorter ($p < 0.05-0.01$) in 4-month fetuses than in all the following age periods, except the period of 6 month of development ($p > 0.05$). The length of the right ovary in 5-month fetuses is shorter than that of the 8-10-month fetuses ($p < 0.05-0.01$), but it is longer than that of 6-month fetuses ($p < 0.05$). The length of the right ovary of 6-month fetuses is reliably shorter than that of the 5 and 7-10-month fetuses ($p < 0.05-0.01$). It does not differ from the length of the right ovary in 4-month fetuses ($p > 0.05$). The length of the right ovary in 7-month



Fig. 1. Internal female reproductive organs of the fetus 270,0 mm of parietal-calcanal length. Macrospecimen. Notes: 1 - uterine; 2 - round ligament of uterus; 3 - uterine tubes; 4 - ovaries; 5 - rectum; 6 - urinary bladder.

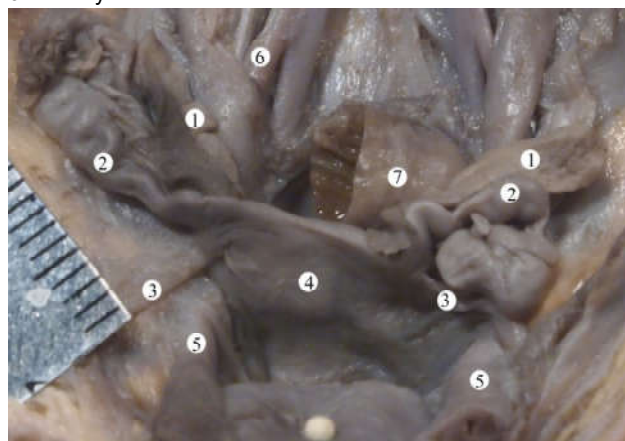


Fig. 2. Internal female reproductive organs of the fetus 270,0 mm of parietal-calcanal length. Macrospecimen. Notes: 1 - ovaries; 2 - uterine tubes; 3 - round ligaments of the uterine; 4 - uterine; 5 - umbilical arteries; 6 - right ureter; 7 - rectum.

fetuses does not differ reliably from that of the 5 and 8-month fetuses ($p > 0.05$). It is reliably longer than the length of the right ovary in the 4 and 6-month fetuses ($p < 0.05$). The length of the right ovary in the 8-month fetuses is reliably shorter than that of the 9 and 10-month fetuses ($p < 0.05$). The length of the right ovary of the 9 and 10-month fetuses does not differ reliably ($p < 0.05$). This parameter in the fetuses from the second group (Fig. 3 B) does not differ reliably from that of the first group ($p > 0.05$) among the 4-7, 9 and 10-month fetuses. Though, it differs reliably in 8-month fetuses ($p < 0.05$). It means that the length of the right ovary of modern specimens is shorter than that of the archival ones.

Dynamics of the length of the left ovary from the first group in the fetal period (Fig. 4 A) has its certain peculiarities in comparison with the right ovary. This parameter in 4-7-month fetuses does not differ reliably ($p > 0.05$), but it is reliably shorter than that of the left ovary in 8-10-month fetuses ($p < 0.05-0.01$). The length of the left ovary in the 5-8-month fetuses does not undergo much changes either ($p > 0.05$), but it is shorter than that in the 9 and 10-month

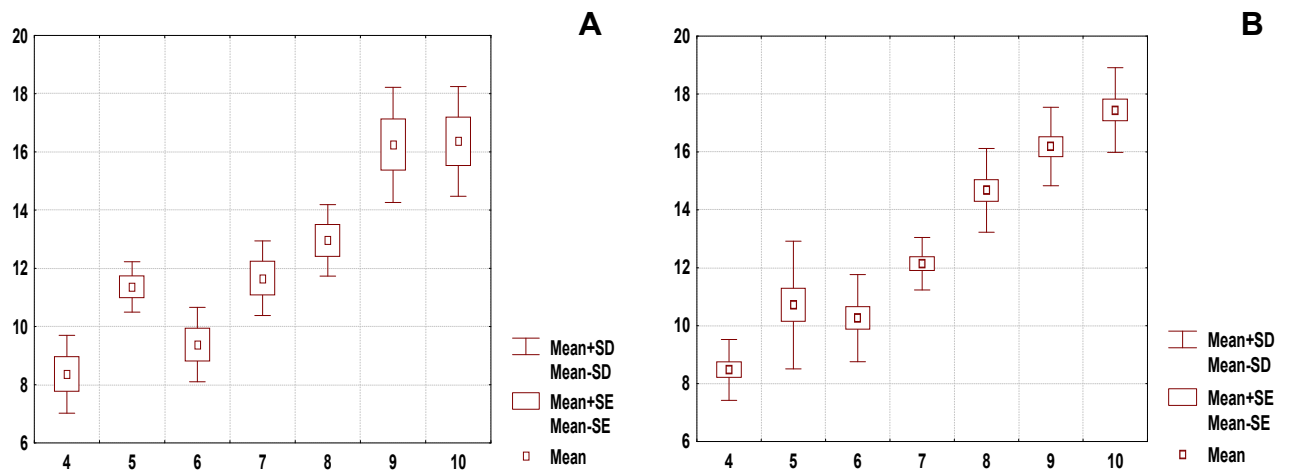


Fig. 3. The length of the right ovary in fetuses from different age groups (mm). Here and further: A - the first group of the study, 2017-2019; B - the second group, specimens of 1970-1990.

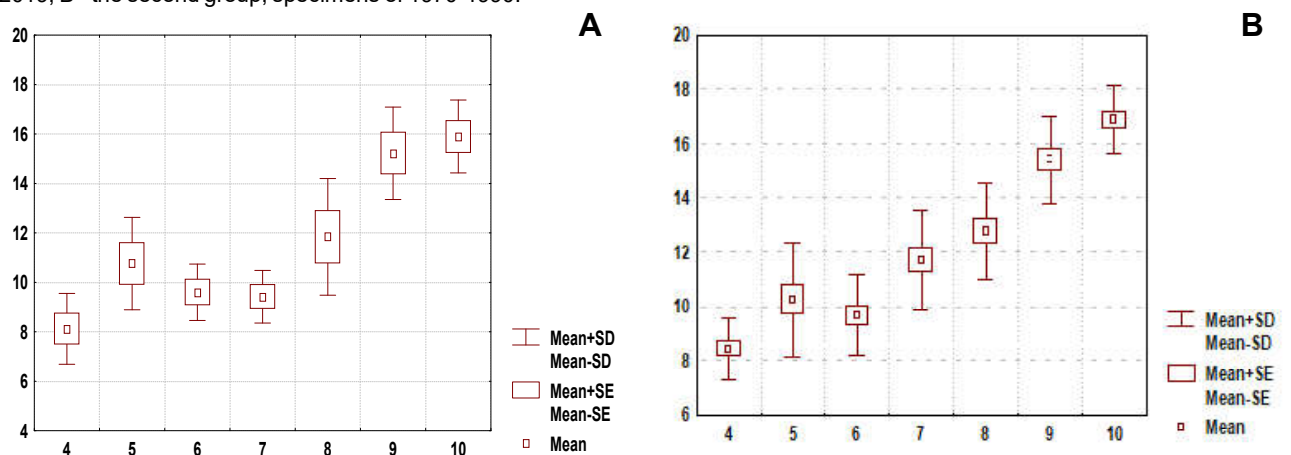


Fig. 4. The length of the left ovary in fetuses of different age groups (mm).

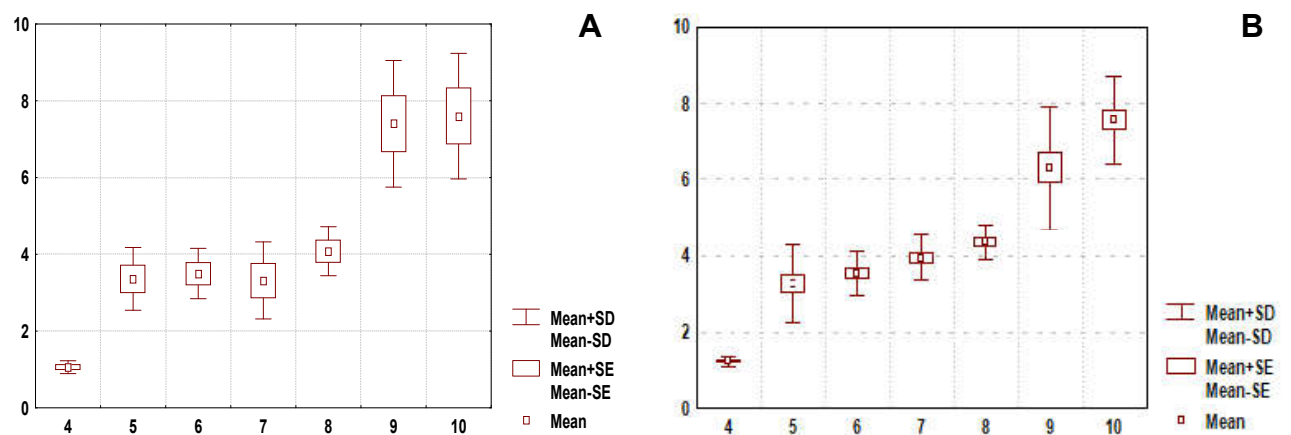


Fig. 5. The width of the right ovary in fetuses from different age groups (mm).

fetuses. This parameter of 8-9-month and 9-10-month fetuses does not differ reliably ($p>0.05$). The length of the left ovary in the 8-month fetuses is reliably longer than that of the 4-7-month fetuses. It is reliably shorter than that of the 9 and 10-month fetuses. The size of the left ovary at this period is reliably longer than in all the previous age groups

($p<0.05-0.01$). Dynamics of the length of the left ovary in the fetuses from the second group (Fig. 4 B) is reliably bigger than that in the 7-month fetuses from the first group ($p<0.05$). In the rest of the age groups these parameters in the first and second groups do not differ reliably ($p>0.05$).

The width of the right ovary in the 4-month fetuses is

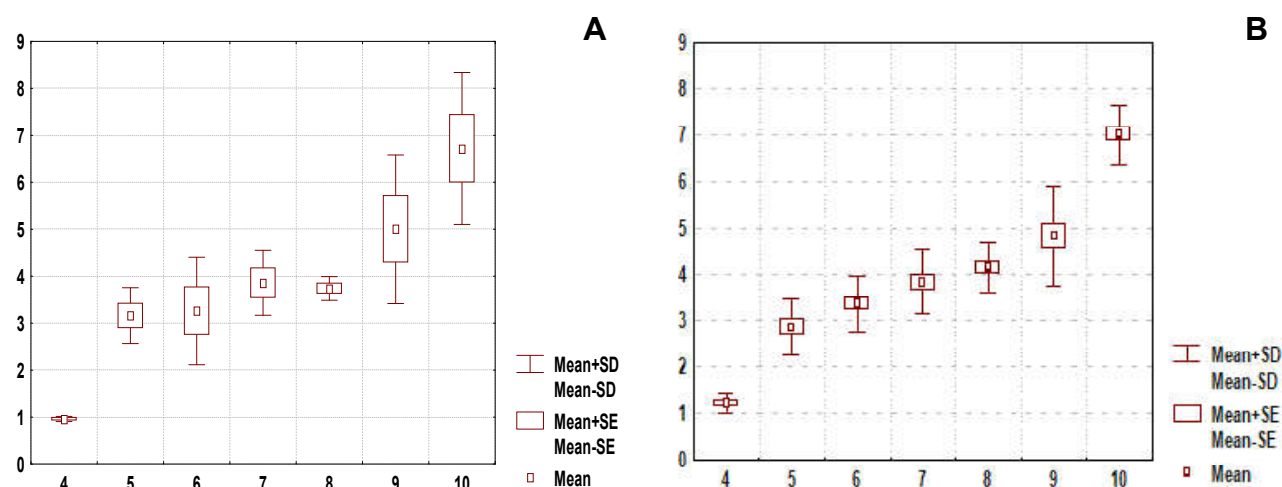


Fig. 6. The width of the left ovary in fetuses from different age groups (mm).

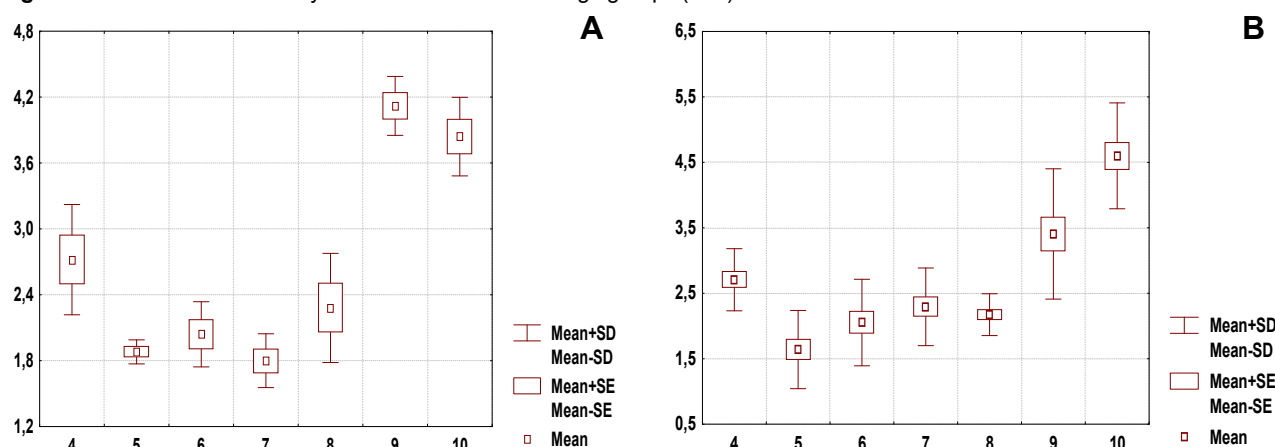


Fig. 7. The thickness of the right ovary in fetuses of different age groups (mm).

reliably shorter than that in all the other age groups ($p < 0.01$) (Fig. 5 A). This parameter in the 5-8-month fetuses does not differ reliably ($p > 0.05$), though it is reliably shorter than that of the 9-10-month fetuses ($p < 0.05$). Their parameters do not reliably differ ($p > 0.05$). This parameter among the fetuses from the first and second groups does not differ reliably ($p > 0.05$) (Fig. 5 B).

The width of the left ovary in the 4-month fetuses from the first group is reliably shorter than that of all the other age groups ($p < 0.01$) (Fig. 6 A). This parameter in the 5-8-month fetuses does not differ reliably similarly to the parameters of the 6-9-month fetuses ($p > 0.05$). Though it is reliably shorter than that of the 9-10-month fetuses ($p < 0.05$), which parameters do not differ much ($p > 0.05$). The width of the left ovary in the fetuses from the first and second groups differs reliably between the groups of the 4-month fetuses only ($p < 0.05$) (Fig. 6 B). In the group of modern specimens this parameter is reliably shorter than that of the fetuses from the archival group.

The thickness of the right ovary in the 4-month fetuses from the first group is reliably less than that of the 9 and 10-month fetuses ($p < 0.05-0.01$) (Fig. 7 A). Though, it is reliably

bigger than that of the 5 and 7-month fetuses ($p < 0.01$). It coincides with the thickness of the right ovary in the 6 and 8-month fetuses ($p > 0.05$). This parameter in the 5-8-month fetuses does not differ reliably ($p > 0.05$). It is reliably less than that of the 9 and 10-month fetuses. There was no reliable difference found between their parameters ($p > 0.05$). A reliable difference between the thickness parameters of the right ovary of fetuses in all the age periods between the fetuses from A and B groups was found in the 7 and 10-month fetuses only. In fetuses from A group the thickness of the right ovary is reliably less than that of B group in the 7 and 10-month fetuses (Fig. 7 B).

The thickness of the left ovary in the 4-month fetuses from the first group (Fig. 8 A) is reliably shorter than that of the 9 and 10-month fetuses ($p < 0.01$), but it is reliably bigger than that in the 5-month fetuses ($p < 0.05$), and it coincides with the thickness of the right ovary in the 6-8-month fetuses ($p > 0.05$). This parameter in the 5-8-month fetuses does not differ reliably ($p > 0.05$). It is reliably less than that of the 9 and 10-month fetuses which parameters do not differ reliably ($p > 0.05$). A reliable difference between the thickness parameters of the right ovary in all the age periods between

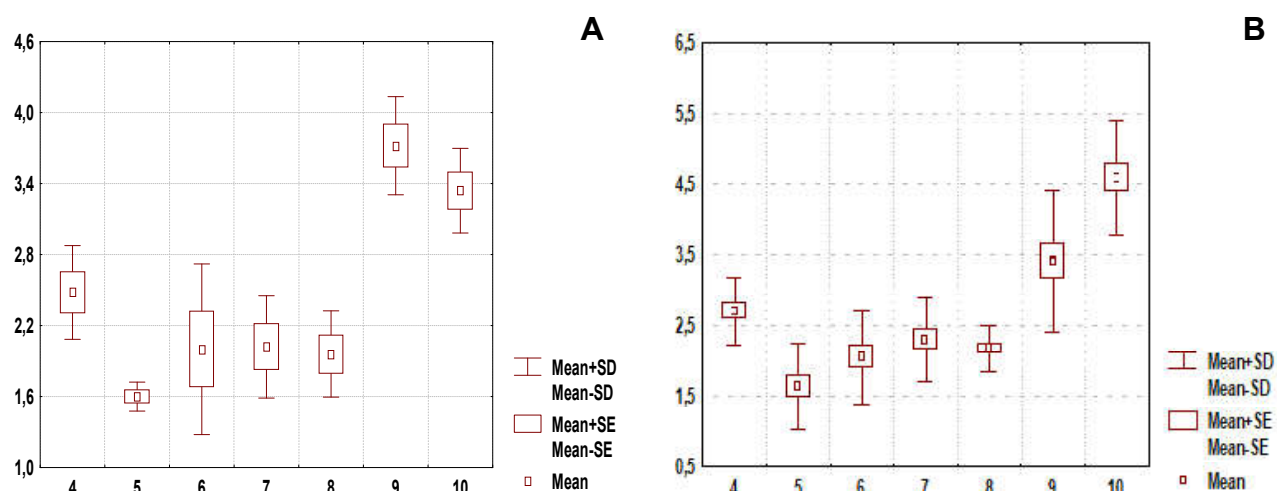


Fig. 8. Thickness of the left ovary of fetuses from different age groups (mm).

the fetuses from A and B groups was found in the 10-month fetuses only. In fetuses from A group the thickness of the right ovary is reliably less than that of B group in the 10-month fetuses (Fig. 8 B).

Discussion

As the result of examination of the topographic ovarian dynamics in fetuses we have found that during the fetal period ovaries can be in the ascending and descending position (immersed in the rectouterine (Douglas') pouch). The ascending position, when the ovaries can reach the caecum and descending colon (the right and left respectively), is peculiar for the 4-7-month fetuses. Often the ovaries are located on both sides of the rectum and adjoin it closely, immersing by their tubular extremities between the loops of the small intestines. Such topographic-anatomical peculiarities can be considered standard for the fetuses of the given age group. Though they can be indicative of developmental retardation at the late stages of the perinatal development, which is not mentioned in the works of certain researchers [9, 14, 16, 19, 23, 25].

In the majority of cases in the 8-month fetuses the ovaries are localized in the cavity of the minor pelvis on the level of the uterine fundus. In late fetuses (9-10 months) and neonates both ovaries occupy the position close to the definite one - parallel to the uterine fundus in the cavity of the minor pelvis, or one of the ovaries remains immersed in the rectouterine (Douglas') pouch.

During the last months of the intrauterine development ovarian topography changes: their position changes from the ascending to the horizontal one. The position in the rectouterine (Douglas') pouch should not be considered peculiar for the definite form, but this position is peculiar for the majority of the late fetuses. Ovarian shape transforms from the elongated triangle to elongated oval. Their segmental structure disappears. To the end of the fetal period the ovarian position changes concerning the uterine tubes from the parallel one at the 8-month period to the

perpendicular one at the 10th month.

Analysis of reliable changes of the ovarian morphometric parameters in fetuses by means of Mann-Whitney U-criterion was indicative of the fact that the length of ovaries in both groups increases gradually from the 4th to the 10th months with an inconsiderable retardation at the 6th month. It might be associated with intensified growth of its parenchyma and intensive increase of its width and thickness respectively. The majority of ovarian parameters in the 9-10-month fetuses do not differ reliably, which is indicative of a complete formation of a definite structure of the ovaries at the 9th month of the intrauterine development. Comparison of the parameters of the fetal specimens in the two groups, remote in time, indicates that in the majority of parameters the values do not differ, though in 8-month fetuses the length of the right ovary and in 7-month fetuses the length of the left ovary in modern studies is less than that in the archival specimens. Similarly the width of the left ovary in modern 4-month fetuses is reliably shorter than that of the archival specimens. The thickness of the right ovary in the 7 and 10-month modern fetuses is reliably less than that in the appropriate groups of the archival specimens. The thickness of the left ovary of modern fetuses is reliably less than that of the archival specimens at the 10th month.

Conclusions

1. An ascending position, when ovaries can reach the caecum and descending colon (the right and left ovary respectively), is peculiar for the 4-7-month fetuses. It is associated with arcuate or vallate uterus. Such topographic-anatomical peculiarities can be considered standard for fetuses of the given age group, though they are indicative of developmental retardation at the late stages of the perinatal development. In the majority of cases ovaries in the 8-10-months occupy a descending position.

2. Morphometric parameters in the group of modern specimens are the following: the length of the right ovary in

the 8-month fetuses and the left ovary in the 7-month fetuses, the width of the left ovary in the 4-month fetuses, the thickness of the right ovary in the 7 and 10-month

fetuses, and the left ovary at the 10th month are reliably less than those in the group of the archival specimens.

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ХАРАКТЕРИСТИКА ЯЄЧНИКІВ У ПЛОДОВОМУ ПЕРІОДІ: ТОПОГРАФІЧНІ ТА МОРФОМЕТРИЧНІ ПАРАЛЕЛІ

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Вади сечостатевої системи посідають 3-тє місце за частотою виникнення. Серед них вади розвитку жіночих статевих органів становлять до 6 %. Саме тому дослідження перинатальної анатомії нині набуває особливо важливого значення. Мета роботи - встановити вікові особливості будови та топографії яєчників плодів, а також спільні та відмінні тенденції змін морфологічних параметрів яєчників двох груп плодів віддалених у часі. Дослідження проведені на двох групах плодів людини 4-10 місяців розвитку - 161,0-500,0 мм тім'яно-п'яткової довжини. Перша група - 35 препаратів, розділених на 7

підгруп відповідно місяцям розвитку (4, 5, 6, 7, 8, 9 і 10), була сформована з плодів, що померли впродовж 2017-2019 рр. Друга група була сформована з препаратів плодів, що були зібрані впродовж 1970-1990 рр. Статистичний аналіз отриманих результатів проведений у ліцензійному статистичному пакеті "Statistica 6.0". Проведена оцінка характеру розподілів для кожного з отриманих варіаційних рядів, визначені середні для кожної ознаки, що вивчається, стандартне квадратичне відхилення, процентильний розмах показників. Достовірність різниці значень між незалежними кількісними величинами визначали за допомогою U-критерія Мана-Уїтні. В результаті проведених досліджень встановлено, що висхідне положення яєчників ранніх плодів можна вважати нормою для даної вікової групи, проте така топографія свідчить про затримку розвитку на пізніх етапах перинатального розвитку. Довжина яєчників двох груп поступово збільшується з 4 по 10 місяць, з деякою затримкою росту на 6 місяці, що імовірно пов'язано з інтенсифікацією розростання їх паренхіми і відповідно інтенсивного збільшення їх ширини та товщини. Більшість параметрів яєчника плодів 9-10 місяців достовірно не різняться, що свідчить про завершення становлення дефінітивної будови яєчників на 9 місяці внутрішньоутробного розвитку. Порівняння параметрів двох розведених (віддалених) у часі груп препаратів плодів вказує на те, що у переважній більшості показників дані не різняться, проте у плодів 8 місяця довжина правого яєчника і 7 місяця довжина лівого яєчника у сучасних дослідженнях менша ніж у архівних препаратів. Так само ширина лівого яєчника сучасних плодів 4 місяця достовірно менша за таку архівних препаратів. Товщина правого яєчника плодів 7 та 10 місяців сучасних плодів достовірно менша, ніж у відповідних групах архівних препаратів. Товщина лівого яєчника сучасних плодів достовірно менша за таку архівних препаратів на 10 місяці. Отже, з 42 пар досліджених морфометричних параметрів двох груп плодів, достовірну відмінність виявили лише у 2 парах параметрів, що свідчить про незначні зміни цих параметрів впродовж 27-49 років.

Ключові слова: яєчники, плід, анатомія, людина.

ХАРАКТЕРИСТИКА ЯИЧНИКОВ В ПЛОДНОМ ПЕРИОДЕ: ТОПОГРАФИЧЕСКИЕ И MORFOMETRICHESKIE PARALLELI

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Пороки мочеполовой системы занимают 3-е место по частоте возникновения. Среди них, пороки развития женских половых органов составляют до 6 %. Именно поэтому исследования перинатальной анатомии сейчас приобретает особенно важное значение. Цель работы - установить возрастные особенности строения и топографии яичников плодов, а также общие и отличительные тенденции изменения морфологических параметров яичников двух отдаленных во времени групп плодов. Исследования проведены на двух группах плодов человека 4-10 месяцев развития - 161,0-500,0 мм темной пятночной длины. Первая группа - 35 препаратов, разделенных на 7 подгрупп соответственно месяцам развития (4, 5, 6, 7, 8, 9 и 10), была сформирована из плодов, что умерли в течении 2017-2019 гг. Вторая группа была сформирована из препаратов плодов, собранных в течении 1970-1990 гг. Статистический анализ полученных результатов проведен в лицензионном статистическом пакете "Statistica 6.0". Проведена оценка характера распределений для каждого из полученных вариационных рядов, определены средние для каждого изучаемого признака, стандартное квадратическое отклонение, процентильный размах показателей. Достоверность различий значений между независимыми количественными величинами определяли с помощью U-критерия Мана-Уитни. В результате проведенных исследований установлено, что восходящее положение яичников ранних плодов можно считать нормой для данной возрастной группы, однако такая топография свидетельствует о задержке развития на поздних этапах перинатального развития. Длина яичников двух групп постепенно увеличивается с 4 по 10 месяц, с некоторой задержкой роста на 6 месяце, предположительно связано с интенсификацией разрастания их паренхимы и соответственно интенсивного увеличения их ширины и толщины. Большинство параметров яичника плодов 9-10 месяцев достоверно не различались, что свидетельствует о завершении становления дефинитивного строения яичников на 9 месяце внутриутробного развития. Сравнение параметров двух разведенных (удаленных) во времени групп препаратов плодов указывает на то, что в подавляющем большинстве показателей данные не различались, однако у плодов 8 месяца длина правого яичника и 7 месяца - длина левого яичника в современных исследованиях меньше чем у архивных препаратов. Также ширина левого яичника современных плодов 4 месяца достоверно меньше, чем у архивных препаратов. Толщина правого яичника плодов 7 и 10 месяцев современных плодов достоверно меньше, чем у соответствующих групп архивных препаратов. Толщина левого яичника современных плодов достоверно меньше такую архивных препаратов на 10 месяце. Итак, из 42 пар исследованных морфометрических параметров двух групп плодов, достоверное отличие обнаружили только в 2 парах параметров, что свидетельствует о незначительных изменениях этих параметров в течение 27-49 лет.

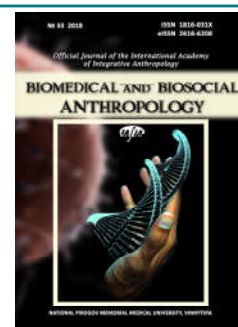
Ключевые слова: яичники, плод, анатомия, человек.



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Sexual features of spirometric indices within the juvenile period of ontogenesis

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The factor of sexual dimorphism is dominant in the ontogenetic formation of various organs and systems, in particular the respiratory organs, whose morpho-functional indicators have significant sex differences. The aim of this work is to establish the sex characteristics of spirometric normative indices in practically healthy young men and young women within the juvenile ontogeny period. Spirometric examination of 109 young women of the ontogeny adolescence was performed, including: 17-year-olds - 29; 18-year-olds - 27; 19-year-olds - 25; 20-year-olds - 28 people and 124 young men, including: 17-year-olds - 28; 18-year-olds - 37; 19-year-olds - 27; 20-year-olds - 32 people. Spirometric examination was performed according to the method of the American Association of Pulmonologists (1995) on the device Medgraphics Pulmonary Function System 1070 series. The analysis of the obtained results was carried out with the help of the licensing program "Statistica 5.5" using non-parametric methods of estimation of indicators. It is established that the indicators of vital capacity of lungs, forced vital capacity, forced capacity of lungs on inhalation, maximal voluntary ventilation, forced expiratory flow rate respectively of 25 % of forced vital capacity, maximum peak expiratory flow, inspiratory capacity, expiratory reserve volume and one-second forced exhalation volume in young men each calendar year and the general group is significantly higher compared to the corresponding years of ontogeny in young women. The only spirometric indicator that is significantly higher for young women than for young men is the Tiffno Index. The revealed sex differences in the magnitude of spirometric parameters can be explained by the significant somatometric differences between the male and female body. Based on the results obtained, we can conclude that the vast majority of spirometric parameters in young men in all calendar periods of adolescence have higher rates than in young women. The most significant gender differences in the majority of spirometric parameters were identified in 18-year-olds.

Keywords: spirometry, spirometric indices, young men, young women, sexual dimorphism.

Introduction

The factor of sexual dimorphism is dominant in the ontogenetic formation of different organs and systems. In this area, there are studies related to the determination of the sex differences of cardiovascular and parenchymal organs [8, 16, 18]. There is no exception regarding the presence of signs of sexual dimorphism and respiratory organs, morpho-functional indicators of which have significant sex differences in different periods of ontogeny [11, 15].

In addition, there has been an increasing number of epidemiological studies recently revealing gender differences in the prevalence and progression of respiratory diseases [5]. In particular, adolescence young men have an

increased exacerbation and greater incidence of asthma than young women, and in adolescence and adulthood this tendency is more pronounced in women. In chronic obstructive pulmonary disease (COPD), a disease that has historically been considered a men's disease, the mortality rate among women is now higher than among men [19]. COPD in women differs from men in phenotype, symptomatology and comorbidities. Women are more likely to develop chronic bronchitis, have more severe shortness of breath and comorbidity about diseases of the nervous system, in particular depression [21]. Compared to men, COPD in women revealed less airway obstruction, but more

serious impairment in gas transmission mechanisms. Parenchymal lesions in assessing lung diffusion capacity had a higher ratio of one-second forced expiratory volume (% of predicted) in women than in men [13].

Gender differences in the prevalence and progression of cystic fibrosis have been established [22]. In women, this genetic disease has worse effects (leading to a reduction in life expectancy) than in men, especially in response to *Pseudomonas aeruginosa* respiratory infections. Women also become colonized by certain common agents of cystic fibrosis earlier than men [20].

The rationale for such gender inequalities in respiratory diseases is only beginning to unfold, and further exploration of the mechanisms that will help develop treatment options for more effective individualized patient care. One of the ways of solving this problem is the study of spirometric parameters [6, 7, 12, 14] in practically healthy individuals of different sex of a separate ontogeny period in order to establish age and sex norms [1].

The *aim* of this work is to establish the sex characteristics of spirographic normative indices in practically healthy young men and young women within the juvenile ontogeny period.

Materials and methods

The materials of the study were obtained from the data bank of the research center of National Pirogov Memorial Medical University, Vinnytsya. Spirographic examination of 109 young women of the ontogeny adolescence was performed, including: 17-year-olds - 29; 18-year-olds - 27; 19-year-olds - 25; 20-year-olds - 28 people and 124 young men, including: 17-year-olds - 28; 18-year-olds - 37; 19-year-olds - 27; 20-year-olds - 32 people. Spirographic examination was performed according to the method of the American Association of Pulmonologists [2] on the device Medgraphics Pulmonary Function System 1070 series. The following spirographic parameters were investigated: FVC - forced vital capacity; SVC - vital lung capacity; FIVC - forced lung capacity for inhalation; MVV - maximal voluntary ventilation; FEF 25 % - forced expiratory flow, respectively, of 25 % of the forced life capacity; FEF 50 % - forced expiratory flow of 50 % of forced life, respectively; FEF 75 % - forced expiratory flow, respectively, of 75 % of the forced life capacity; FEF 75-85 % - forced expiratory flow (75 % to 85 % exhaled expiratory vital capacity, respectively); FEF 25-75 % - average expiratory flow; FEF MAX - maximum peak expiratory flow; IC - inspiratory capacity; ERV - expiratory reserve volume; FIF 50 % - forced inspiratory flow, which is 50 % of the exhale from the forced life capacity; FEV1 - one-second forced expiratory volume; FEV1/FVC is the ratio of one-second forced expiratory volume to the forced vital capacity (Tiffno Index). The results obtained were analyzed using the Statistica 5.5 licensing program, using non-parametric methods of estimating indicators.

Results

We found that the *vital capacity index* in 17-year-old young men was significantly greater than in 17-year-old young

women ($p < 0.001$), in 18-year-old young men significantly higher than in 18-year-old young women ($p < 0.001$), in 19-year-old young men were significantly larger than 19-year-old young women ($p < 0.001$) and 20-year-old young men were significantly larger than 20-year-old young women ($p < 0.001$). The value of the vital capacity index is significantly higher in the general group of young men than in the general group of young women ($p < 0.001$), which logically follows from the previous regularities (Table 1). *The rate of forced vital capacity* in young men is significantly higher (in all cases $p < 0.001$) than in young women. We found that the *forced inspiratory flow* in 17-year-old young men was significantly higher than in 17-year-old young women ($p < 0.01$), in 18-year-old young men significantly higher than in 18-year-old young women ($p < 0.001$), in 19-year-old young men were significantly larger than 19-year-old young women ($p < 0.01$) and in 20-year-old young men were significantly larger than 20-year-old young women ($p < 0.001$). The magnitude of the forced inspiration flow was significantly higher in the general group of young men than in the general group of young women ($p < 0.001$) (see Table 1).

It was found that the *maximal voluntary ventilation* rate in young men was significantly higher (in all cases $p < 0.001$) than in young women in all ages during the adolescent ontogeny period and in the general comparison groups. *The expiratory volume rate, which is 25 % of exhalation from the forced vital capacity*, respectively, in 17-year-old and 18-year-old young men was significantly higher than in 17-year-old and 18-year-old young women (in both cases, $p < 0.001$), in 19-year and 20-year-old young men were significantly larger than young women of the corresponding calendar age (in both cases $p < 0.01$) in the general group of young men than in the general group of young women ($p < 0.001$). It was found that the *expiratory volume rate, which is 50 % of exhalation from the forced vital capacity* in 17-year-old young men was significantly higher than in 17-year-old young women ($p < 0.001$), in 18-year-old young men significantly higher than in 18-year-old young women ($p < 0.001$), in the general group of young men significantly higher than in the general group of young women ($p < 0.001$). The expiratory volume rate, which is 75 % of exhalation from the forced vital capacity was significantly higher in the general group of young men than in the general group of young women ($p < 0.001$) and in 17-year-old young men than in 17-year-old young women ($p < 0.01$), in 18-year-old young men than in 18-year-old young women ($p < 0.001$). We found that the expiratory volume rate, respectively, from 75 % to 85 % of exhaled expedited life capacity in 17-year-old young men is greater than in 17-year-old young women ($p < 0.01$), in 18-year-old young men is greater than in 18-year-old young women ($p < 0.05$), in the general group of young men than in the general group of young women ($p < 0.01$) (see Table 1).

The mean expiratory flow rate in 17-year-old young men was significantly higher than in 17-year-old young women ($p < 0.001$) and in 18-year-old young men than in 18-year-old young women ($p < 0.001$). We found that the value of this

Table 1. Sexual dimorphism of spirometric indices in young men and young women ($M \pm \sigma$).

| Indicators | Age groups | Young women | Young men |
|-------------------|------------|-------------|----------------|
| SVC (l) | 17 | 3.980±0.762 | 5.384±0.701*** |
| | 18 | 4.011±0.536 | 5.473±0.805*** |
| | 19 | 4.130±0.628 | 5.561±0.712*** |
| | 20 | 4.305±0.675 | 5.809±0.916*** |
| | Total | 4.039±0.676 | 5.665±0.825*** |
| FVC (l) | 17 | 3.715±0.619 | 5.116±0.994*** |
| | 18 | 3.723±0.696 | 5.307±1.130*** |
| | 19 | 3.895±0.674 | 5.200±0.865*** |
| | 20 | 4.005±0.734 | 5.402±1.119*** |
| | Total | 3.767±0.665 | 5.417±1.044*** |
| FIVC (l) | 17 | 2.685±0.672 | 3.608±1.147** |
| | 18 | 2.761±0.788 | 3.702±1.124*** |
| | 19 | 2.921±0.633 | 3.704±1.024** |
| | 20 | 2.462±0.663 | 3.677±1.134*** |
| | Total | 2.686±0.715 | 3.682±1.065*** |
| MVV (l/m) | 17 | 100.0±19.9 | 153.3±38.7*** |
| | 18 | 105.9±21.3 | 181.5±34.1*** |
| | 19 | 104.0±28.3 | 176.5±32.3*** |
| | 20 | 121.8±23.5 | 189.9±34.0*** |
| | Total | 106.4±24.0 | 180.8±37.3*** |
| FEF 25 % (l/s) | 17 | 5.775±0.847 | 7.985±1.789*** |
| | 18 | 5.348±1.181 | 8.780±2.012*** |
| | 19 | 6.285±1.299 | 8.007±2.417** |
| | 20 | 6.906±1.544 | 8.647±2.139** |
| | Total | 6.047±1.367 | 8.566±2.073*** |
| FEF 50 % (l/s) | 17 | 4.213±0.956 | 5.654±1.270*** |
| | 18 | 3.685±0.986 | 6.242±1.706*** |
| | 19 | 4.438±1.332 | 5.156±1.822 |
| | 20 | 5.030±1.344 | 5.746±1.885 |
| | Total | 4.342±1.202 | 5.787±1.675*** |
| FEF 75 % (l/s) | 17 | 2.203±0.701 | 2.963±1.038** |
| | 18 | 2.052±0.724 | 2.985±1.031*** |
| | 19 | 2.355±0.856 | 2.609±1.120 |
| | 20 | 2.678±0.704 | 2.954±1.250 |
| | Total | 2.334±0.765 | 2.902±1.084*** |
| FEF 75-85 % (l/s) | 17 | 1.675±0.619 | 2.342±0.902** |
| | 18 | 1.684±0.604 | 2.245±0.871* |
| | 19 | 1.870±0.758 | 1.968±0.927 |
| | 20 | 2.107±0.697 | 2.245±1.093 |
| | Total | 1.859±0.691 | 2.218±0.946** |

indicator is greater in the general group of young men than in the general group of young women ($p < 0.001$). *Indicators of maximum peak expiratory flow and inspiratory capacity* in young men of the general group and each calendar year

Continuation of table 1.

| Indicators | Age groups | Young women | Young men |
|------------------|------------|--------------|----------------|
| FEF 25-75% (l/s) | 17 | 3.701±0.982 | 5.028±1.235*** |
| | 18 | 3.349±0.953 | 5.486±1.394*** |
| | 19 | 3.997±1.173 | 4.692±1.663 |
| | 20 | 4.500±1.161 | 5.173±1.618 |
| | Total | 3.864±1.126 | 5.153±1.463*** |
| FEF MAX (l/s) | 17 | 6.636±1.072 | 9.676±2.403*** |
| | 18 | 6.233±1.688 | 10.49±2.29*** |
| | 19 | 7.173±1.661 | 10.47±2.09*** |
| | 20 | 7.323±1.918 | 10.99±2.26*** |
| | Total | 6.778±1.604 | 10.60±2.31*** |
| IC (l) | 17 | 2.727±0.645 | 3.456±0.644*** |
| | 18 | 2.687±0.549 | 3.490±0.558*** |
| | 19 | 2.552±0.403 | 3.468±0.477*** |
| | 20 | 2.627±0.387 | 3.711±0.760*** |
| | Total | 2.627±0.494 | 3.588±0.655*** |
| ERV (l) | 17 | 1.251±0.291 | 1.926±0.484*** |
| | 18 | 1.325±0.286 | 1.983±0.680*** |
| | 19 | 1.578±0.427 | 2.094±0.680** |
| | 20 | 1.676±0.563 | 2.098±0.649** |
| | Total | 1.411±0.458 | 2.076±0.622*** |
| FIF 50 % (l/s) | 17 | 2.265±0.856 | 2.911±1.466 |
| | 18 | 2.374±1.000 | 2.935±1.105* |
| | 19 | 2.412±0.812 | 2.871±1.072 |
| | 20 | 2.557±0.869 | 2.991±1.403 |
| | Total | 2.374±0.822 | 2.979±1.240*** |
| FEV1 (l) | 17 | 3.214±0.510 | 4.428±0.844*** |
| | 18 | 3.204±0.604 | 4.598±0.975*** |
| | 19 | 3.432±0.688 | 4.344±0.841*** |
| | 20 | 3.551±0.682 | 4.720±0.885*** |
| | Total | 3.305±0.619 | 4.641±0.889*** |
| FEV1/FVC (%) | 17 | 86.85±7.14 | 86.47±6.32 |
| | 18 | 86.81±7.68 | 86.39±5.20 |
| | 19 | 87.82±7.46 | 83.53±8.39 |
| | 20 | 87.68±10.87* | 85.22±5.32 |
| | Total | 87.72±8.26** | 85.21±6.45 |

Notes: *** - indicator of statistical significance of sex differences if $p < 0.001$; ** - indicator of statistical significance of sex differences if $p < 0.01$; * - indicator of statistical significance of sex differences if $p < 0.05$.

were significantly higher compared to the corresponding years of ontogeny in young women (in all cases, $p < 0.001$) (see Table 1).

It was found that the *residual expiratory volume rate* in 17-year-old young men was significantly higher than in 17-year-old young women ($p < 0.001$), in 18-year-old young men significantly higher than in 18-year-old young women

($p < 0.001$), in 19-year-old young men were significantly larger than 19-year-old young women ($p < 0.01$) and 20-year-old young men were significantly larger than 20-year-old young women ($p < 0.01$). The value of the residual expiratory volume was significantly higher in the general group of young men than in the general group of young women ($p < 0.001$), which is quite clear when considering the previous patterns.

The forced expiratory volume rate, which is 50 % of exhalation from the forced vital capacity of only 18-year-old young men is significantly greater than in 18-year-old adolescent young women of ontogeny period ($p < 0.05$), in the general group of young men the value of this indicator is greater than in the general group of young women ($p < 0.001$).

It was found that the *one-second forced expiratory volume* of young men in all comparison groups ($p < 0.001$) was significantly higher than that of young women.

We found that in the general group of young women the value of the Tiffno index was significantly higher than in the general group of young men ($p < 0.01$) and in 20-year-old young women greater than in 20-year-old young men ($p < 0.05$) (see Table 1).

Discussion

In most scientific studies, there are significant differences in spirometric parameters between male and female [3, 4, 10]. Analyzing the sex characteristics of spirometry indices within the adolescent ontogeny period, we find that in all cases they are of greater importance in male than female, except for the Tiffno index. We found that the index of vital capacity of lungs in young men each calendar year (at 17 years by 35.27 %, at 18 - 36.45 %, at 19 - 34.64 %, at 20 - 34.93 %) and the general group (by 40.25 %) significantly higher compared to the corresponding years of ontogeny in young women. V. A. Melnyk and S. N. Melnyk [15] found that the rates of vital capacity of the lungs were higher in young men compared to young women in all age groups, and it was found that with age within the adolescent ontogeny, this indicator increases more rapidly in representatives male. This pattern is confirmed by the results obtained in our study, within the adolescent ontogeny period.

The most significant gender differences in the magnitude of the forced vital capacity index were established at the age of 18 (it is 42.57 % higher for young men than for young women); in 17-year-old young men this indicator is 37.71 % higher than in young women; in 19-year-olds - by 33.50 %; in 20-year-olds - by 34.88 %; in the general group of young men, compared with the general group of young women by 43.80 %. We found that the forced expiratory lung capacity of adolescents in each calendar year is significantly higher than the corresponding years of ontogeny in young women: in the 17 and 18 years, an increase is observed in the range of 34 %, in 19 years found the smallest gender difference (only 26.80 % this indicator is higher in young men), in 20 years - the highest (by 48.94 %). The maximum voluntary ventilation rate is significantly higher for young men than for young women in all ages, particularly for 17-year-old young men by 53.30 %

higher than for 17-year-old young women, in 18.3-year-old young men by 71.38 %, in 19-year-old young men - by 69.71 %, in 20-year-old young men - by 55.91 %; in the general comparison groups, the gender difference is 69.92 %.

It was found that the expiratory volume rate, respectively, of 25 % of the forced vital capacity was significantly higher in young men each calendar year compared to the corresponding years of ontogeny in young women. In 17 years the sex difference of this indicator is 38.26 %, in 18 - 64.17 %, in 19 - 27.39 %, in 20 - 25.20 %, in the general group - 41.65 %. It was found that the expiratory volume rate of 50 % of the forced life capacity of young men, respectively, compared to young women, was significantly higher only in the first half of the ontogeny adolescent period (at 17 by 34.20 %, at 18 by 64.17 %). As with the previous spirometric index, the expiratory volume rate, respectively, in 75 % of the forced life capacity has significant gender differences only in 17-year-olds (34.49 % higher in young men) and 18-year-olds (45.46 % higher in young men) persons of adolescent ontogeny.

The expiratory volume rate, respectively, from 75% to 85% of exhaled expiratory life capacity in 17-year-old young men was significantly higher (39.82 %) than in 17-year-old young women, 18-year-old young men higher (33.31 %) than their peers young women. In the first half of the adolescent ontogenesis, the mean expiratory flow rate was significantly higher in males compared to females (by 39.82 % at 17, 33.31 % at 18).

The maximum peak expiratory flow rate in 17-year-old young men is 53.95 % higher than in 17-year-old young women, in 18-year-old young men by 49.66 %, in 19-year-old young men by 32.70 % and in 20-year-olds young men are 25.17 % higher than in young women of the same age.

It was found that the rate of inspiratory capacity in young men is significantly higher than that of young women in all ages during adolescence (at 17 years by 26.73 %, at 18 - 29.88 %, at 19 - 35.89 %, at 20 - 41.26 %). The value of this indicator is higher in the general group of young men compared to the general group of young women (by 36.58 %), which confirms the age differences we have established when comparing individual groups of young men and young women. We found that the residual exhalation volume of 17-year-old young men was greater than that of 17-year-old young women (by 53.95 %), that of 18-year-old young men was greater than that of 18-year-old young women (by 49.66 %), 19-year-old young men - than 19-year-old young women (32.70 %), 20-year-old young men - less than 20-year-old young women (25.17 %). Thus, we found that this spirometric indicator in young men each calendar year is significantly higher than in young women, and, the most significant manifestations of sexual dimorphism are observed in the first years of adolescent ontogeny. The rate of forced inspiratory flow, which is 50 % of exhalation from the forced life capacity only in 18-year-old young men is significantly higher (by 23.63 %) than in 18-year-old young women. In the general group of young men the value of this indicator is much higher (by

25.48 %) than in the general group of young women.

It is established that the indicator of one-second forced exhalation volume in young men of every calendar year is significantly higher compared to the corresponding years of ontogeny in young women (in 17 years by 37.77 %, in 18 - 43.50 %, in 19 - 26.57 %, in 20 - 32.92 %). The one-second expiratory volume is accordingly 40.42 % higher in the general young men group than in the young women group, which clearly follows from the previous patterns.

The only spirometric indicator that is significantly higher for young women than for young men is the Tiffno Index. This figure is significantly higher in 20-year-old young women than in 20-year-old young men, and in the general group of young women, the Tiffno index is significantly greater than in the general group of young men.

The sex differences we found in the magnitude of spirometric parameters can be explained by the significant somatometric differences between the male and female body. Indeed, it is the complex of anthropometric and somatotypological features that determines the features of morpho-functional indicators [23]. Recent scientific studies reveal the relationship between individual indicators of the external structure of the body and those of external respiration [22]. Relationships of fat mass with indicators of pulmonary function for both age and sex were detected. On the other hand, total non-fat mass showed a positive association with

indicators of pulmonary function [17]. Studies have been conducted regarding the association of fat mass index and the degree of obesity with pulmonary function in individuals aged 18 to 22 years. In the studies of Holguera R. M. and others [9, 10] found that in men the muscular mass of the lower extremities is most closely related to spirometric parameters, in women the muscular mass of the trunk has the highest correlations. The linear dependence of spirometry on body length and body weight in adolescence has been established in studies by Asif M. et al. [3]. Thus, the total body size and size of body fat, the morpho-functional state of the muscles of the trunk and lower extremity, which have the most pronounced sex differences, are related to indicators of external respiration.

Conclusions

1. It has been found that spirometric indices within the juvenile ontogeny period are significantly higher in males ($p < 0.05$ - 0.001) than in females, except for the Tiffno index, which is higher for young women in the general group ($p < 0.01$) and 20 years ($p < 0.05$).

2. The most significant sex differences in the majority of spirometric parameters (forced vital capacity, maximal voluntary ventilation, forced expiratory volume, expiratory flows, expiratory residual volume, one-second forced expiratory volume) were determined at 18 years of age.

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СТАТЕВІ ОСОБЛИВОСТІ СПІРОМЕТРИЧНИХ ПОКАЗНИКІВ У ЮНАЦЬКОМУ ПЕРІОДІ ОНТОГЕНЕЗУ

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Фактор статевого диморфізму має домінуюче значення у онтогенетичному формуванні різних органів та систем, зокрема органів дихання, морфо-функціональні показники яких мають значні статеві відмінності. Мета роботи - встановити статеві особливості нормативних показників спірографії у практично здорових юнаків і дівчат у межах юнацького періоду онтогенезу. Проведено спірографічне обстеження 109 дівчат юнацького періоду онтогенезу, з них: 17-річних - 29; 18-річних - 27; 19-річних - 25; 20-річних - 28 осіб та 124 хлопців юнацького віку серед яких: 17-річних - 28; 18-річних - 37; 19-річних - 27; 20-річних - 32 особи. Спірографічне дослідження проводили за методикою Американської асоціації пульмонологів (1995) на апараті Medgraphics Pulmonary Function System 1070 series. Аналіз отриманих результатів проведений за допомогою ліцензійної програми "Statistica 5.5" з використанням непараметричних методів оцінки показників. Встановлено, що показники життєвої ємності легень, форсованої життєвої ємності, форсованої ємності легень на вдиху, максимальної довільної вентиляції, об'ємної швидкості видиху відповідно у 25% від форсованої життєвої ємності, максимального пікового потоку видиху, ємності вдиху, залишкового об'єму видиху та односекундного об'єму форсованого видиху в юнаків кожного календарного року та загальної групи достовірно більші у порівнянні з відповідними роками онтогенезу у дівчат. Єдиним спірометричним показником, який у дівчат достовірно більший, ніж у юнаків, є індекс Тіффно. Виявлені статеві відмінності у величині спірометричних показників можна пояснити значними соматометричними відмінностями чоловічого та жіночого тіла. На основі отриманих результатів можна зробити висновок, що переважна більшість спірометричних показників у юнаків в усі календарні періоди юнацького віку має більші значення, ніж у дівчат. Найсуттєвіші статеві відмінності у величині більшості спірометричних показників визначені у 18-річних осіб.

Ключові слова: спірометрія, спірометричні показники, юнаки, дівчата, статевий диморфізм.

ПОЛОВЫЕ ОСОБЕННОСТИ СПИРОМЕТРИЧЕСКИХ ПОКАЗАТЕЛЕЙ В ЮНОШЕСКОМ ПЕРИОДЕ ОНТОГЕНЕЗА

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Фактор полового диморфизма имеет доминантное значение в онтогенетическом формировании различных органов и систем, в том числе органов дыхания, морфо-функциональные показатели которых имеют значительные половые различия. Цель работы - установить половые особенности нормативных показателей спирометрии у практически здоровых юношей и девушек в пределах юношеского периода онтогенеза. Проведено спирометрическое обследование 109 девушек юношеского периода онтогенеза, из них: 17-летних - 29; 18-летних - 27; 19-летних - 25; 20-летних - 28 человек и 124 ребят юношеского возраста среди которых: 17-летних - 28; 18-летних - 37; 19-летних - 27; 20-летних - 32 человека. Спирометрическое исследование проводили по методике Американской ассоциации пульмонологов (1995) на аппарате Medgraphics Pulmonary Function System 1070 series. Анализ полученных результатов проведен с помощью лицензионной программы "Statistica 5.5" с использованием непараметрических методов оценки показателей. Установлено, что показатели жизненной емкости легких, форсированной жизненной емкости, форсированной емкости легких на вдохе, максимальной произвольной вентиляции, объемной скорости выдоха соответственно в 25% от форсированной жизненной емкости, максимального пикового потока выдоха, емкости вдоха, остаточного объема выдоха и односекундного объема форсированного выдоха у юношей каждого календарного года и общей группы достоверно больше по сравнению с соответствующими годами онтогенеза у девушек. Единственным спирометрическим показателем, который у девушек достоверно больше, чем у юношей, является индекс Тиффно. Выявленные половые различия в величине спирометрических показателей можно объяснить значительными соматометрическими различиями мужского и женского тела. На основе полученных результатов можно сделать вывод, что подавляющее большинство спирометрических показателей у юношей во все календарные периоды юношеского возраста имеет большие значения, чем у девушек. Существенные половые различия в величине большинства спирометрических показателей определены у 18-летних лиц.

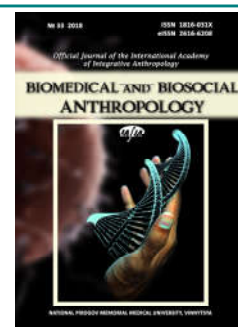
Ключевые слова: спирометрия, спирометрические показатели, юноши, девушки, половой диморфизм.



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Quality of life in patients of specialized cardiology unit

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The existing methods of evaluation of the state of a patient do not account for all variables in their life. This creates a need to establish a complex approach in assessing a patient's condition, including the integral criterion of their subjective state, the quality of life (QL): physical, social and societal well-being. The evaluation is done using certain surveys. Despite a significant amount of research on the quality of life of patients with cardiovascular disease, the understanding of the link between the illness and factors such as age, sex, diagnosis, and its distinctive features remains vague. The objective of the study is to assess the quality of life of hospitalized patients with cardiovascular disease, depending on their age, sex and diagnosis. 115 hospitalized cardiology patients (59 men and 56 women) were surveyed in the cardiology department of Vinnytsia Regional Clinical Hospital named after Pirogov. The mean age of the surveyed amounted to 57.71 ± 1.32 years. 78 patients were diagnosed with different forms of coronary heart disease (II, III, IV classes of angina, atherosclerotic and postinfarction cardiosclerosis, cardiac arrhythmia and disturbances of impulse conduction), mostly in combination with stage II-III of essential hypertension (EH). Stage II EH without CHD was observed in 17 patients, while 20 patients suffered from different cardiovascular illnesses (myocarditis, pericarditis, cardiomyopathies, heart defects). The control group comprised of 30 healthy individuals with no evident cardiac pathology (17 men and 13 women), the mean age of whom amounted to 43.26 ± 15.01 years. To evaluate the quality of life, the MOS-SF-36 questionnaire has been used, which consists of eight sections, each scaled on 0-100. The higher the score was, the better the state of health was. The validity of the results was determined by employing analysis of variance, namely Student's T-Test. A reliable decrease in the quality of life in all sections of the SF-36 Survey has been found as well as the difference in gender, age, diagnosis, and its distinctive features. The figures of the quality of life during a cardiac disease could be additional informative characteristics that should be used for a better assessment of the health state of the patients and solutions for the efficacy of their treatment.

Keywords: cardiovascular disease's, quality of life, the SF-36 questionnaire.

Introduction

Over the past decades, significant growth of interest took place among the clinicians in quality of life (QL), as the current methods of evaluation of patient's condition and efficiency of therapeutic interventions, as a rule, reflect a biological model approach and fail to capture the diversity of human life. This determines the need for wider implementation of the complex approach in the evaluation of patients' condition into clinical standards including integral criteria of their subjective state, namely quality of life (QL), as a measure of their physical, mental and social well-being [16, 22]. In public health, the term "Health-related Quality of life" is more common. When estimating it, both

patient's complaints caused by the disease and concomitant complaints are taken into consideration which allows establishing the effect of a disease on the psychological and emotional states of a patient and their social status [2, 9, 19].

Some studies have found that the QL indices in patients with cardiovascular disease (CVD) make it possible to measure accurately enough the disease effect on the physical, psychological and social functioning of a patient, the effectiveness of treatment, forecasting the clinical course and the outcome of a disease [18, 20, 22]. Thus, when measuring QL in patients with essential hypertension

(EH), a reduction and the reasons for this decline have been identified. It was found that QL is directly related to a patient's volitional control and negatively correlated with emotional instability, suspiciousness, anxiety, social control of behaviour, and stress level [3, 19, 20]. QL in patients with coronary heart disease (CHD) is 2.0-2.5 times lower than that of healthy individuals. This occurs due to a pathological process as well as the intensity of emotional and personal disorders [1, 4, 13, 14]. The QL reduction in patients with chronic heart failure (CHF) depends on its severity. In the early stages of the disease, patients with CHF restrict their work activities, lower daily life activities; in its late stages, the pathology continues in a sharp reduction of all QL parameters [7, 11, 23]. QL assessment can be useful in clinical research and the choice of an individual treatment policy for the stratification of risks in patients [18].

The development of contemporary methods for QL measurement has led to the creation of special questionnaires, with a sufficient level of safety (reproducibility), validity, and sensibility. The questionnaires, currently most widely used in clinical practice for evaluation of QL of patients - irrespective of tested population disease and specific characteristics of treatment - are: Sickness Impact Profile (SIP), Nottingham Health Profile (NHP) and Medical Outcomes Study 36 - Item Short Form heart survey (SF-36) [6, 12, 16, 17, 22]. However, despite a significant number of studies devoted to the QL of patients with CVD, its relation to patients' age and gender, diagnosis, clinical course peculiarities remain insufficiently explored.

The objective of the research is to assess QL in patients with CVD who were admitted to the Cardiology Unit according to their age, gender, and diagnosis, using the SF-36 Health Status Survey.

Materials and methods

The test group consisted of 115 patients (59 men and 56 women) admitted to Cardiology Unit, Vinnytsia Regional Clinical Hospital named after Pirogov. Before the beginning of the assessment, all patients were informed about its goals and tasks, the privacy of information obtained and they gave their voluntary consent to survey.

The average age of participants amounted to 57.71 ± 1.32 years old (men 55.93 ± 1.78 , women 59.62 ± 1.95). 78 patients were diagnosed with different types of CHD (II, III, IV functional classes of cardiac angina, atherosclerotic and postinfarction cardiosclerosis, arrhythmia and abnormal heart capacity), in most cases in combination with stages II-III EH; in 17 patients with stage II EH without CHD, in 20 patients with other diseases of cardiovascular system (myocarditis, pericarditis, cardiopathy, heart defects). The control group included 30 healthy people without cardiac pathology symptoms (17 men and 13 women), whose average age amounted to 43.26 ± 15.01 years old.

To evaluate the quality of life of the participants, the questionnaire MOS-SF-36 (Medical Outcomes Study-Short Form) designed by J.E. Ware was applied [24]. The method

is designed for clinical trials of non-specific, health-related, regardless of disease, gender, age-related peculiarities and specific of all treatment options. The questionnaire was thoroughly validated in patient-reported surveys of QL in patients of different populations and it is considered as a "gold" standard of a generic instrument to measure QL in patients with CVD [16, 17, 19]. Data of MedLine, 2006 show that SF-36 is nowadays used in 95% scientific studies devoted to QL analysis in different diseases.

The survey consists of 11 sections, which include 36 questions. Outcomes are presented in scores (from 1 to 100), according to eight scaled scores. The scales are grouped into two indicators: "Physical health" and "Mental Health":

I. Physical health (PH)

1. Physical Functioning (PF) is a measure indicating the degree to which the health limits physical tasks (self-care, walking, going up the stairs, carrying heavy things, etc.).

2. Role-Physical Functioning (RP) is an impact of physical status on role functioning (work, daily activities).

3. Bodily Pain (BP) is pain severity and its impact on a patient's ability to do activities of daily living, including housework and work.

4. General Health (GH) is an evaluation of the current health status and prospects of treatment by a patient.

II. Mental Health (MH)

5. Vitality (VT) scale is a measure of vitality, energy level or, vice-versa, fatigue).

6. Social Functioning (SF) scale is determined by the degree to which physical or emotional condition limits social activities (communication).

7. Role-Emotional (RE) is an impact of emotional status on role-functioning, meaning an evaluation of degree in which the emotional status includes job-related limitations and limitations in the performance of other daily activities (including time-consuming, decrease of work done, reduction of its quality, etc.).

8. Mental Health (MH) score demonstrates self-evaluation of psychic health, specifies mood (occurrence of depression, anxiety, a general index of positive emotions).

The computer processing "SF-36 HEALTH STATUS SURVEY", available at <http://vch.narod.ru> was used in the research. Graph 8 of basic scales has been constructed on "raw" scores which are the percent rate from 0 to 100 scores in reference to the highest possible score in each scale with zero reference point. The higher score reflects a better health state.

The validity of research outcomes was evaluated using a method of variation statistics using Student's T-Criteria. The reliably meaningful outcome is considered the one with the difference of indicators $p < 0.05$.

Results

Based on the findings, a reduction of QL in patients with cardiovascular pathology has been identified in comparison with healthy people, including all items of the

Table 1. Indicators of quality of life in scores by scales of patients of the cardiology unit based on sex (M±m).

| Test group | Indicators of Questionnaire SF-36 (scores) | | | | | | | | | |
|------------------|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|
| | PF | RP | BP | GH | VT | SF | RE | MH | PhC | PsC |
| Men (n=59) | 47.03±2.21* | 27.53±4.67* | 48.21±3.10* | 45.62±2.01* | 41.30±2.48* | 46.67±1.80* | 35.40±5.63* | 55.53±2.78 | 42.10±1.76 | 40.98±1.26 |
| Women (n=56) | 39.63±2.99* | 13.86±3.97* | 35.72±3.45* | 42.97±2.20* | 34.74±2.47 | 44.76±1.98* | 25.60±5.17* | 42.21±2.85* | 33.05±1.76 | 36.80±13.73 |
| p ¹⁻² | >0.05 | <0.001 | <0.01 | >0.05 | >0.05 | >0.05 | >0.05 | <0.01 | <0.01 | <0.05 |

Notes: PF - physical functioning; RP - role physical functioning; BP - bodily pain; GH - general health; VT - vitality; SF - social functioning; RE - role-emotional; MH - mental health; PhC and PsC are correspondingly physical and psychological components of health; p¹⁻² - credibility of differences between men and women; * - credibility of differences of indicators in comparison with control group.

Table 2. Indicators of quality of life of patients of cardiology unit on the basis of age (M±m).

| Age of patients | Indicators of Questionnaire SF-36 (scores) | | | | | | | |
|--|--|------------|------------|------------|------------|------------|-------------|------------|
| | PF | RP | BP | GH | VT | SF | RE | MH |
| Under 45 years old (n=16) | 61.63±6.76 | 26.67±3.56 | 53.31±7.72 | 47.95±4.75 | 36.00±3.96 | 40.13±3.93 | 45.90±12.12 | 51.04±5.05 |
| 45-59 years old (n=40) | 47.93±4.04 | 28.21±5.82 | 48.97±7.72 | 45.44±2.46 | 41.53±3.70 | 49.58±3.62 | 40.01±7.13 | 54.30±3.33 |
| 60-74 years old (n=59) | 37.05±2.66 | 15.74±2.49 | 34.07±3.45 | 42.82±2.20 | 36.31±2.42 | 44.79±1.77 | 21.30±5.07 | 45.83±3.26 |
| 75 and more years old (n=10) | 29.51±5.74 | 10.03±5.02 | 39.41±7.30 | 41.16±5.68 | 37.53±5.68 | 45.22±5.93 | 16.82±10.82 | 42.47±8.80 |
| Control group 43.26±15.01 years old (n=30) | 77.02±0.44 | 53.80±0.73 | 61.30±0.45 | 56.56±0.33 | 55.15±0.38 | 69.67±0.41 | 57.23±0.72 | 58.82±0.34 |
| p ¹⁻² | >0.05 | >0.1 | >0.1 | >0.1 | >0.05 | >0.05 | >0.1 | >0.1 |
| p ²⁻³ | <0.05 | >0.05 | >0.05 | >0.1 | >0.05 | >0.05 | <0.05 | >0.05 |
| p ³⁻⁴ | >0.05 | >0.05 | >0.05 | >0.05 | >0.05 | >0.05 | >0.05 | >0.05 |
| p ¹⁻⁴ | <0.001 | <0.05 | >0.05 | >0.1 | >0.1 | >0.1 | <0.1 | >0.1 |
| p ¹⁻⁵ | <0.001 | <0.001 | >0.05 | >0.05 | <0.001 | <0.001 | >0.05 | >0.05 |

Notes: p¹⁻² - the credibility of differences in the groups of patients aged under 45 years old and 45-59 years old; p²⁻³ - the credibility of difference in the groups of patients aged 45-59 years old and 60-74 years old; p³⁻⁴ - the credibility of difference in the groups of patients aged 60-74 years old and more than 75 years old. 4; p¹⁻⁴ - the credibility of difference in the groups of patients under 45 years old and more than 75 years old; p¹⁻⁵ - the credibility of difference in the groups of patients under 45 years old and control group.

SF-36 survey. The most dramatic reduction rates could be observed in Physical Functioning (p<0.001) scale, Role-Physical functioning (p<0.001), and Role functioning specified by emotional status (p<0.001).

While considering gender difference, QL in women in all scales of the survey appeared to be lower than that of men; however, statistically significant differences were revealed in three of them: impact of physical condition on role functioning (p<0.001), bodily pain (p<0.01), and self-evaluation of mental health (p<0.001) (Table 1).

The values of integral indicators of physical and psychological health components were reliably lower for women (Table 1). Gender differences are shown in Figure 1.

The analysis of QL of patients within different age groups has shown that QL worsened with age increase in most scales of the survey, the most significant in groups of patients of elderly and senile age, mostly in scales of physical and role-physical functioning as well as in scale related to role emotional status. At the same time, in scale demonstrating bodily pain, the age-related difference of indices was less considerable. The decline of indicators

in scales related to vitality, social functioning, and self-evaluation of mental health was less significant, which is possibly caused by partial adaptation to an existing long-term disease (Table 2).

This information can be verified by analyzing physical and psychological components of the questionnaire. The indicators of physical component declined steadily with age, especially in patients of elderly and senile age (Fig. 2).

In assessing the outcomes of survey depending on diagnosis, the degradation of QL indicators on almost all scales (except for bodily pain) could be observed in patients with EH; moreover, the decline in physical functioning and role functioning scales could be caused by physical state, general health and social functioning (Table 3).

The degradation of QL was significantly expressed in the group of patients with CHD, and, similarly to patients with EH, it decreased for account of physical functioning indicators (p<0.001) and role functioning caused by physical and emotional states (p<0.001), and, unlike the patients with EH, it was defined by more intensive bodily pain (p<0.05). At the same time, such indicators as vitality and

Table 3. Indicators of quality of life of patients of cardiology unit on the basis of diagnosis (M±m).

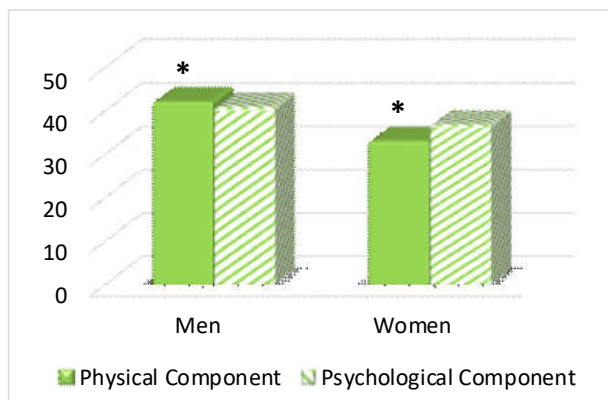
| Test group | Indicators of Questionnaire SF-36 (scores) | | | | | | | |
|---|--|------------|------------|------------|------------|------------|------------|------------|
| | PF | RP | BP | GH | VT | SF | RE | MH |
| Essential hypertension (n=17) | 63.24±5.86 | 34.31±8.99 | 56.46±7.10 | 48.52±2.50 | 47.11±5.45 | 45.80±3.09 | 56.90±1.70 | 53.26±5.63 |
| Coronary heart disease (n=78) | 39.86±2.47 | 19.20±3.70 | 37.11±2.55 | 43.42±1.91 | 36.86±2.13 | 45.77±1.56 | 26.54±4.43 | 48.27±2.67 |
| Other pathology (n=20) | 23.76±5.44 | 16.23±7.73 | 50.11±6.25 | 44.28±3.70 | 15.33±3.50 | 45.92±4.06 | 24.78±8.44 | 49.61±3.74 |
| Age 43.26±15.01; Control group of healthy persons (n=30) | 77.02±0.44 | 53.80±0.73 | 53.80±0.73 | 56.56±0.33 | 56.56±0.33 | 56.56±0.33 | 57.23±0.72 | 58.82±0.34 |
| p ¹⁻² | <0.001 | <0.001 | >0.05 | >0.05 | >0.05 | >0.1 | >0.05 | >0.1 |
| p ¹⁻³ | <0.001 | <0.001 | >0.1 | >0.1 | <0.001 | >0.1 | <0.05 | >0.1 |
| p ²⁻³ | <0.01 | >0.1 | >0.05 | >0.1 | <0.001 | >0.1 | >0.1 | >0.1 |
| p ¹⁻⁴ | <0.01 | <0.001 | >0.1 | <0.001 | >0.05 | <0.01 | >0.1 | >0.05 |

Notes: p¹⁻² - credibility of differences in the groups of patients with EH and CHD, p¹⁻³ - credibility of differences in the groups of patients with EH and other pathologies, p²⁻³ - credibility of differences in the groups of patients with CHD and other pathologies, p¹⁻⁴ - credibility of differences in the groups of patients with EH and control group.

Table 4. Integral indicators of the quality of life of patients of cardiology unit on the basis of diagnosis (M±m).

| Test group | Physical component | Psychological component |
|-------------------------------|--------------------|-------------------------|
| Essential hypertension (n=17) | 50.62±3.40 | 50.71±3.49 |
| Coronary heart disease (n=78) | 34.94±1.46 | 39.31±1.52 |
| Other pathology (n=20) | 37.95±3.21 | 39.03±2.79 |
| p ¹⁻² | <0.001 | <0.05 |
| p ¹⁻³ | <0.01 | <0.05 |
| p ²⁻³ | >0.1 | >0.1 |

Notes: p¹⁻² - the credibility of differences in the groups of patients with EH and CHD, p¹⁻³ - the credibility of differences in the groups of patients with EH and other pathologies, p²⁻³ - the credibility of differences in the groups of patients with CHD and other pathologies.


Fig. 1. Gender differences of integral indicators of quality of life of patients of cardiology unit.

self-evaluation of mental health were less reduced and social functioning was almost the same as in the previous group (p>0.1).

The health of the patients whose clinical course of CHD was accompanied by stable angina compared to that of patients without pain syndrome, could be characterized by sharp decline of indicators in scale of pain (p<0.001) as well as significantly lower numbers in scales of physical functioning, role physical functioning, and role functioning, determined by emotional state and vitality and self-evaluation of their state (p<0.05).

The group which consisted of the patients with myocarditis, cardiopathy, pericarditis, and heart defects was different due to very low indicators of the first two scales of the survey, but, in contrast to previous groups, bodily pain was less evident. In addition, they had a low level of vitality: probably, due to severe cardiac pathologies which occurred suddenly in most cases (Table 3).

Comparative assessment of integral indicators has helped identify a moderate decline in physical and psychological components in the group of patients with essential hypertension and, significantly, particularly physical component in patients with CHD (p<0.001). In the third test group, the reduction in both indicators was also considerable and practically coincided with that of the second group (Table 4). The dynamics of integral indicators of QL is presented in Fig. 3.

Essential differences have been determined between the groups, formed according to the functional classes of CHF. The highest scores in all scales of the questionnaire could be observed in patients with no heart failure or its slight manifestations (FC I), though they were slightly lower than in the control group. However, the dramatic decline in most indicators of QL (especially, scales demonstrating physical functioning) could be seen in patients with FC II. The indices of pain, vitality, and self-evaluation of mental health scales deteriorated considerably (p<0.05). The aforementioned changes surely demonstrate the

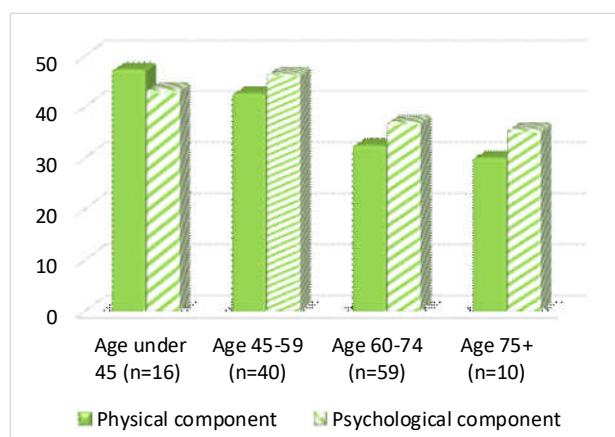


Fig. 2. Age differences of integral indicators of quality of life of patients of cardiology unit.

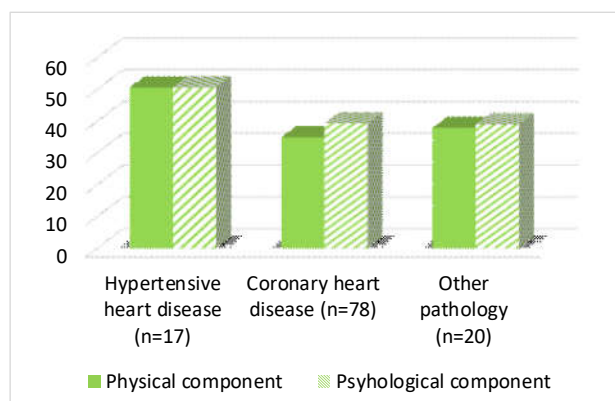


Fig. 3. Disparities in integral indicators of quality of life on the basis of diagnosis.

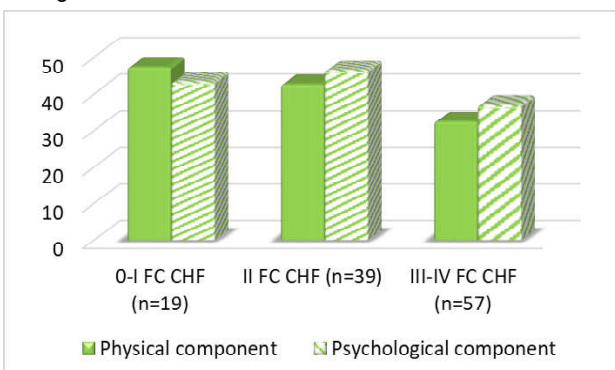


Fig. 4. Disparities in integral indicators of quality of life on the basis of intensity of chronic heart failure.

aggravation of patients' health: increasing shortness of breath, weakness, cardiac arrhythmia, and cardialgia. Special attention should be given to the fact that there were no substantial changes in the social functioning scale. Perhaps, it is due to the imprecise evaluation of the concept "social activity" by patients surveyed. The most negative dynamics was in the group of patients with CHF FC III-IV. The indicators of QL demonstrating human physical capacities and their role in daily work activities were the

lowest [8]. The vitality and self-evaluation of mental health reflecting depression, anxiety, reduction in positive emotions were equally low [15]. In analyzing generic indicators of survey, a reliable statistical decline was identified only in patients with III-IV FC CHF, whereas in patients with II FC CHF, the indicators were slightly reduced and were just the same as in patients with CHF I FC (Fig. 4).

Discussion

As indicated above, quality of life is an integral criterion, based on a subjective perception that reflects the physical, mental, emotional and social human condition. The analysis of QL is extremely important concerning chronic cardiovascular diseases, in which an afflicted individual must take medication regularly or for a long time. Medication, in spite of the objective improvement of a condition, can lead to deterioration of QL. Because the assessment of QL demonstrates the patient's attitude towards their state, it is strictly individual. However, certain influences on a patient's self-perception of gender, age and diagnosis cannot be excluded.

Data on the impact of gender on QL of patients with cardiovascular diseases are heterogeneous. When assessing gender differences, it has been found that QL of women was lower than that of men in all scales of the survey. The most significant value of differences by scales was observed in the influence of physical status on role functioning, bodily pain, and self-evaluation of mental health. This indicates that women with cardiovascular diseases are more limited in their daily activities than men are; moreover, cardiac pain has a bigger influence on their daily activities. In addition, with regard to the progression of the basic disease, women have more intense depressive sensations of anxiety and mental disorders.

The assessment of QL of patients of different age groups indicates that QL became worse in most scales of the survey as the age groups increased, the most significant one in the groups of elderly and senile age. In contrast, younger patients had reliably higher scores in physical functioning (PF) and general health (GH) scales, which indicates better physical health. No reliable differences were found in people of middle age in comparison with young people in most scales, except for higher scores of QL related to the psycho-emotional sphere: role restrictions caused by personal or emotional problems and emotional well-being. In comparison with people of elderly and senile age, their QL scores were significantly higher in all scales. Higher QL scores in people of middle age with AH can be due to their better adaptation to the disease than in young patients and fewer concomitant pathologies than in elderly age. Nevertheless, even in the group of young patients, QL scores were more different from the group of healthy people of the representative age, especially in scales of physical functioning, role functioning both physical and emotional as well as in the scale of vitality. Apparently, having become ill and unable to work fully, young people feel emotional

stress which leads to a decrease in their social activities. If we compare with patients of young age, certain improvement of scores of the psychological component in patients of middle age might be connected to the fact that the psychological status of patients surveyed rose as a result of effective treatment and improvement of their condition.

The assessment of the quality of life in relation to the diagnosis showed inconsistency of changes of indicators, demonstrating physical condition in patients with EH and CHD, with a higher degree of intensity in patients with CHD and with lowering of scores demonstrating bodily pain intensity. Apparently, such outcomes could be the result of the reduction of physical and social activities as well as of limited possibility to perform routine functions caused by considerable increase of arterial blood pressure and its changes or pains in the heart, which patients interpret as aggravation of generic health. Similar data were obtained by a number of authors who indicate that the level of QL in patients with essential hypertension is directly related to patient's volitional control and negatively correlated with emotional instability, suspiciousness, anxiety, social control of behavior and stress levels [3, 10, 21].

Based on our observations, the degree to which QL can decline was associated with the severity of CHD and angina syndrome. Similar outcomes, showing that the violation of QL as a whole and its parameters depend on myocardial ischemia variants, are presented in the literature [1, 13].

The authors emphasize that QL is slightly reduced in patients with "latent" myocardial ischemia and reduced significantly in episodes of severe cardialgia [4, 5]. The occurrence of pain has a great influence not only on one's physical capacities but also on one's social activities and mental health. A dramatic reduction in scores in the first three scales of the survey is caused by the occurrence of high arterial hypertension, CHF, arrhythmia, and cardiac angina in most patients with CHD. Overestimated self-evaluation of mental health and vitality perhaps correlates with certain adaptations to chronic disease and relatively high social functioning due to simplified representation of society. Most surveyed patients with CHD are disabled people and pensioners, whose social contacts are limited to communication with their relatives and neighbors; perhaps such social functioning, as it is understood by them, is sufficient enough.

The progression of HF was accompanied by the degradation of QL. A rapid decrease was observed in most indicators of QL in patients with FC II, especially in scales demonstrating physical functioning, which grew as FC CHF increased. The most negative dynamics was in the group of patients with CHF FC III-IV and the indicators of QL-that demonstrate human physical capacities and their role in daily work activities-were the lowest which corresponds to the outcomes obtained by other authors [8]. The vitality and self-evaluation of mental health reflecting depression,

anxiety, reduction in positive emotions were equally low [15]. In analyzing generic indicators of survey, a reliable statistical decline was identified only in patients with III-IV FC CHF, whereas in patients with II FC CHF, the indicators were slightly reduced and were just the same as in patients with CHF I FC.

There is a perception that QL of patients who get long-lasting antihypertensive and anti-ischemic treatment is lower than that of untreated patients, and even the existence of necessity to take medication for a long time can reduce QL level. On the other hand, degradation of QL in patients surveyed was often associated with a reduction in long-term adherence to treatment; in this connection, the measures aimed to raise compliance became of vital importance.

The indicators of QL in patients afflicted by cardiovascular disease could be additional informative characteristics, the use of which is crucial to a better assessment of the functional condition of patients and issues of treatment efficacy. It is advisable to consider their possible application during medical and social expertise of people of elderly and senile age, including the cases when it is difficult to do an exercise tolerance test.

Conclusions

1. The study showed reliable evidence of reduction of QL in patients with cardiovascular pathologies in all scales of the survey SF-36, the most significant in physical functioning scale, role physical functioning scale, and role functioning scale caused by emotional state.

2. Gender and age differences of indicators were highlighted: the indicators of physical functioning were reduced to a greater degree in women with CVD than in men; their daily activities are more strongly influenced by cardiac pain and depression and anxiety, while psychological problems are more visible.

3. The indicators of scales which demonstrated the physical component of QL declined with age increase. The mental status in middle age was slightly higher than in young people and dramatically reduced in elderly and senile age. This could be caused by the adaptation of patients of the second age group to the disease and the increase of disease burden and, accordingly, lower efficiency of treatment in the third and fourth test groups.

4. The QL of patients with EH dropped equally because of both physical and psychological components. More negative dynamics in patients with CHD was connected with the physical component, which indicated low physical capacity of such patients. The presence of cardiac angina in patients with CHD has a significant influence not only on physical capacities but also on social activities and mental health. A direct correlation between the reduction of most indicators of QL and the progression of chronic heart failure has been proven.

5. The reduction of indicators of the psychological component in all test groups shows that chronic disease

of the cardiovascular system has a notable impact on a patient's mental health and neurotic disorders. This proves the necessity of psychological care, focused on increasing the level of individual adaptive capacity of a patient. These

include but are not limited to: reduction of impacts of factors of cardiac risks, development of adaptive resources, improvement of patient's quality of life under conditions of chronic disease.

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ЯКІСТЬ ЖИТТЯ ПАЦІЄНТІВ СПЕЦІАЛІЗОВАНОГО КАРДІОЛОГІЧНОГО ВІДДІЛЕННЯ

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Існуючі методи оцінки стану пацієнта не враховують усе різноманіття життя людини. Це встановлює необхідність впровадження комплексного підходу до оцінки стану хворих із включенням інтегральних критеріїв їх суб'єктивного стану: якості життя (ЯЖ) як складової їх фізичного, психічного і соціального добробуту. Оцінка ЯЖ досягається використанням спеціальних опитувальників. Незважаючи на значну кількість досліджень, присвячених ЯЖ хворих з серцево-судинною патологією, її зв'язок з віком і статтю пацієнтів, а також з діагнозом та особливостями перебігу захворювання залишається недостатньо вивченим. Мета дослідження: дати оцінку якості життя госпіталізованих хворих з захворюваннями серцево-судинної системи в залежності від віку, статі та діагнозу захворювання. Обстежено 115 кардіологічних хворих (59 чоловіків

і 56 жінок), госпіталізованих в кардіологічне відділення Вінницької обласної клінічної лікарні ім. М.І. Пирогова. Середній вік обстежених склав $57,71 \pm 1,32$ років. У 78 пацієнтів було діагностовано різні форми ІХС (II, III, IV функціональні класи стенокардії, атеросклеротичний і післяінфарктний кардіосклероз, порушення ритму і провідності); у більшості випадків у поєднанні з ГХ II-III стадії, у 17 пацієнтів - ГХ II стадії без ІХС, у 20 - інші захворювання серцево-судинної системи (міокардити, перикардити, кардіопатії, вади серця). Контрольна група складалася із 30 здорових осіб (17 чоловіків і 13 жінок) без ознак кардіологічної патології; середній вік склав $43,26 \pm 15,01$ років. Для оцінки ЯЖ було використано опитувальник MOS-SF-36. Результати відповідей оцінювались у балах (від 1 до 100) по 8 шкалам. Більш високий бал відповідав кращому стану здоров'я. Достовірність результатів дослідження оцінювались методом варіаційної статистики із використанням t-критерія Стьюдента. Виявлено достовірне зниження ЯЖ пацієнтів за всіма шкалами опитувальника SF-36, гендерні та вікові відмінності, а також відмінності в залежності від діагнозу захворювання та особливостей його перебігу. Показники ЯЖ при захворюваннях серцево-судинної системи можуть бути додатковими інформативними характеристиками, які слід використовувати для більш повної оцінки функціонального стану хворих і вирішення питань ефективності лікування.

Ключові слова: серцево-судинні захворювання, якість життя, опитувальник SF-36.

КАЧЕСТВО ЖИЗНИ ПАЦИЕНТОВ СПЕЦИАЛИЗИРОВАННОГО КАРДИОЛОГИЧЕСКОГО ОТДЕЛЕНИЯ

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Существующие методы оценки состояния пациента не учитывают всё многообразие жизни человека, что определяет необходимость внедрения в практику комплексного подхода к оценке состояния больных с включением интегральных критериев их субъективного состояния - качества жизни (КЖ) как меры их физического, психического и социального благополучия. Оценка КЖ достигается использованием специальных опросников. Несмотря на значительное число исследований, посвящённых КЖ больных с сердечно-сосудистой патологией, остаётся недостаточно изученной её связь с возрастом и полом пациентов, с диагнозом, с особенностями течения заболевания. Цель исследования: дать оценку качеству жизни госпитализированных больных с заболеваниями сердечно-сосудистой системы в зависимости от возраста, пола и диагноза заболевания. Обследовано 115 кардиологических больных (59 мужчин и 56 женщин), госпитализированных в кардиологическое отделение Винницкой областной клинической больницы им. Н.И.Пирогова. Средний возраст обследованных составил $57,71 \pm 1,32$ лет. У 78 пациентов были диагностированы различные формы ИБС (II, III, IV функциональные классы стенокардии, атеросклеротический и постинфарктный кардиосклероз, нарушения ритма и проводимости), в большинстве случаев в сочетании с ГБ II-III стадии, у 17 пациентов - ГБ II стадии без ИБС, у 20 - другие заболевания сердечно-сосудистой системы (миокардиты, перикардиты, кардиопатии, пороки сердца). Контрольную группу составили 30 здоровых лиц без признаков кардиальной патологии (17 мужчин и 13 женщин), средний возраст составил $43,26 \pm 15,01$ года. Для оценки КЖ был использован опросник MOS-SF-36. Результаты ответов оценивали в баллах (от 1 до 100) по 8 шкалам. Более высокий балл соответствовал лучшему состоянию здоровья. Достоверность результатов исследования оценивали методом вариационной статистики с использованием t критерия Стьюдента. Выведено достоверное снижение КЖ пациентов по всем шкалам опросника SF-36, гендерные и возрастные различия, а также различия в зависимости от диагноза заболевания и особенностей его течения. Показатели КЖ при заболеваниях сердечно-сосудистой системы могут быть дополнительными информативными характеристиками, которые следует использовать для более полной оценки функционального состояния больных и решения вопросов эффективности лечения.

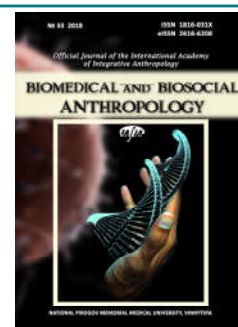
Ключевые слова: сердечно-сосудистые заболевания, качество жизни, опросник SF-36.



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Peculiarities of organometric parameters of the coronary arteries in the perinatal period of ontogenesis

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Formation of the structure and topography of the coronary arteries during the fetal and early neonatal periods of human ontogenesis is an essential constituent while making perinatal diagnosis and understanding real parameters of the norm and pathology. Objective of the study is to determine organometric parameters of the carotid arteries during the fetal and early neonatal periods of human ontogenesis. The study was conducted on 50 specimens of dead fetuses (from 4 to 10 months) and 9 neonates (5 isolated complexes of organs in particular) by means of adequate anatomical methods: macrodissection, injection of the blood vessels, making topographic-anatomical sections, morphometry, and statistical analysis. During perinatal period external diameters and lengths of the carotid arteries are found to be characterized by two periods of an accelerated development and the period of relatively slow development. For the external diameter of the right common carotid artery and the external diameter of the left internal carotid artery the periods from the 4th to 7th months of the intrauterine development and the period from the 9th month to the neonatal period are the periods of an accelerated development; the periods from the 7th to 9th months of development are the period of relatively slow development. The periods from the 4th to the 7th months of the intrauterine development and the period from the 10th month till neonatal period are the periods of an accelerated development for the external diameter of the left common carotid artery and external diameter of the right internal carotid artery; the period from the 7th to the 10th months of development is the period of relatively slow development. The periods from the 4th to the 7th months of the intrauterine development and from the 8th month of development till the neonatal period are the periods of an accelerated development for the external diameter of the right and left external carotid arteries; the period during 7-8th months is the period of relatively slow development. The length of the cervical part of the right and left carotid arteries is characterized by the two periods of an accelerated development - from the 4th to the 6th month and from the 7th month till the neonatal period; the period of relatively slow development is from the 6th to the 7th month of the intrauterine development. Comparison of the developmental periods of the carotid arteries with all the possible organometric parameters enables to affirm that practically similar enlargement of the external diameters of the common, external and internal carotid arteries both from the right and left sides is peculiar for the period of relatively slow development. The first period of an accelerated development of the carotid arteries is more specific for the external diameter and length of the left common and left external artery contrary to the second accelerated period of development of the carotid arteries. It is characterized by enlargement of the external diameters of the right common and right external carotid artery. A reliable difference of the mean values of the external diameters of the right and left common, external and internal carotid arteries is peculiar for the 4th, 7th, 10th months of development and for the neonatal period for the common carotid arteries; for the external carotid arteries - the 4th, 7th, 9th months of development and neonatal period; for the internal carotid arteries - for the whole months of development.

Keywords: common carotid artery, external carotid artery, internal carotid artery, morphometry, fetal and early neonatal periods of human ontogenesis.

Introduction

Perinatal mortality with congenital developmental defects remains high (23-25 %), and mortinatality is 11-13 % [9, 14]. Therefore, the main task of present perinatology is development of effective methods of prevention and early prenatal diagnostics of congenital pathology. Antenatal care of health of successors is impossible without substantial examination of variable factors determining physiological and pathological development of the fetus. The issue associated with finding critical periods in structural transformations of the organs and systems is not elaborated completely and it requires further studies [1-3, 6, 21].

The study conducted considerably supplements existing data concerning the structure and topography of the carotid arteries during the fetal and early neonatal period of human ontogenesis, which is an essential constituent while making perinatal diagnostics and understanding real parameters of the norm and pathology [4, 5, 16, 17, 19, 20]. The obtained new scientifically substantiated data concerning organometric characteristic of the carotid arteries at all the stages of the perinatal period determine morphological basis and are essential to determine developmental criteria of the carotid arteries and their correspondence to the terms of gestation [7, 8, 13, 18].

Objective of the study is to determine organometric parameters of the carotid arteries during the fetal and early neonatal periods of human ontogenesis.

Materials and methods

The study was conducted on 50 specimens of dead fetuses (from 4 to 10 months) and 9 neonates (5 isolated complexes of organs in particular) without external signs of anatomical deviations or defects and without visible macroscopic deviations from the normal structure of the cardio-vascular system. The following adequate anatomical methods were applied during the study: macrodissection, injection of the blood vessels, making topographic-anatomical sections, morphometry, and statistical analysis. Preserved and non-preserved dead fetuses and neonates were used for macro-dissection. The cut was made along the left median axillary line, and a thoracic part of the aorta was dissected in the posterior mediastinum. The aorta was catheterized, the catheter was inserted cranially. The injection mixture on the basis of red lead was introduced. After that sternotomy was performed, the superior vena cava was exposed and catheterized. The catheter was directed cranially, and mixture on the basis of nutrient gelatin was introduced. 5% and 10% formalin solutions were used to preserve dead fetuses and neonates: 5 % solution was used for intermediate preservation of the material, and 10 % solution - for the final preservation and storage of the material between the stages of the study. Micro- and macro-dissection of the structures of the major vascular-nervous cervical bundle was made by means of pincers and scissors. Dead fetuses and neonates were kept during 1-1,5 months

depending on the size of an object in a special solution (24% zinc chloride in 40% formaldehyde). Topographic-anatomical sections 0,5-1,5 cm thick were made in one out of three planes by means of a special knife.

The obtained data were statistically processed by means of the licensed program RStudio. Null hypothesis was verified as to the fact that samples were taken from one distribution or from distributions with similar medians: H_0 : {every group has similar distribution}; H_1 : {every group does not have similar distribution}. Student test, nonparametric Kruskal-Wallis criterion (answers the question if there is difference between the distributions of groups, but does not indicate what groups do not differ), Conover-Iman test were used to compare stochastic dominance and to obtain results between different pair comparison after Kruskal-Wallis test for stochastic dominance among k groups. While analyzing sample coefficient of correlation (r) binding force was assessed by Cheddok scale: with $r = 0$ - lack of bond; with $r =$ from 0.1 to 0.3 - poor bond; 0.3-0.5 - moderate bond; 0.5-0.7 - visible bond; 0.7-0.9 - strong bond, 0.9-1 - powerful bond. The values were considered statistically significant with $p < 0.05$.

The study was performed according to the major regulations of the Declaration of Helsinki as a statement of ethical principles for medical research involving human subjects (1964-2000) and the Order of the Ministry of Health of Ukraine № 690 dated 23.09.2009. The study is a fragment of a comprehensive planned initiative scientific-research work of M.G.Turkevych Department of Human Anatomy, the Department of Anatomy, Topographic Anatomy and Operative Surgery at the Higher State Educational establishment of Ukraine "Bukovinian State Medical University": "Peculiarities of Morphogenesis and Topography of the Organs and Systems during the Prenatal and Postnatal Periods of Ontogenesis" (State Registration № 0115U002769).

Results

The external diameter of the right common carotid artery (EDRCCA) during the perinatal period of ontogenesis increases from 1.562 ± 0.051 mm (4-month fetuses) to 3.220 ± 0.006 mm (neonatal period) (Table 1). EDRCCA increases utmost in the period from the 4th to 7th month of the intrauterine development and during the period from the 9th month till neonatal period. These parameters 1.219 mm and 0.450 mm increase respectively. In the period from the 8th to the 9th months of development these parameters do not increase considerably. This period can be called the period of relatively slow development. According to the results of Conover-Iman test for EDRCCA, the median difference for all the possible age pairs is statistically significant, except the following pairs: "4 month - 5 month", "5 month - 6 month", "7 month - 8 month", "7 month - 10 month", "8 month - 9 month", "8 month - 10 month", "9 month - 10 month". The external diameter of the left common carotid artery (EDLCCA)

Table 1. External diameter of the common carotid arteries during the perinatal period of ontogenesis (mm).

| Age group | External diameter of the common carotid arteries | | | |
|-----------|--|-------------------|-------------|-------------------|
| | right | | left | |
| | M±m | Confidence limits | M±m | Confidence limits |
| 4 month | 1.562±0.051 | 1.421 - 1.703 | 1.322±0.072 | 1.141 - 1.503 |
| 5 month | 1.917±0.132 | 1.594 - 2.240 | 1.790±0.233 | 1.233 - 2.341 |
| 6 month | 2.202±0.143 | 1.881 - 2.522 | 1.964±0.083 | 1.774 - 2.153 |
| 7 month | 2.782±0.062 | 2.653 - 2.911 | 2.527±0.081 | 2.331 - 2.723 |
| 8 month | 2.690±0.111 | 2.410 - 2.971 | 2.517±0.114 | 2.243 - 2.790 |
| 9 month | 2.602±0.052 | 2.473 - 2.730 | 2.470±0.121 | 2.221 - 2.712 |
| 10 month | 2.778±0.071 | 2.612 - 2.944 | 2.372±0.043 | 2.270 - 2.473 |
| Neonates | 3.221±0.006 | 3.090 - 3.351 | 2.876±0.041 | 2.771 - 2.960 |

Table 2. External diameter of the external carotid arteries during perinatal period of ontogenesis (mm).

| Age group | External diameter of the external carotid arteries | | | |
|-----------|--|-------------------|-------------|-------------------|
| | right | | left | |
| | M±m | Confidence limits | M±m | Confidence limits |
| 4 month | 0.848±0.005 | 0.711 - 0.985 | 0.683±0.044 | 0.581 - 0.784 |
| 5 month | 1.360±0.205 | 0.880 - 1.831 | 1.247±0.232 | 0.693 - 1.801 |
| 6 month | 1.640±0.105 | 1.391 - 1.880 | 1.568±0.082 | 1.374 - 1.762 |
| 7 month | 2.138±0.045 | 2.030 - 2.245 | 1.937±0.034 | 1.861 - 2.012 |
| 8 month | 1.990±0.050 | 1.864 - 2.112 | 1.833±0.105 | 1.591 - 2.074 |
| 9 month | 2.273±0.045 | 2.164 - 2.381 | 2.070±0.030 | 1.982 - 2.152 |
| 10 month | 2.567±0.072 | 2.163 - 2.971 | 2.630±0.071 | 2.453 - 2.804 |
| Neonates | 3.202±0.055 | 3.092 - 3.311 | 3.016±0.053 | 2.910 - 3.122 |

during this period of development increases from 1.322±0.072 mm in 4-month fetuses to 2.876±0.041 mm in the neonatal period (Table 1). Intensive increase of EDLCCA during the perinatal period occurs from the 4th to the 7th months of the intrauterine development, and from the 10th month till neonatal period. They 1.205 mm and 0.504 mm increase respectively. The period from the 7th month to the 10th month of development for EDLCCA is the period of relatively slow development. Conover-Iman test demonstrated that median difference for EDLCCA in all the age pairs is statistically significant, except pairs "4 month - 5 month", "4 month - 6 month", "5 month - 6 month", "7 month - 8 month", "7 month - 9 month", "8 month - 9 month", "7 month - 10 month", "8 month - 10 month", "9 month - 10 month".

The external diameter of the right external carotid artery (EDRECA) during the perinatal period of ontogenesis increases from 0.848±0.005 mm (4-month fetuses) to 3.202±0.055 mm (neonatal period) (Table 2). An intensive increase of EDRECA during the perinatal period is peculiar from the 4th to the 7th month of the intrauterine development, and from the 8th month of development till the neonatal period. These organometric parameters 1.290 mm and 1.212 mm

increase respectively. The period of 7-8 months is a period of relatively slow development for EDRECA. According to the results of Conover-Iman test for EDRECA the median difference for all the possible age pairs is statistically significant, except the pair "5 month - 6 month". The external diameter of the left external carotid artery (EDLECA) during this age period increases from 0.683±0.044 mm in the 4-month fetuses to 3.016±0.053 mm during the neonatal period (Table 2). EDLECA parameters experience the largest increase from the 4th to the 7th months of the intrauterine development, and from the 8th month of development to the neonatal period. These organometric parameters 1.254 mm and 1.183 mm increase respectively. The period of a relatively slow development for EDLECA is from the 7th to the 8th month of development. Conover-Iman test demonstrated that median difference for EDLECA in all the possible age pairs is statistically significant except the pairs "5 month - 6 month", "7 month - 8 month".

The external diameter of the right internal carotid artery (EDRICA) during the perinatal period increases from 0.662±0.051 mm (4-month fetuses) to 2.202±0.060 mm (neonatal period) (Table 3). An intensive increase of EDRICA parameters is peculiar for the periods from the 4th to the 7th months of the intrauterine development, and from the 10th month of development to the neonatal period. These parameters 1.198 mm and 0.300 mm increase respectively. The period of relatively slow EDRICA development is from the 7th to the 10th months of development. According to the results of Conover-Iman test for EDRICA the median difference is statistically significant for the pairs formed with the groups "4 months" and "neonates". For all the other age pairs there is no a considerable difference between medians. The external diameter of the left internal carotid artery (EDLICA) at this age period increases from 0.762±0.071 mm (4-month fetuses) to 2.271±0.055 mm (neonatal period) (Table 3). EDLICA is characterized by the two periods of an accelerated development: from the 4th to the 7th months of the intrauterine development, and from the 9th month of development till the neonatal period. The parameters 1.055 and 0.319 mm increase respectively. The period of relatively slow development is from the 7th to the 9th months. Conover-Iman test demonstrated that median difference for EDLICA in all the age pairs is statistically significant, except the pairs "4 month - 5 month", "5 month - 6 month", "7 month - 8 month", "7 month - 9 month", "8 month - 9 month", "8 month - 10 month", "9 month - 10 month".

The length of the cervical part of carotid arteries (distance between the point of origin of the common carotid arteries from the subclavicular arteries to the point of intersection of the external and internal carotid arteries with the stylohyoid muscles) during the perinatal period of ontogenesis increases from 19.40±0.58 mm (4-month fetuses) to 38.60±0.28 mm (neonatal period) in the right (Table 4), and from 19.70±0.37 mm to 40.13±0.48 mm in the left (Table 4). The length of the cervical part of the right and left carotid

Table 3. External diameter of the internal carotid arteries during the perinatal period of ontogenesis (mm).

| Age group | External diameter of the internal carotid arteries | | | |
|-----------|--|-------------------|-------------|-------------------|
| | right | | left | |
| | M±m | Confidence limits | M±m | Confidence limits |
| 4 month | 0.662±0.051 | 0.523 - 0.802 | 0.762±0.071 | 0.571 - 0.953 |
| 5 month | 1.360±0.272 | 0.691 - 2.024 | 1.239±0.142 | 0.888 - 1.589 |
| 6 month | 1.553±0.133 | 1.254 - 1.852 | 1.593±0.075 | 1.433 - 1.752 |
| 7 month | 1.860±0.113 | 1.611 - 2.104 | 1.817±0.062 | 1.683 - 1.951 |
| 8 month | 1.763±0.166 | 1.373 - 2.152 | 1.930±0.122 | 1.625 - 2.233 |
| 9 month | 1.802±0.161 | 1.382 - 2.222 | 1.952±0.041 | 1.843 - 2.061 |
| 10 month | 1.902±0.081 | 1.722 - 2.081 | 2.042±0.040 | 1.951 - 2.133 |
| Neonates | 2.202±0.060 | 2.060 - 2.344 | 2.271±0.055 | 2.158 - 2.383 |

Таблица 4. Length of the cervical part of the carotid arteries during the perinatal period of ontogenesis (mm).

| Age group | Length of the cervical part of the carotid arteries | | | |
|-----------|---|-------------------|------------|-------------------|
| | right | | left | |
| | M±m | Confidence limits | M±m | Confidence limits |
| 4 month | 19.40±0.58 | 17.79 - 21.01 | 19.70±0.37 | 18.66 - 20.74 |
| 5 month | 27.34±1.04 | 24.81 - 29.88 | 29.09±1.14 | 26.31 - 31.86 |
| 6 month | 29.94±0.43 | 28.93 - 30.95 | 31.31±0.52 | 30.08 - 32.54 |
| 7 month | 28.76±0.53 | 27.52 - 29.99 | 30.51±0.38 | 29.63 - 31.39 |
| 8 month | 34.80±0.85 | 32.72 - 36.88 | 34.34±0.78 | 32.43 - 36.25 |
| 9 month | 35.05±0.51 | 33.75 - 36.35 | 36.3±0.42 | 35.21 - 37.39 |
| 10 month | 36.87±0.28 | 36.18 - 37.56 | 37.37±0.56 | 36.01 - 38.74 |
| Neonates | 38.60±0.28 | 37.95 - 39.25 | 40.13±0.48 | 39.03 - 41.24 |

arteries is characterized by the two periods of an accelerated development (4th-6th months of development, and from the 7th month - the neonatal period), and the period of relatively slow development (from the 6th to the 7th months of the intrauterine development). Conover-Iman test demonstrated that median difference for the length of the cervical part of the carotid arteries in all the age pairs is statistically significant, except the pairs "5 month - 7 month", "6 month - 7 month", "8 month - 9 month", which is peculiar for the length of the cervical part of the right carotid artery, and the pairs "5 month - 6 month", "5 month - 7 month", "6 month - 7 month", "8 month - 9 month" - for the left carotid artery.

Making the correlation analysis between all the organometric parameters of the external diameters and lengths of the carotid arteries during the perinatal period of ontogenesis we have determined that the values of all the pair correlation coefficients are positive and rather close to 1 (>0.84), which is indicative of a close positive relation between all the organometric parameters.

Discussion

The conducted statistical analysis for comparison of all the mean values of the external diameters of the right and left common, external and internal carotid arteries resulted

in determination of reliable ($p < 0.05$) differences: for the 4th, 7th, 10th months of development and for the neonatal period for the common carotid arteries; for the 4th, 7th, 9th months of development and the neonatal period for the external carotid arteries; as well as for all the months of development for the internal carotid arteries, which is indicative of a considerable difference of mean values of the external diameters of the above arteries. Certain data concerning organometric parameters of the carotid arteries are found in scientific works by Lo A. et al. [10], Naritomo M. et al. [11], Pfeiffer J., Ridder G. J. [12], Sehirli O. S. et al. [15].

In early fetuses (4-5-month) organometric parameters of the external diameter of the left common artery increase more in comparison with the right artery; in 6-7-month fetuses these sizes of the right and left arteries increase practically similar; late fetuses (8-10-month) and the neonatal period are characterized by prevailing increase of the external diameters of the right common carotid artery in comparison with the left one.

During the perinatal period of ontogenesis the external diameter of the external carotid arteries is characterized by enlargement of these parameters in the early fetuses in the left; in 6-7-month fetuses - in the right; for late fetuses and neonates - the parameters increase practically similar both in the right and left.

Organometric parameters of the external diameter of the right internal carotid artery increase more during the perinatal period of ontogenesis contrary to the left internal carotid artery.

The length of the cervical part of the carotid arteries increase more in the left in the 4-5 and 8-10-month fetuses and neonates in comparison with the length of the right carotid artery. In 6-7-month fetuses these parameters increase practically similar from both the right and left sides.

During perinatal period external diameters and lengths of the carotid arteries are found to be characterized by two periods of an accelerated development and the period of relatively slow development. Having compared the periods of development of the carotid arteries with all the possible organometric parameters we can suggest that practically similar enlargement of the external diameters of the common, external and internal carotid arteries both from the right and left are peculiar for the period of relatively slow development. The first period of an accelerated development of the carotid arteries is more specific for the external diameter and length of the common and left external carotid arteries contrary to the second accelerated period, which is characterized by more accelerated enlargement of the external diameters of the right common and right external carotid arteries.

Conclusions

1. During perinatal period external diameters and lengths of the carotid arteries are found to be characterized by two periods of an accelerated development and the period of relatively slow development. For the external

diameter of the right common carotid artery and the external diameter of the left internal carotid artery the periods from the 4th to 7th months of the intrauterine development and the period from the 9th month to the neonatal period are the periods of an accelerated development; the periods from the 7th to 9th months of development are the period of relatively slow development. The periods from the 4th to the 7th months of the intrauterine development and the period from the 10th month till neonatal period are the periods of an accelerated development for the external diameter of the left common carotid artery and external diameter of the right internal carotid artery; the period from the 7th to the 10th months of development is the period of relatively slow development. The periods from the 4th to the 7th months of the intrauterine development and from the 8th month of development till the neonatal period are the periods of an accelerated development for the external diameter of the right and left external carotid arteries; the period during 7-8th months is the period of relatively slow development. The length of the cervical part of the right and left carotid arteries is characterized by the two periods of an accelerated development - from the 4th to the 6th month and from the 7th month till the neonatal period; the period of relatively slow

development is from the 6th to the 7th month of the intrauterine development.

2. Having compared the periods of development of the carotid arteries with all the possible organometric parameters we can suggest that practically similar enlargement of the external diameters of the common, external and internal carotid arteries both from the right and left are peculiar for the period of relatively slow development. The first period of an accelerated development of the carotid arteries is more specific for the external diameter and length of the common and left external carotid arteries contrary to the second accelerated period, which is characterized by more accelerated enlargement of the external diameters of the right common and right external carotid arteries.

3. A reliable difference of the mean values of the external diameters of the right and left common, external and internal carotid arteries is peculiar for the 4th, 7th, 10th months of development and for the neonatal period for the common carotid arteries; for the external carotid arteries - the 4th, 7th, 9th months of development and neonatal period; for the internal carotid arteries - for the whole months of development.

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ОСОБЛИВОСТІ ОРГАНОМЕТРИЧНИХ ПАРАМЕТРІВ СОННИХ АРТЕРІЙ В ПЕРИНАТАЛЬНОМУ ПЕРІОДІ ОНТОГЕНЕЗУ

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Становлення будови і топографії сонних артерій у плодовому та ранньому неонатальному періодах онтогенезу людини є необхідною складовою під час проведення перинатальної діагностики та розуміння фактичних даних норми і патології. Мета дослідження - встановити органометричні параметри сонних артерій впродовж плодового і раннього неонатального періодів онтогенезу людини. Дослідження проведено на 50 препаратах трупів плодів (від 4 до 10 місяців) та 9 новонароджених (зокрема, 5 ізольованих органокомплексів) за допомогою адекватних анатомічних методів: макропрепарування, ін'єкція кровоносних судин, виготовлення топографоанатомічних зрізів, морфометрія та статистичний аналіз. Встановлено, що впродовж перинатального періоду для зовнішніх діаметрів і довжин сонних артерій характерні два періоди прискореного розвитку і період відносно сповільненого розвитку. Для зовнішнього діаметра правої загальної сонної артерії та для зовнішнього діаметра лівої внутрішньої сонної артерії з 4-го по 7-й місяць внутрішньоутробного розвитку та у період з 9-го місяця до періоду новонародженості - періоди прискореного розвитку; з 7-го по 9-й місяці розвитку - період відносно сповільненого розвитку. Для зовнішнього діаметра лівої загальної сонної артерії та для зовнішнього діаметра правої внутрішньої сонної артерії з 4-го по 7-й місяць внутрішньоутробного розвитку та у період з 10 місяця до періоду новонародженості - періоди прискореного розвитку; з 7-го по 10 місяці розвитку - період відносно сповільненого розвитку. Для зовнішнього діаметра правої і лівої зовнішніх сонних артерій з 4-го по 7-й місяці внутрішньоутробного розвитку та з 8-го місяця розвитку до періоду новонародженості - періоди прискореного розвитку; впродовж 7-8 місяців - період відносно сповільненого розвитку. Для довжин шийної частини правої і лівої сонних артерій притаманні два періоди прискореного розвитку - з 4-го по 6-й місяць розвитку та з 7-го місяця розвитку до періоду новонародженості; період відносно сповільненого розвитку - з 6-го по 7-й місяць внутрішньоутробного розвитку. За умов порівняння періодів розвитку сонних артерій зі всіма можливими їх органометричними параметрами можна стверджувати, що майже однакове збільшення зовнішніх діаметрів загальної, зовнішньої та внутрішньої сонних артерій як справа так і зліва є характерним для періоду відносно сповільненого розвитку. Перший період прискореного розвитку сонних артерій більш притаманний для зовнішнього діаметра і довжини лівої загальної та лівої зовнішньої артерії на противагу другому прискореному періоду розвитку сонних артерій, для якого є характерне збільшення зовнішніх діаметрів правої загальної та правої зовнішньої сонної артерії. Значима різниця середніх значень зовнішніх діаметрів правої і лівої загальних, зовнішніх та внутрішніх сонних артерій характерна для 4-го, 7-го, 10-го місяців розвитку та для періоду новонародженості для загальних сонних артерій; для зовнішніх сонних артерій - для 4-го, 7-го, 9-го місяців розвитку та для періоду новонародженості; для внутрішніх сонних артерій - для всіх місяців розвитку.

Ключові слова: загальна сонна артерія, зовнішня сонна артерія, внутрішня сонна артерія, морфометрія, плодовий та ранній неонатальний періоди онтогенезу людини.

ОСОБЕННОСТИ ОРГАНОМЕТРИЧЕСКИХ ПАРАМЕТРОВ СОННЫХ АРТЕРИЙ В ПЕРИНАТАЛЬНОМ ПЕРИОДЕ ОНТОГЕНЕЗА

Герасим Л. Н., Слободян А. Н.

Становление строения и топографии сонных артерий в плодовом и раннем неонатальном периодах онтогенеза человека является необходимой составляющей при проведении перинатальной диагностики и понимания фактических данных нормы и патологии. Цель исследования - установить органометрические параметры сонных артерий в течение плодового и раннего неонатального периодов онтогенеза человека. Исследование проведено на 50 препаратах трупов плодов (от 4 до 10 месяцев) и 9 новорожденных (в частности, 5 изолированных органокомплексов) с помощью адекватных анатомических методов: макропрепарирование, инъекция кровоносных сосудов, изготовление топографоанатомических срезов, морфометрия и статистический анализ. Установлено, что в течение перинатального периода для наружных диаметров и длины сонных артерий характерны два периода ускоренного развития и период относительного замедленного развития. Для внешнего диаметра правой общей сонной артерии и для внешнего диаметра левой внутренней сонной артерии с 4-го по 7-й месяц внутриутробного развития и в период с 9-го месяца по период новорожденности - периоды ускоренного развития; с 7-го по 9-й месяц развития - период относительного замедленного развития. Для наружного диаметра левой общей сонной артерии и для внешнего диаметра правой внутренней сонной артерии с 4-го по 7-й месяц внутриутробного развития и в период с 10 месяца по период новорожденности - периоды ускоренного развития; с 7-го по 10 месяц развития - период относительного замедленного развития. Для внешнего диаметра правой и левой внешних сонных артерий с 4-го по 7-й месяц внутриутробного развития и с 8-го месяца развития по период новорожденности - периоды ускоренного развития; в течение 7-8 месяца - период относительно замедленного развития. Для длины шейной части правой и левой сонной артерии присущи два периода ускоренного развития - с 4-го по 6-й месяц развития и с 7-го месяца развития по период новорожденности; период относительного замедленного развития - с 6-го по 7-й месяц внутриутробного развития. В условиях сравнения периодов развития сонных артерий со всеми возможными их органометрическими параметрами

можно утверждать, что почти одинаковое увеличение наружных диаметров общей, внешней и внутренней сонных артерий как справа так и слева характерно для периода относительно замедленного развития. Первый период ускоренного развития сонных артерий более присущий для внешнего диаметра и длины левой общей и левой наружной сонных артерий в противовес второму ускоренному периоду развития сонных артерий, для которого характерно увеличение наружных диаметров правой общей и правой наружной сонных артерий. Значимая разница средних значений внешних диаметров правой и левой общих, наружных и внутренних сонных артерий характерна для 4-го, 7-го, 10 месяцев развития и для периода новорожденности для общих сонных артерий; для наружных сонных артерий - для 4-го, 7-го, 9-го месяцев развития и для периода новорожденности; для внутренних сонных артерий - для всех месяцев развития.

Ключевые слова: *общая сонная артерия, наружная сонная артерия, внутренняя сонная артерия, морфометрия, плодовый и ранний неонатальный периоды онтогенеза человека.*



Features of gynecological pathology in women of reproductive age from Kyiv region

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One of the main conditions for the birth of a healthy baby is the gynecological health of the mother. For this reason, the purpose of the work was to assess the state of gynecological health of women in the Kyiv region. In this work, we used the data of departmental statistical reporting of the Ministry of Health of Ukraine about the number of cases of gynecological pathology from 2010-2017. The number of women of the corresponding age was determined according to the State Statistics Service of Ukraine. The relative risk of pathology (taking into account the 95 % confidence interval) from 2010-2013, 2014-2017 in the Kyiv region was evaluated in comparison with the general indicators in Ukraine as well as from 2014-2017 compared to 2010-2013 in the Kyiv region and general data in Ukraine. Separately for the Kyiv region, the frequency of gynecological pathology was determined among women of reproductive age (707 women), who visited Municipal Institution of Kyiv Regional Council "Kyiv Regional Centre for the Mother and Child Health Defense" from 2014 to 2017. The average age of women was 31.66 ± 0.37 . In most cases, the residents of the Kyiv region were diagnosed with chronic inflammatory diseases of the pelvic organs (salpingitis, 21.6 %). The relative risks of the occurrence of such diseases were determined in the region, compared with Ukraine, and over time. Those, who had menstrual disorders, hyperproliferative processes of the endometrium were more often recorded (10.8% versus 3.1%, $p < 0.01$), and those with inflammatory processes of the pelvic organs more often had cervical dysplasia (19.8 % versus 4.7 %, $p < 0.001$), chronic diseases of the genitourinary system (7.1 % versus 3.2 %, $p < 0.05$) and digestive organs (17.3 % versus 9.6 %, $p < 0.01$), which indicates a possible pathogenetic role of the inflammatory factor in the development of gynecological pathology. The relative risk of gynecological diseases among the women in the Kyiv region showed that the greatest attention is needed to improving the diagnostics of infertility and endometriosis, as well as the prevention and treatment of salpingitis and uterine cancer. Women with menstrual disorder during their visit to a gynecologist should be checked for the presence of hyperproliferative pathology and, in case a woman is diagnosed with other chronic diseases, they should be offered treatment of these areas of inflammation, which can further positively affect their reproductive health.

Keywords: gynecological pathology, reproductive health, menstrual disorders, inflammatory factor.

Introduction

In the face of economic difficulties, high mortality rates, and declining birth rates, reproductive health issues are being raised, which has been the focus of international attention for some time now and is being implemented by the "Sexual and Reproductive Health Action Plan" (Until

Europe's sustainable development strategy is achieved by 2030, no one is left behind) [21]. The issue of infertility has been kept by the palm of primes with a prevalence from 9 % to 18 % of the total population [2], creating a significant financial burden even in countries with high levels of

economy [4, 11]. Parallel to the current medical and social problem is hyperproliferative pathology of the endometrium with high specific gravity in the structure of gynecological morbidity, the risk of its malignant transformation [3, 14, 17] and inflammatory diseases of the female genital area, in which some positive changes have been achieved. But today, the situation remains unstable, debatable and in need of further search for solutions [5, 12, 13]. Regarding our country, in 1999-2003 the program of genetic monitoring was implemented on the territory of Kyiv region, and from 2009 the registers of birth defects in newborns, spontaneous abortions and infertility continued to operate, which made it possible to assess the level of genetically conditioned pathology and to determine its level and priority factors of its formation [10, 18]. But, it should not be forgotten that the main factor at birth of a healthy baby (namely, it should be the result of the activity of the gynecological service) is its healthy mother, including - in the issues of the gynecological sphere. This issue is dedicated to this study, which according to the Ministry of Health of Ukraine estimated the level of gynecological pathology in the Kyiv region in comparison with Ukraine in general and characterized gynecological pathology according to the Municipal Institution of Kyiv Regional Council "Kyiv Regional Centre for the Mother and Child Health Defense" (MI KRC KRCMCHD).

The purpose of the work was to assess the gynecological health of women in the Kyiv region.

Materials and methods

Number of women (general group and group of first detected) with urogenital system diseases, menstrual disorders (MD), salpingitis, endometriosis, infertility, urogenital mycoplasmosis, chlamydial infection and cancer of the uterus taken from MOH Ukraine published in the collections "Health status of the female population in Ukraine" for 2010-2017.

The number of women of the appropriate age was determined according to the State Statistics Service of Ukraine. Estimated relative risk (RR) of pathology in 2010-2013, 2014-2017 in the Kyiv region compared with the general indicators in Ukraine and in the period 2014-2017 compared to 2010-2013. Estimated the limits of 95 % confidence interval. If both the upper and lower bounds were on one side of 1 (ie, the confidence interval does not include 1), then we concluded that the statistical significance of the detected difference with probability $p < 0.05$. If the lower bound was 95 % of the confidence interval less than 1, and the upper bound was greater, we concluded that there was no statistical significance of the effect of the factor on the incidence of pathology, regardless of the value of RR ($p < 0.05$) [19].

Compared to the usual "p" significance assessment, 95% confidence intervals are more consistent with decision-making practice, because it is possible to take into account the value of the indicator rather than simply the fact that there is a difference between the indicators [22].

The frequency of gynecological pathology among women of fertile age (707 women) who went to the MI KRC KRCMCHD for 2014-2017 was determined separately for the Kyiv region. The average age of women was 31.66 ± 0.37 years old.

Results

As of January 1, 2018, the population of Kyiv Region (estimated) was 1754284 inhabitants. In 2017, the population decline in the Kyiv region was more rapid than in the country as a whole (-6.3 vs. -5.1 per 1000 population), with an average life expectancy at birth slightly lower (70.46 versus 71.98 years), the mortality rate was higher (1203.8 versus 1052.4 per 100 thousand people) [16]. But the marital activity of the population of the region is higher: the higher total fertility rate (1,412 against 1,374 in Ukraine per woman) and age-related fertility rates (the largest difference was observed among 20-24 year-old women: 82.1 versus 79.5 live births per 1000 women). In addition, as of January 1, 2018, the proportion of people 18 years and older in the Kyiv Region is lower than in the country as a whole (80.8 % vs. 82.0 %) at the expense of a larger proportion of children (19.2 % versus 18.0 % for children ages 0-17).

That is, against the background of negative natural growth and low average life expectancy, the Kyiv region has the potential for reproduction, and precisely for its preservation and should be directed to providing medical care to the population, in particular women of reproductive age.

In the Kyiv Region, 2.995 ± 0.030 patients among 1000 women of reproductive age (4.072 ± 0.007 ‰ in Ukraine) encountered infertility problems in 2010-2017. The frequency of menstrual disorders (MD), which is one of the leading pathologies of the female genital area, in 2010-2017 was 13.86 ± 0.07 among 1000 women of fertile age (15.69 ± 0.01 ‰ in Ukraine). The frequency of the first detected MD was 9.122 ± 0.053 ‰ (10.039 ± 0.001 ‰ in Ukraine).

Salpingitis met with a frequency of 21.58 ± 0.07 and endometriosis 1.270 ± 0.018 per 1000 working women (17.31 ± 0.01 ‰ and 3.266 ± 0.006 ‰ in Ukraine, respectively). The incidence of newly detected salpingitis and endometriosis was 11.64 ± 0.05 ‰ and 0.541 ± 0.012 ‰ (9.368 ± 0.010 ‰ and 1.249 ± 0.004 ‰ in Ukraine, respectively).

Uterine cancer met with a frequency of 4.739 ± 0.028 per 1000 women 18 years of age and older with a morbidity rate of 0.167 ± 0.007 among 1000 working women (3.885 ± 0.005 ‰ and 0.138 ± 0.001 ‰ in Ukraine, respectively).

The incidence of infections, including urogenital mycoplasmosis and chlamydial infection, in the Kyiv region was the same (1.924 ± 0.018 and 1.918 ± 0.018 per 1.000 women 18 years of age and older) and higher than the overall rate in Ukraine (1.192 ± 0.003 ‰ and 0.786 ± 0.002 ‰ respectively).

If the frequency demonstrates the prevalence of a condition in a group, then the relative risk (RR) indicator is considered as the occurrence of a pathological condition or death in one group of persons relative to another.

Table 1. Relative risk of some gynecological diseases in women of Kyiv region and Ukraine in 2010-2013 compared to 2014-2017 (times).

| Pathology | RR | CI | RR | CI |
|---------------------------------|-------------|-----------|---------|-----------|
| | Kyiv region | | Ukraine | |
| Prevalence | | | | |
| Salpingitis | 0.92 | 0.91-0.93 | 0.88 | 0.88-0.88 |
| Sterility | 1.05 | 1.01-1.09 | 0.99 | 0.98-0.99 |
| Death from cancer of the uterus | 1.06 | 0.90-1.24 | 0.90 | 0.87-0.93 |
| MD | 1.09 | 1.07-1.11 | 1.02 | 1.02-1.02 |
| Uterine cancer | 1.16 | 1.13-1.19 | 1.04 | 1.03-1.04 |
| Endometriosis | 1.16 | 1.10-1.23 | 1.12 | 1.12-1.13 |
| Morbidity | | | | |
| Sterility | 0.98 | 0.90-1.06 | 0.90 | 0.89-0.91 |
| Salpingitis | 0.99 | 0.98-1.01 | 0.89 | 0.89-0.89 |
| Uterine cancer | 1.04 | 0.85-1.26 | 0.94 | 0.91-0.98 |
| Mycoplasma genitalium | 1.06 | 1.02-1.10 | 0.75 | 0.75-0.76 |
| Endometriosis | 1.07 | 0.98-1.17 | 1.19 | 1.18-1.20 |
| Chlamydial infection | 1.10 | 1.06-1.14 | 0.71 | 0.71-0.72 |
| MD | 1.24 | 1.21-1.27 | 1.05 | 1.05-1.05 |

The situation with RR of occurrence of some gynecological diseases among women of Kyiv region in 2010-2013 compared to 2014-2017 was in most cases similar to this in Ukraine in general (Table 1). The only exceptions were the increased RR in the region as opposed to the lowered one in Ukraine:

- the prevalence of infertility (one explanation may be to seek women's counseling as it is a chance to receive extracorporeal fertilization funding at public expense);
- incidence of urogenital mycoplasmosis and chlamydial infection.

But these differences cannot be defined as negative compared to the general situation in Ukraine.

In the Kyiv region, relative to Ukraine, there is an increased relative risk of salpingitis and uterine cancer, although it has been shown that the occurrence of salpingitis over time has decreased, as is the case with uterine cancer. However, judging by the relative risk of death from uterine cancer (it does not differ from Ukrainian), its timely diagnosis leads to an increase in effective treatment and a significant reduction in mortality (see Fig. 1, 2).

Against the background of an increase in RR incidence of urogenital mycoplasmosis and chlamydial infection, the relative risk of these infections in the region compared to Ukraine in general is also shown over time, which is another confirmation of effective work on the prevention of TORCH infections (see Table 1, Fig. 2).

The frequency of MD among women of fertile age - residents of the Kyiv region who sought medical care at the MI KRC KRCMCHD during 2014-2017, amounted to 396.3 ± 18.4 ‰ (Table. 2). This is almost 30 times higher than the same indicator among all women of fertile age,

according to the Ministry of Health of Ukraine. But this fact is explained by the fact that the object of the Center's activity is to provide the population with the most qualified obstetric and gynecological help.

For comparison, according to genetic monitoring data (1999-2003) in the Kyiv region, among women who had a miscarriage up to 12 weeks and who gave birth to a healthy baby, MD was recorded at 4.75 ± 0.53 % and 2.99 ± 0.55 % of cases and was determined to be significant in the event of unauthorized miscarriage at an early date (OR=1.61 at confidence interval (CI) 1.02-2.55) [12].

Among women with MD, the highest number of women complained of having an irregular menstrual cycle - almost every second 49.21 ± 2.80 % with a frequency of 220.65 ± 15.60 ‰ among all women who applied to the MI KRC KRCMCHD. This figure is comparable to the results of a US survey, where MD accounted for 19.1 % of the 20 million visits to gynecological facilities [6].

Menorrhagia, as a diagnosis, was found in every fourth woman with MD (25.24 ± 2.44 %) with a frequency of 113.15 ± 11.91 ‰, algomenorrhea - in every ninth woman with MD (11.04 ± 1.76 %) with a frequency of 49.50 ± 8.16 ‰,

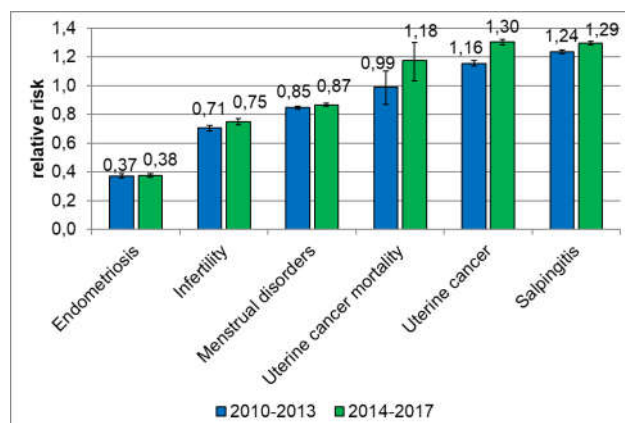


Fig. 1. Relative risk of gynecological diseases (in general, prevalence) in female residents of Kyiv region compared to general indicators in Ukraine.

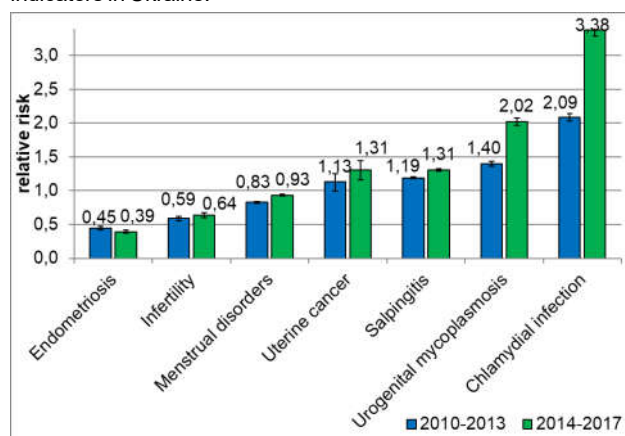


Fig. 2. Relative risk of gynecological diseases (first detected, morbidity) in female residents of Kyiv region compared to general indicators in Ukraine.

Table 2. The number of cases of hyperproliferative pathology among women of different ages with the presence and absence of MD (%).

| Hyperproliferative pathology | 19-49 (years) | | 19-34 (years) | | 35-49 (years) | |
|---|---------------|-------------|---------------|-------------|---------------|-------------|
| | MD | | MD | | MD | |
| | Yes | No | Yes | No | Yes | No |
| adenomyosis | 5.714±1.387 | 2.810±0.800 | 4.217±1.560 | 1.544±0.766 | 7.895±2.526 | 4.762±1.643 |
| endometrial hyperplasia + uterine polyp | 13.93±2.07 | 7.963±1.310 | 10.84±2.41 | 3.089±1.075 | 18.42±3.63 | 15.48±2.79 |
| endometrial hyperplasia | 8.929±1.704 | 5.152±1.070 | 6.627±1.931 | 2.317±0.935 | 12.28±3.07 | 9.524±2.265 |
| uterine polyp | 6.071±1.427 | 4.450±0.998 | 4.819±1.662 | 1.158±0.665 | 7.895±2.526 | 9.524±2.265 |

metrorrhagia - in every twelfth woman with MD (8.202±1.541 %) with a frequency of 36.78±7.08 %, hypomenstrual syndrome - in every sixteenth woman with MD (6.309±1.366 %) with a frequency of 28.29±6.24 % cases. Almost one in eight women with MD recorded two types of MD (12.50±1.98 %), which was 50.78±8.24 % among 1000 women.

If women were divided into groups by the presence of MD, hyperplastic processes were more frequently registered among those who had MD, including endometrial hyperplasia and uterine polyp. This is especially true for women of active reproductive age of 19-34 years. Among patients with MD, hyperproliferative processes were three times more frequent, compared with women with unchanged menstrual cycles (10.84±2.41 % vs. 3.089±1.075 %, $p<0.01$). In these women, endometrial hyperplasia was three times more recorded (6.627±1.931 % vs. 2.317±0.935 %, $p<0.05$) and four times more recorded polyps of the uterine (4.819±1.662 % vs. 1.158±0.665 %, $p<0.05$). Among those women who had MD, compared with women with unchanged menstrual cycles, adenomyosis (5.714±1.387 % versus 2.810±0.800 %, $p=0.08$) was also more frequently reported (Table 2).

These findings are further evidence that MD can be considered as an important clinical marker of gynecological pathology at the pre-hospital stage. When studying the menstrual function of the obstetrician-gynecologist, the following important rules should be followed: try to use the most adaptive scale for both the patient and the doctor to determine the adequacy of the menstrual cycle and find the reasons for its violation [8].

6.223±0.909 % of patients were treated with the problem of infertility at the MI KRC KRCMCHD; primary infertility was noted in 4.102±0.746 % of cases, secondary - in 2.122±0.542 %. Salpingitis met with a frequency of 37.91±1.82 %, endometriosis - 0.283±0.200 %.

In general, inflammation of the pelvic organs (chronic salpingitis/oophoritis, chronic metritis, and cervicitis) occurred in every second patient of the MI KRC KRCMCHD (51.79±1.88 %), among whom in every tenth, all three pathological conditions were diagnosed 9.9%, in every fourth - two (24.5 %), and only two thirds of women had one of three pathologies (65.7 %).

If the fact of the presence of the inflammatory process of the pelvic organs in women is divided into groups, among those who had an inflammatory process were more

common:

- history of artificial abortion (24.18±2.24 % vs. 16.33±2.00 %, $p<0.01$);
- cervical dysplasia (19.78±2.09 % vs. 4.665±1.139 %, $p<0.001$);
- chronic diseases of the genitourinary system, such as chronic pyelonephritis and chronic cystitis (7.143±1.350 % vs. 3.207±0.951 %, $p<0.05$);
- chronic digestive diseases such as chronic cholecystitis, pancreatitis, gastritis and gallstone disease (17.31±1.98 % vs. 9.621±1.592 %, $p<0.01$).

Discussion

In the Kyiv region, with infertility problems in 2010-2017, there were 2.995±0.030 among 1000 women of reproductive age (4.072±0.007 % in Ukraine) (according to the Ministry of Health of Ukraine), and this figure is far from realistic even according to the MI KRC KRCMCHD (6.223±0.909 %), in particular, in Russia and the USA this figure is 8-15 %, in Europe - about 10%, in Canada - 17 %, in Iran - 8 %, in Kazakhstan - about 15 % [2, 4].

Endometriosis occurred only in 1.270±0.018 per 1000 working women (3.266±0.006 % in Ukraine, respectively), which also differs from the global indicators. For example, around 176 million women between the ages of 15 and 49 are estimated to suffer from endometriosis worldwide [1]. Endometriosis affects 10-15 % of all women of reproductive age and is observed in 70 % of women with chronic pelvic pain [9]. In 47 % of women with endometriosis-associated infertility are diagnosed with endometrial polyps [7, 15, 20].

RR calculations show that the largest difference between the indicator in the Kyiv region and the Ukrainian level was recorded for endometriosis (Fig. 1, 2). It is this pathology that needs the most attention, although in this case it is necessary to exclude the fact of insufficient diagnosis, but a positive point should be noted some increase in this indicator over time.

Therefore, according to the results of the calculation of RR, the appearance of gynecological pathology in the Kyiv region requires the greatest attention to the improvement of diagnostic and treatment measures for the problem of endometriosis and infertility. The situation with the latter may change when attracting data from private reproductive medicine clinics located in the region and Kyiv.

Increased RR incidence of urogenital mycoplasmosis

and chlamydial infection in the region as opposed to decreased in Ukraine in 2010-2013 compared to 2014-2017 may be explained by the fact that, in contrast to other regions in the Kyiv region, the examination of persons of reproductive age for TORCH infection continues which, according to the results of genetic monitoring, during 1999-2003 were identified as priority risk factors for the occurrence of reproductive losses of genetic etiology [10, 18].

In the future, it is necessary to carry out an analysis in each individual region of Ukraine on a similar principle, which will allow to determine priority directions and rationalize the work of the obstetric and gynecological service of each investigated area.

Conclusions

1. The relative risk of gynecological diseases among women of the Kyiv region in 2014-2017 compared to 2010-2013 is similar to the situation in Ukraine, except for the increased relative risk of the prevalence of infertility and incidence of urogenital mycoplasmosis and chlamydial

infection in the region. An assessment of the relative risk of gynecological pathology in the area shows that the greatest attention is needed to improve the diagnosis of infertility and endometriosis, as well as the prevention and treatment of salpingitis and uterine cancer.

2. Adenomyosis (5.7 % vs. 2.8 %, $p=0.08$) and hyperproliferative pathology (10.8 % vs. 3.1 %, $p<0.01$) were more frequently reported in women with menstrual dysfunction than those who had menstrual cycles within normal range, incl. separately endometrial hyperplasia and uterine polyps, especially among women 19-34 years.

3. It was found that in the presence of inflammation of the pelvic organs, women had a history of artificial abortion (24.2 % vs. 16.3 %, $p<0.01$), cervical dysplasia (19.8 % vs. 4.7 %, $p<0.001$), chronic diseases of the genitourinary system (7.1 % vs 3.2 %, $p<0.05$) and chronic diseases of the digestive system (17.3 % vs 9.6 %, $p<0.01$) than those examined without evidence of inflammation, which may indicate an important etiological role of the inflammatory factor in the development of gynecological pathology.

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ОСОБЛИВОСТІ ГІНЕКОЛОГІЧНОЇ ПАТОЛОГІЇ У ЖІНОК РЕПРОДУКТИВНОГО ВІКУ - МЕШКАНОК КИЇВСЬКОЇ ОБЛАСТІ

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Однією з головних умов народження здорової дитини є гінекологічне здоров'я матері. Саме тому метою роботи стала оцінка стану гінекологічного здоров'я жінок Київської області. В роботі використані дані відомчої статистичної звітності МОЗ України щодо кількості випадків гінекологічної патології за 2010-2017 рр. Кількість жінок відповідного віку визначали за даними Державної служби статистики України. Оцінювали відносний ризик виникнення патології (з урахуванням 95 % довірчого інтервалу) у 2010-2013, 2014-2017 рр. в Київській області порівняно із загальними показниками України та у 2014-2017 рр. порівняно з 2010-2013 рр. в Київській області та загалом в Україні. Окремо для Київської області визначали частоту гінекологічної патології серед жінок фертильного віку (707 жінок), які звернулися до Комунального закладу Київської обласної ради "Київський обласний центр охорони здоров'я матері та дитини" за період 2014-2017 рр. Середній вік жінок становив $31,66 \pm 0,37$ роки. Найчастіше у мешканок Київської області визначали хронічні запальні захворювання органів малого таза (сальпінгіти, 21,6 %). Визначені відносні ризики виникнення таких захворювань в області, порівняно з Україною, та в динаміці. В обстежених, які мали порушення менструального циклу, частіше реєстрували гіперпроліферативні процеси ендометрія (10,8 % проти 3,1 %, $p < 0,01$), а у тих, хто мав запальний процес органів малого таза, частіше зустрічалась дисплазія шийки матки (19,8 % проти 4,7 %, $p < 0,001$), хронічні хвороби сечостатевої системи (7,1 % проти 3,2 %, $p < 0,05$) та органів травлення (17,3 % проти 9,6 %, $p < 0,01$), що свідчить про патогенетичну роль запального фактора у розвитку гінекологічної патології. Оцінка відносного ризику виникнення гінекологічних захворювань серед жінок Київської області показала, що найбільшій увазі потребує покращання діагностики безплідності та ендометріозу, а також профілактика та лікування сальпінгітів та раку тіла матки. При зверненні жінок з порушенням менструального циклу до гінеколога необхідно звертати увагу на наявність у них гіперпроліферативної патології, а при наявності у жінки інших хронічних захворювань пропонувати санацію цих вогнищ, що може в подальшому позитивно вплинути на їх репродуктивне здоров'я.

Ключові слова: гінекологічна патологія, репродуктивне здоров'я, порушення менструального циклу, запальний фактор.

ОСОБЕННОСТИ ГИНЕКОЛОГИЧЕСКОЙ ПАТОЛОГИИ У ЖЕНЩИН РЕПРОДУКТИВНОГО ВОЗРАСТА - ЖИТЕЛЬНИЦ КИЕВСКОЙ ОБЛАСТИ

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Одним из главных условий рождения здорового ребенка является гинекологическое здоровье матери. Именно поэтому целью работы являлась оценка состояния гинекологического здоровья женщин Киевской области. В работе использованы данные ведомственной статистической отчетности МОЗ Украины о количестве случаев гинекологической патологии за 2010-2017 гг. Количество женщин соответствующего возраста определяли по данным Государственной службы статистики Украины. Оценивали относительный риск возникновения патологии (с учетом 95 % доверительного интервала) в 2010-2013, 2014-2017 гг. в Киевской области по сравнению с общими показателями по Украине и в 2014-2017 гг. по сравнению с 2010-2013 гг. в Киевской области и общими данными Украины. Отдельно для Киевской области определяли частоту гинекологической патологии среди женщин фертильного возраста (707 женщин), которые обратились в коммунальное учреждение Киевского областного совета "Киевский областной центр охраны здоровья матери и ребенка" за период 2014-2017 гг. Средний возраст женщин составлял $31,66 \pm 0,37$ года. Чаще всего у жительниц Киевской области определяли хронические воспалительные заболевания органов малого таза (сальпингиты, 21,6 %). Определены относительные риски возникновения таких заболеваний в области, по сравнению с Украиной, и в динамике. У обследованных, которые имели нарушения менструального цикла, чаще регистрировали гиперпролиферативные процессы эндометрия (10,8 % против 3,1 %, $p < 0,01$), а у тех, кто имел воспалительный процесс органов малого таза, чаще встречалась дисплазия шейки матки (19,8 % против 4,7 %, $p < 0,001$), хронические заболевания мочеполовой системы (7,1 % против 3,2 %, $p < 0,05$) и органов пищеварения (17,3 % против 9,6 %, $p < 0,01$), что свидетельствует о возможной патогенетической роли воспалительного фактора в развитии гинекологической патологии. Оценка относительного риска возникновения гинекологических заболеваний среди женщин Киевской области показала, что наибольшего внимания требует улучшение диагностики бесплодия и эндометриоза, а также профилактика и лечение сальпингитов и рака тела матки. При обращении женщин с нарушением менструального цикла к гинекологу следует обращать внимание на наличие у них гиперпролиферативной патологии, а при выявлении у женщины других хронических заболеваний - предлагать санацию этих очагов, что может в дальнейшем положительно отразиться на их репродуктивном здоровье.

Ключевые слова: гинекологическая патология, репродуктивное здоровье, нарушения менструального цикла, воспалительный фактор.



Age-related features of walking with cognitive tasks

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Human walking is considered as a complex cognitive act. The research purpose is an analysis of age-related features of spatio-temporal parameters of human walking and directions of their changes at walking with dual (cognitive) tasks. The walking spatio-temporal indexes were studied in 608 individuals of both sexes aged 12-43 years by GAITRite® (CIR Systems Inc., Clifton, NJ) under normal walking at individually comfortable velocity and under additional cognitive tasks: 1) sequentially pronounce aloud any known animals; 2) starting from a number 100, subtract 7 and pronounce the result aloud. The statistical processing of the got results was carried out in the licensed software "STATISTICA 5.5". At performing the first, simpler, task, the spatial parameters had no significant changes in all age groups. Most of the temporal parameters changed: cycle time, swing time, single support time, and double support time increased. Therefore, equilibrium maintaining at walking with naming animals is realized with a longer overall support period, reducing the walking cadence and velocity. The constant width of the support base and the angle of the feet turn indicate that the magnitudes of the functional support base and angle of the feet turn at normal walking is sufficient to maintain posture and balance at walking with simultaneous performance of the cognitive task, as well as more rigid mechanisms of regulation of these two parameters. The walking temporal parameters are more labile than spatial parameters. With age, the percentage of the integral index of walking quality (FAP) decreases especially in females: in girls by 15.3 %, in young women by 14.4 %, in middle-aged women by 7.4 %. At performing the second, more complex, arithmetic task, in young men and young girls support base, toe-in-out, step length difference had no significant changes only. The mean velocity, cadence, step length, stride length, step extremity ratio decreased. The count of steps, all temporal parameters, and stance percentage increased. FAP declined critically by 30.4 % in young men and 33.4 % in young women, indicating a decrease in balance and body stability under walking with cognitive task and increasing the risk of falls. Therefore, a significant reduction in FAP can be used as a diagnostic criterion in neurological practice.

Keywords: spatial and temporal parameters of walking, different age groups, gait with an additional cognitive task.

Introduction

Human movements consist of maintenance of equilibrium and movement proper (motor component, locomotion). Normal human movements provide not only a movement in space but also satisfaction of everyday necessities, maintenance of full-fledged social relations and life quality. Practically all parts of the central nervous system (CNS) - centers of locomotion, postural control, balance, voluntary movements, cognitive processes contribute to control of upright walking and labour activity [12, 14]. Therefore, a human walking should be considered not only

as a motor, but also as a complex cognitive act [23]. Having analyzed 62 research papers on effect of cognitive tasks on human walking performance in 2300 persons [1], the authors concluded that the use of dual task methodology (walking and cognitive/motor task) has become a leading theme in human walking studies. However, despite the growing body of researches on human walking and its disorders, there remain a number of unsolved issues. They revealed walking disorders while performing additional tasks in the elderly, neurological patients [5, 6, 10]. At the same time, there are

reports of the lack of cognitive tasks effect on walking in both young healthy people and healthy elderly people [19]. But the authors used light cognitive tasks as additional ones that required low cognitive costs, or perhaps priority during research was given exceptionally to walking. In single researches of walking with dual tasks (cognitive/motor) in young healthy people individual indexes were studied only and in most researches without the account of age and gender [11].

Thus, the organization of walking and its disorders remain one of the most difficult sections of physiology and pathology of the nervous system, due not only to the mysterious intimate mechanisms, but also to the methodological problems of the walking research.

The *research purpose* is an analysis of age-related features of spatio-temporal parameters of human walking and directions of their changes at walking with dual (cognitive) tasks.

Materials and methods

608 clinically healthy individuals of both sexes aged 12-43 years were examined. The age distribution was as follows: 69 adolescents - 36 girls (12-15 years) and 33 boys (13-16 years); 502 young people - 241 young men (17-21 years) and 261 young women (16-20 years); 37 middle-aged women (21-43 years). During the study period, the volunteers did not have traumas and diseases that could lead to changes in walking parameters, did not use alcohol, sedatives, and medications for the last 72 hours. The spatio-temporal indexes of walking were studied by the high-quality computerized electronic walkway system GAITRite® (CIR Systems Inc., Clifton, NJ), which is a 4.2 meter long and 1.5 meter wide polymer path with built-in 22000 pressure sensors. While walking along the path, the system scans the sensors, processes them, saves and calculates the integral spatial and temporal parameters of walking. The gait parameters were determined separately for the right and left legs. The study was performed without shoes, as more reliable changes in the spatio-temporal parameters are obtained [22]. The reliability of the GAITRite® system has been established in a number of studies [8, 15, 20, 27]. The followings parameters were determined: velocity, step count, cadence, step length, stride length, step length difference, support base, step time, cycle time, swing time, single support time, double support time, structure of step cycle, integral index of walking quality - Functional Ambulation Performance Score, FAP. The integral index of general walking quality ("normality" of walking) FAP represents the level of maintenance of equilibrium and stability of body during movement. FAP is represented as a singular number and automatically calculated by the GAITRite® system, taking into account step time, step extremity ratio, mean normalized velocity (velocity/mean extremity length) and mean extremity length - the arithmetic mean of the right and left extremities length. The magnitude of FAP is also influenced by extraneous assistance, the use of assisted equipment, and

the dynamics of the support base. Normally, the FAP magnitude is 95-100 %. The walking parameters were evaluated under normal walking at individually comfortable velocity and under additional cognitive tasks: 1) sequentially pronounce aloud any known animals without repeating; 2) starting from a number 100, subtract 7 and pronounce the result aloud. The quality of walking and the quality of the cognitive task were evaluated. There was no indication of the priority of one task over another (walking over the cognitive task or vice versa). The results of the automatic calculation of walking parameters were transferred to the "Excel" spreadsheet for further processing, analysis and comparison. The statistical processing of the got results was carried out in "STATISTICA 5.5" (owned by Center of Scientific and Information Technologies of Vinnytsya National Pirogov Memorial Medical University, license number AXXR910A374605FA).

Results

In the researches of walking with pronouncing aloud any known animals 69 adolescents, 298 persons of youth age, 37 women of middle ages were examined.

It was set that in boys, the velocity was 118.6 ± 3.5 cm/s. cadence was 101.8 ± 2.0 steps/min. Spatial parameters were as follows: step length right was 69.41 ± 1.46 cm, step length left - 70.03 ± 1.42 cm; step extremity ratio right 0.771 ± 0.021 and step extremity ratio left 0.781 ± 0.021 ; stride length right 139.34 ± 2.83 cm, stride length left 139.38 ± 2.8 cm; support base right was 10.62 ± 0.59 cm, support base left 10.25 ± 0.58 cm; toe-in-out right was $9.231 \pm 1.041^\circ$, toe-in-out left - $7.401 \pm 1.082^\circ$. Temporal indexes: step time right and step time left were identical 0.602 ± 0.011 s; cycle time right was 1.191 ± 0.032 s, cycle time left - 1.192 ± 0.021 s; swing time right and swing time left were identical 0.502 ± 0.011 s; stance time right and stance time left were identical 0.701 ± 0.022 s; duration of single support was 0.502 ± 0.010 s for both extremities; double support time was identical for both extremities - 0.210 ± 0.010 s. FAP index was 83.15 ± 3.88 %.

At comparing the spatio-temporal parameters of the ordinary walking and walking with simultaneous cognitive task in boys it was revealed that spatial indexes do not have reliable changes ($p > 0.05$). Most temporal parameters differed statistically: step time was increased from both sides (by 11.1 ± 1.9 %), cycle time left - (by 10.2 ± 0.9 %) cycle time right - (by 11.2 ± 0.9 %) ($p < 0.05$), cadence diminished (by 9.3 ± 1.1 %) ($p < 0.001$), single support time was increased from both sides (by 13.6 ± 2.3 %), swing time from both sides (by 13.6 ± 2.3 %) ($p < 0.001$). Stance time was increased from both sides (by 19.4 ± 4.5 %). velocity diminished (by 8.4 ± 2.6 %) and ambulation time was increased (by 9.0 ± 3.8 %) ($p < 0.05$). Time of double support from both sides did not have reliable changes only ($p > 0.05$).

In young men the velocity was 124.11 ± 3.29 cm/s, cadence was 102.09 ± 1.68 steps/min. The following spatial parameters were got: step length right was 72.17 ± 1.21 cm, step length left - 72.98 ± 1.18 cm; step extremity

ratio was identical from both sides and was 0.792 ± 0.011 ; stride length right was 145.57 ± 2.32 cm, stride length left - 144.97 ± 2.20 cm; support base right was 10.48 ± 0.48 cm, support base left - 10.51 ± 0.46 cm; toe-in-out right was $10.36 \pm 0.85^\circ$, toe-in-out left - $7.976 \pm 0.759^\circ$. Temporal indexes: step time right was 0.587 ± 0.012 s, step time left - 0.596 ± 0.010 s; cycle time right was 1.192 ± 0.031 s, cycle time left - 1.188 ± 0.019 s; swing time right and swing time left were identical 0.502 ± 0.009 s; stance time right lasted 0.701 ± 0.010 s, stance time left - 0.693 ± 0.008 s; duration of single support was 0.502 ± 0.011 s from both sides; double support time right and double support time left were - 0.210 ± 0.010 s. FAP index was 82.1 ± 2.2 %.

At comparing the spatio-temporal parameters of the ordinary walking and walking with simultaneous cognitive task in young men it was revealed that spatial indexes do not have reliable changes ($p > 0.05$). Most temporal parameters differed statistically: step time left was increased (by 7.1 ± 1.8 %), step time right was increased (by 7.3 ± 1.8 %), cycle time from both sides was increased (by 7.2 ± 1.8 %) ($p < 0.05$), cadence diminished (by 6.4 ± 0.4 %) ($p < 0.001$), single support time left was increased (by 11.1 ± 2.2 %) single support time right was increased (by 8.7 ± 2.2 %), swing time left was increased (by 8.7 ± 2.2 %) swing time right was increased (by 11.1 ± 2.2 %), ($p < 0.001$), stance time left was increased (by 4.5 ± 1.5 %) stance time right was increased (by 7.7 ± 1.5 %), velocity diminished (by 6.5 ± 2.5 %) and ambulation time was increased (by 5.2 ± 3.7 %) ($p < 0.05$). Time of double support from both sides did not have reliable changes only ($p > 0.05$).

In girls, the velocity was 103.26 ± 4.51 cm/s, cadence was 95.53 ± 2.71 steps/minute. The following spatial parameters were obtained: step length right was 64.01 ± 1.37 cm, step length left - 64.09 ± 1.32 cm; step extremity ratio right was 0.761 ± 0.019 and step extremity ratio left - 0.761 ± 0.009 ; stride length right was 128.33 ± 2.62 cm, stride length left - 128.16 ± 2.67 cm; support base right was 7.101 ± 0.592 cm, support base left - 7.03 ± 0.591 cm; toe-in-out right was $2.511 \pm 0.892^\circ$, toe-in-out left - $0.402 \pm 0.841^\circ$. Temporal indexes: step time right and step time left were identical and equal 0.654 ± 0.021 s; cycle time right and cycle time left were identical and equal 1.302 ± 0.041 s; swing time right was 0.543 ± 0.019 s, swing time left - 0.536 ± 0.020 s; stance time right was 0.768 ± 0.029 s, stance time left - 0.764 ± 0.031 s; single support time right was 0.528 ± 0.021 s and single support time left - 0.543 ± 0.019 s; double support right and double support left were identical - 0.248 ± 0.007 s. FAP index was 81.8 ± 1.8 %.

At comparing the spatio-temporal parameters of the ordinary walking and walking with simultaneous cognitive task in girls it was revealed that spatial indexes do not have significant changes ($p > 0.05$). Most temporal parameters differed statistically: step time was increased (by 20.4 ± 1.9 % from both sides) as well as cycle time (by 20.4 ± 1.9 % from both sides) ($p < 0.05$), single support time left (by 22.7 ± 2.3 %) single support time right (by 20.5 ± 2.3 %), swing

time left (by 20.5 ± 2.3 %) swing time right (by 22.7 ± 2.3 %) ($p < 0.001$), stance time left (by 20.3 ± 3.1 %) stance time right (by 18.6 ± 3.1 %), double support time left (by 19.0 ± 3.1 %) double support time right (by 25.0 ± 5.0 %) ($p < 0.05$), velocity diminished (by 13.0 ± 1.2 %) and ambulation time increased (by 22.4 ± 5.1 %) ($p < 0.05$), cadence diminished (by 14.8 ± 0.8 %) ($p < 0.001$).

In young women velocity was 98.974 ± 3.32 cm/s; cadence was 93.56 ± 2.27 steps per minute. Spatial parameters: step length right was 62.53 ± 0.87 cm, step length left 62.98 ± 0.93 cm; step extremity ratio right was 0.733 ± 0.009 and step extremity ratio left - 0.741 ± 0.011 ; stride length right was 125.7 ± 1.8 cm, stride length left - 125.6 ± 1.8 cm; support base right was 6.619 ± 0.494 cm, support base left - 6.553 ± 0.484 cm; toe-in-out right was $2.952 \pm 0.658^\circ$, toe-in-out left - $0.501 \pm 0.687^\circ$. Temporal parameters: step time right was 0.658 ± 0.017 s, step time left - 0.681 ± 0.020 s; cycle time right was 1.341 ± 0.039 s, cycle time left - 1.337 ± 0.041 s. swing time right was 0.543 ± 0.021 s, swing time left - 0.562 ± 0.020 s, stance time right - 0.788 ± 0.031 s, stance time left - 0.769 ± 0.018 s, single support time right was 0.568 ± 0.021 s and single support time left 0.538 ± 0.019 s. Double support right and double support left were identical - 0.262 ± 0.011 s. FAP index was 82.3 ± 1.1 %.

At comparing the spatio-temporal parameters of the ordinary walking and walking with simultaneous cognitive task in young women it was revealed that spatial indexes do not have significant changes ($p > 0.05$). All temporal parameters were statistically different. It was determined increasing in step time left (by 25.9 ± 1.9 %) and step time right (by 24.5 ± 1.9 %), step cycle left (by 24.3 ± 0.9 %) and step cycle right (by 25.2 ± 0.9 %), single support time left (by 22.7 ± 2.3 %) single support time right (by 27.3 ± 2.3 %), swing time left (by 27.3 ± 2.3 %) and swing time right (22.7 ± 2.3 %) ($p < 0.001$), stance support left (22.2 ± 1.7 %) and stance support right (23.4 ± 1.6 %), double support time from both sides (by 30.0 ± 5.0 %) ($p < 0.05$). Velocity decreased (by 16.1 ± 0.9 %) ($p < 0.001$), ambulation time increased (by 25.0 ± 3.9 %) ($p < 0.05$) and cadence decreased (by 17.4 ± 0.8 %) ($p < 0.001$).

In middle-aged women, velocity was 101.32 ± 4.48 cm/s; the number of steps per minute was 94.24 ± 3.11 . Spatial parameters: step length right was 63.68 ± 1.12 cm, step length left was 63.78 ± 1.07 cm; step extremity ratio right was 0.738 ± 0.018 and step extremity ratio left - 0.751 ± 0.009 ; stride length right was 127.5 ± 2.1 cm; stride length left was 127.9 ± 2.2 cm; support base right was 6.452 ± 0.576 cm, support base left - 6.482 ± 0.568 cm; toe-in-out right was $2.281 \pm 0.802^\circ$, toe-in-out left - $4.148 \pm 0.942^\circ$. Temporal parameters: step time right and left were the same 0.669 ± 0.028 s; cycle time right was 1.342 ± 0.051 s, cycle time left - 1.323 ± 0.048 s; swing time right and left were equal 0.542 ± 0.021 s; stance time right was 0.803 ± 0.038 s, stance time left - 0.792 ± 0.032 s, single support time was 0.538 ± 0.019 s for both sides; double support right and double support left were identical - 0.279 ± 0.018 s. FAP index

was 79.48 ± 4.71 %.

At comparing the spatio-temporal parameters of the ordinary walking and walking with simultaneous cognitive task in middle-aged women it was determined that the spatial parameters had no significant changes ($p > 0.05$). Most of the temporal parameters were statistically different: it was determined increasing in step time on both sides (by 21.8 ± 3.6 %), cycle time left (by 20.0 ± 2.7 %) and cycle time right (by 21.8 ± 2.7 %), single support time on both sides (22.7 ± 2.3 %), swing time on both sides (22.7 ± 2.3 %), stance time left (19.7 ± 3.0 %) and stance time right (19.4 ± 4.5 %) ($p < 0.001$), double support time on both sides (21.3 ± 4.3 %); velocity decreased (9.8 ± 1.5 %), ambulance time increased (by 13.7 ± 4.8 %) ($p < 0.05$) as well as cadence (by 14.2 ± 1.2 %) ($p < 0.001$).

At the age-related comparison of the studied groups, no significant differences in the quality of the cognitive task performance were detected ($p > 0.05$). To analyze the cognitive task quality at walking the average number of errors in absolute quantity and in the percentage of detected errors to the total number of the named animals in each age group were determined. Repetition of an already named animal during walking or complete stop were errors.

Walking with arithmetic cognitive task (starting from a number 100, subtract 7 and pronounce the result aloud) was examined in 204 adolescents.

In young men it was found, that the average walking speed was 61.68 ± 2.77 cm/s; steps number per minute was 61.41 ± 2.43 . Step length of the right leg was 60.23 ± 1.042 cm, of the left leg 60.09 ± 1.09 cm; ratio of stride length to leg length was the same for the right and left legs and was 0.653 ± 0.012 ; the difference between step length of the right and left legs was 2.682 ± 0.248 cm; double step length of the right leg was 120.36 ± 2.11 cm, of the left one was 120.17 ± 2.14 cm; width of the support base for the right leg was 10.06 ± 0.49 cm, for the left - 10.01 ± 0.49 cm; rotation angle of the right foot was $8.232 \pm 0.691^\circ$, of the left - $5.518 \pm 0.672^\circ$. The average length of steps for the right leg was 1.187 ± 0.079 s, for the left one - 1.173 ± 0.068 s; duration of stepping cycle for the right leg was 2.35 ± 0.136 s, the left - 2.368 ± 0.136 s. Duration of the right leg transfer was 0.931 ± 0.062 s, of the left - 0.918 ± 0.057 s; reliance time for the right leg lasted 1.413 ± 0.078 s, for the left one 1.449 ± 0.087 s; duration of single reliance of the right leg was 0.921 ± 0.058 s, of the left one 0.928 ± 0.059 s; time of double reliance while performing a step by the right leg lasted 0.513 ± 0.041 s, by the left - 0.519 ± 0.039 s. The difference in step duration between the right and the left leg was 0.209 ± 0.038 s, and the difference in step cycles duration for both legs was 0.091 ± 0.019 s. In the structure of walking cycle with simultaneous performance of cognitive task in boys, the following ratios were obtained: the duration of foot transfer from the total duration of the walking cycle was 38.9 ± 0.5 % for the right leg, 38.8 ± 0.6 % for the left leg; reliance duration for the right leg was 61.1 ± 0.5 % of the total duration of stepping cycle, for the left leg - 61.2 ± 0.6 %; single reliance

duration of the right leg in examined boys was 39.2 ± 0.6 %, of the left - 38.8 ± 0.7 % of the total duration of the respective step cycle; reliance on both feet for the stepping cycle for the right leg was 22.3 ± 0.8 %, for the left leg - 22.6 ± 0.8 %. FAP of walking with simultaneous performance of cognitive task in adolescent boys was 67.6 ± 1.7 %.

At comparing the spatio-temporal parameters of the ordinary walking and walking with simultaneous cognitive task in young men it was revealed that step length and stride length for both legs, as well as step extremity ratio were significantly smaller at walking with the cognitive task ($p < 0.001$ in all cases). The support base for both legs, toe-in-out and step length difference at walking with the simultaneous performance of the cognitive task remained unchanged ($p > 0.05$). Step time for both legs, cycle time for both legs, stance time for both legs, swing time for both legs, single support time for both legs, and double support time for both legs were statistically significantly higher ($p < 0.001$ in all cases). The step time difference and cycle time difference were increased ($p < 0.001$ in both cases). In the step cycle structure the percentage of swing time right ($p < 0.01$) and swing time left ($p < 0.001$), single support time for each leg were reduced ($p < 0.001$), the percentage of stance time right ($p < 0.001$) and left ($p < 0.001$) as well as double support time were increased ($p < 0.001$).

Thus, among all spatio-temporal parameters in walking with the cognitive task, only the support base for each leg, toe-in-out, step length difference was not significantly different compared to ordinary walking. The velocity, cadence, step length, stride length, step extremity ratio decreased significantly. The number of steps along the GAITRite® mat, as well as all temporal parameters increased significantly. In the step cycle structure the portion of stance time right and left, and double support time were increased, but the portion of swing time right and left, and single support time for each leg were reduced.

The spatio-temporal parameters when walking with simultaneous performance of the same cognitive task in young women were as follows: average speed of movement 47.16 ± 2.38 cm/s; per minute the girls performed 54.38 ± 2.18 steps; the right leg step length was 51.19 ± 0.91 cm, for the left leg 50.58 ± 0.88 cm; ratio of stride length to leg length was the same for the right and left legs and was 0.602 ± 0.009 ; difference between step length of the right and left legs was 2.602 ± 0.201 cm; double step length of the right leg was 101.7 ± 1.8 cm, of the left one was 102.0 ± 1.8 cm; width of the support base for the right leg was 6.209 ± 0.428 cm, for the left leg - 6.138 ± 0.418 cm; the right foot rotation angle was $4.019 \pm 0.621^\circ$, for the left - $0.501 \pm 0.658^\circ$. Right leg steps duration was 1.348 ± 0.068 s, for the left one - 1.279 ± 0.057 s. Stepping cycle duration for the right leg was 2.62 ± 0.127 s, for the left 2.581 ± 0.117 s; duration of the right leg transfer was 1.009 ± 0.058 s, of the left one - 0.948 ± 0.048 s; reliance duration for the right leg was 1.608 ± 0.082 s, for the left one - 1.638 ± 0.079 s; single reliance duration of the right foot was 0.947 ± 0.049 s, of the left one was 1.012 ± 0.058 s;

reliance on both feet when performing a step with the right leg lasted 0.662 ± 0.043 s, left - 0.668 ± 0.044 s; difference in step duration between the right and left legs was 0.212 ± 0.031 s, and the difference in step cycles duration for both legs was 0.139 ± 0.017 s; foot transfer duration from the total duration of stepping cycle was 37.9 ± 0.6 % for the right leg, 36.6 ± 0.6 % for the left leg; reliance duration for the right leg was 62.2 ± 0.6 % of the total duration of stepping cycle, for the left leg it was 63.4 ± 0.6 %; duration of a single reliance for the right leg was 36.5 ± 0.6 % of the total duration of stepping cycle, with the left - 38.1 ± 0.7 %; both feet reliance for stepping cycle for the right leg was 25.7 ± 0.8 %, for the left leg - 26.3 ± 0.9 %. FAP when walking with simultaneous cognitive task in girls was 63.4 ± 1.5 %.

At comparing the spatio-temporal parameters of the ordinary walking and walking with simultaneous cognitive task in young women it was found out statistically significant differences among most spatial and all temporal parameters. The velocity was significantly lower, the cadence was greater, the young women performed significantly fewer steps per minute ($p < 0.001$ in all cases). The step length and stride length, as well as the step extremity ratio were statistically significantly smaller ($p < 0.001$ in all cases). The support base and toe-in-out did not differ ($p > 0.05$), and step length difference significantly increased ($p < 0.001$). Step time, cycle time, swing time, stance time, single support and double support for both legs were statistically significantly greater than when walking ($p < 0.001$ in all cases). The difference in step time and cycle for both legs increased ($p < 0.001$ in both cases). In the step cycle structure, both percentage of swing time for both extremities and percentage of single time for each extremity from the duration of their step cycles ($p < 0.001$) significantly decreased, and percentage of stance time for each leg, double support time right and left increased significantly ($p < 0.001$).

In detailed analysis of actual cognitive task quality, it was found that standing in the general group of adolescents, out of 14 possible numbers to calculate, the average number of errors for them was 1.1 ± 1.4 , which is equal to 7.9 ± 9.8 %.

When performing a cognitive task while walking on a track in adolescents group, the average total number of calculated numbers was 8.3 ± 3.2 , and the average number of errors in calculations - 1.3 ± 1.5 , which is equal to 17.4 ± 18.3 %.

Discussion

Despite the traditional ideas about anatomical and functional isolation of motor systems from cognitive, modern researchers allow to assert that these systems are interconnected [6, 9, 10, 24, 28]. The base of movements formation is the coordinated activity of different brain systems of both those that directly control the realization of the motor act and those that are related with the processes of perceptions, attention and memory [17].

For the purpose to study the effect of the cognitive task on the spatio-temporal parameters of human walking, we used two tasks of different complexity: 1) sequentially pronounce aloud any known animals without repeating; 2) starting from a number 100, subtract 7 and pronounce the result aloud. The results of walking with additional cognitive tasks were compared with the results of normal walking at individually comfortable velocity.

It was revealed similar changes in the parameters of walking with an easier cognitive task (naming animals) in all groups. It should be noted that the spatial parameters had no significant changes. As opposed to the spatial parameters, most temporal ones in all groups were changed statistically, namely: there was an increase in the cycle time, swing time, the duration of the single and double support. Changing in these parameters logically led to a decrease in velocity and ambulation time. Therefore, equilibrium maintaining at walking with naming animals is realized with a longer overall support period in the step cycle of such walking, reducing the walking cadence and velocity and increasing the ambulation time.

The constant width of the support base and the angle of the feet turn in all groups may indicate that the magnitudes of the functional support base and angle of the feet turn at normal walking is sufficient to maintain posture and balance at walking with simultaneous performance of the cognitive task, as well as more rigid mechanisms of regulation of these two parameters [3, 4, 30].

At comparing the spatio-temporal parameters of walking with simultaneous cognitive task between groups of different age no statistically significant differences were found in male and female groups.

We did not find differences in cognitive performance between age groups.

At naming animals while walking, the cognitive component obviously appeared to be such a force of influence that it led to a change in not all walking parameters but only to a change in a number of temporal parameters. Thus, it can be reasonably assumed that temporal parameters at walking with an additional cognitive task begins to change already during the execution of the simplest cognitive tasks, and therefore are more labile than the spatial parameters that change as the complexity of the cognitive task increases.

Assessing changes in walking parameters under additional motor or cognitive tasks, it is important to consider that the spatial and temporal parameters of walking can indirectly evaluate the state of the CNS structures responsible for the walking parameters formation. Walking quality with the additional cognitive task tended to decrease in all investigated groups, as indicated by the results of comparing the FAP index at normal individually comfortable walking and walking with the additional cognitive task. Accordingly FAP went down for boys from 96.4 ± 4.0 % to 83.1 ± 3.9 %, for young men from 96.7 ± 4.9 % to 82.1 ± 2.2 %, for girls from 97.1 ± 3.9 % to

81.8±1.8 %, for young women from 96.7±3.9 % to 82.3±1.1 %, for middle-aged women from 96.8±5.3 % to 89.5±4.7 %. It is interesting that with age, especially among women, the percentage of FAP decreases: in girls by 15.3 %, in young women by 14.4 %, in middle-aged women by 7.4 %. Probably, such a decrease in FAP proves that performing a cognitive task while walking leads to a decrease of balance and body stability during the movement, and thus increases the risk of falls, so a significant decrease in FAP can be used as a diagnostic criterion in neurological practice.

More significant changes in walking were established during performing more complex (sequential subtraction 7 out of 100) cognitive task. Velocity decreased by 52.5 % in boys and 61.5 % in girls. The same effect of cognitive performance on walking velocity, but less power, has been observed in other studies [10]. At the same time, the cadence decreased by 44.1 % in boys and 52.6 % in girls, which is usual for slow walking [30].

It should be noted that there are conflicting results of studies of cognitive tasks effect on human walking parameters. There are reports of cognitive tasks no influence on walking of young healthy people as well as on healthy elderly people [18, 19, 21]. The authors used easy cognitive tasks as additional ones (verbal response to auditory stimulus, verbal response to visual stimulus, etc.) that required little cognitive effort, or perhaps gave priority exclusively to walking, which was studied less accurately, mostly using electronic footswitch systems. The direction of changes in the spatial-temporal parameters of walking with the simultaneous performance of the cognitive task in our study only in some cases coincided with those given in the literature. However, current research can reasonably argue that motor and cognitive systems are interconnected [9, 10]. The basis of motions formation is the coordinated activity of various brain systems, both those that directly control the implementation of the motor act and those related to the processes of perception, attention, and memory [17].

Thus, reducing walking speed while performing an additional task is likely to be a defensive reaction to maintain movement stability. On the other hand, there is evidence in the literature that slow walking speed, which is often accompanied by an increase in the variability of step cycle duration, contributes to gait instability [17]. Therefore, in our case, when arithmetic is concurrent with walking, a decrease in speed may indicate that such walking becomes unstable compared to ordinary walking. Instability may be associated with qualitative changes in walking control, which becomes less effective at decreased speed.

We have determined that both young men and young women have a decrease in walking speed with simultaneous counting due to an increase in all temporal parameters without exception and, first of all, due to the increase in stance time and swing time. The step cycle was restructured in the direction of reducing the parts of the swing time and single support time (by 3.9 % and 3.7

% for young men, young women by 7.6 % and 7.4 % respectively), and an increase in the parts of stance time and double support (2.7 % and 18.5 % for young men, 5.2 % and 34.7 % for young women respectively). Therefore, to maintain equilibrium at walking with the arithmetic task a longer overall support period in the step cycle of such walking helps. Moreover, the increased instability of walking with simultaneous calculation in comparison with ordinary walking is indicated by the increase of asymmetries of step time (from 0.010±0.001 s to 0.209±0.038 s), cycle time (from 0.010±0.001 s to 0.091±0.019 s), and young women also have an asymmetry in step length (from 1.620±0.120 cm to 2.602±0.201 cm).

FAP, while performing cognitive tasks, is critically reduced by 30.4 % in young men and 33.4 % in young women, indicating a significant reorganization of basic mechanisms for walking stability regulation with the participation of spinal and suprasegmental structures under the influence of powerful outputs from the highest cortical centers.

Invariability of support base width and feet rotation angles in both boys and girls may indicate that functional support base dimensions in normal walking is sufficient to maintain posture and balance even in walking with simultaneous performance of cognitive task, as well as on more rigid mechanisms of these two parameters regulation. The support base is the spatial parameter which stability is required to maintain medio-lateral and anterior-posterior walking stability. It is shown that the support base is the most stable parameter, which does not change with different walking paradigms. In our previous studies, it was found that support base did not change with many additional tasks [30].

We found a decrease in walking performance (as evidenced by a decrease in FAP) with additional tasks compared to ordinary walking performance in all examined groups. Several theories can be applied to explain the reason for the changes in the spatial-temporal organization of walking with cognitive task [26, 29]. According to the neuropsychological theory of "resource allocation", if both tasks performed simultaneously they require the use of resources that exceed the resource of central general ability, the performing a single task, or, even, both will worsen, regardless to the specific nature of the tasks. According to the modified version of the theory of "resource allocation", due to the ability of attention to be distributed, when it is dispersed to perform two tasks that need attention, it may deteriorate, even if the capacity of the resource is not exceeded [16].

Since naming animals requires coordination between the processes of articulation, phonation and respiration, this additional task can also be considered as a complex motor task. And according to the theory of "bottle neck", the performance of two similar by nature tasks reduces the quality of their performance [10]. But it is important that studies on the influence of cognitive tasks on the process of walking show that the cognitive tasks change walking even when they have no motor component [6]. Naming

animals while walking can be classified as a rhythmic activity. In the scientific literature there are some data that, while performing two rhythmic tasks of different frequencies, their powerful interference can occur [13]. Obviously, in our study, the rhythmic nature of naming animals could interfere with walking rhythm and thus provoke significant changes in walking.

We used one of the complex cognitive tasks, arithmetic, which requires maximum attention and memory. As a result, the quality of both walking and cognitive performance decreased, but the quality of counting (more than twice) declined more critically, in favor of moving forward and maintaining balance. Thus, the examined individuals subconsciously gave priority to walking. This is coordinated with the "first pose strategy" put forward by A. Shumway-Cook, according to which, in case of increasing threat of falling, the subject prefers late control or stability of walking over the performance of additional, secondary task in order to reduce risk of falling and injury [24].

Therefore, regulation of spatio-temporal parameters of walking depends on the work of all levels of nervous system. The basic spatio-temporal pattern is initiated by central generators of spinal cord rhythm, whose work is set up and modulated by supra-segmental structures, and layered commands from cerebral cortex can substantially change the basic pattern by creating an appropriate spatio-temporal model of walking.

Changes in spatio-temporal pattern of walking with simultaneous performance of certain tasks depend not only on task nature, but also increase in accordance with its difficulty. The greater impact of complex cognitive task on walking can be related to the mechanisms of information processing in CNS. Probably, in case of arithmetic counting, they were activated to a greater extent. In addition, counting is dependent on operative brain memory [2] and thus directly on executive function. Competition for executive function resource of two simultaneously performed tasks in walking conditions with additional cognitive task turned out to be quite intense. We have established a powerful influence of cognitive tasks on the spatial and temporal organization of walking, which showed itself in reduce of walking velocity, step length and increase of the contact duration of the lower extremities with the support surface (track) due to the increase in the duration of support and the duration of double support, and by reorganization of step cycle to increasing the part of contact with the track and reducing the duration swing phase.

Walking variability is a unique area that provides intellectual awareness of the risk of falls and future mobility decline. Dynamic higher-level walking control requires adaptability in the context of additional proposed tasks. Evaluation of walking data obtained is the key to a comprehensive assessment and study of dynamic gait control [7]. The data of our study argue for the possibility of using additional tasks as a tool of isolated influence on temporal (cognitive task similar to ours in type and complexity - animal naming) and spatial (motor task) gait parameters,

which allows to indirectly evaluate the functional state of different parts of the nervous system. Given the changes in quantitative and qualitative indicators of walking in different physiological paradigms, we can confidently state that walking is not an automatic process, but requires the use of various additional CNS resources, especially attention and cognitive resources.

The results obtained can be used to create more sophisticated physiological models of mechanisms for the formation of patterns of normal walking. Obtained indexes of spatial and temporal parameters of walking can be used as criteria for the assessment of normal walking, for the diagnosis and differential diagnosis in the neurology and traumatology and orthopedics, including early, subclinical and oligosymptomatic stages, to improve the effectiveness of treatment and at solving expert problems in the practice of rehabilitation treatment in order to expand the walking function and better performance of simultaneous tasks in sports medicine to evaluate the athlete's functionality in order to further involve sportsmen in a particular sport activity.

Further research is needed to understand the brain processes that underlie cognitive-motor interaction. Their understanding will improve procedures for both assessing human walking and developing new approaches to maintain functional independence in old people.

Conclusions

1. At a simpler cognitive task (animal naming) in all groups it was found that the spatial indices had no significant changes, most of the temporal parameters changed: there was an increase in the step cycle time, an increase in the swing time, the duration of the single and double support. Changing of these parameters resulted in a slower velocity and a longer ambulation time. Therefore, maintaining equilibrium at walking with animal naming aloud is due to a longer overall support period in the step cycle of such walking, reducing the cadence and velocity of walking and increasing the total ambulation time. Invariability of support base width and feet rotation angles in both boys and girls may indicate that functional support base dimensions in normal walking is sufficient to maintain posture and balance even in walking with simultaneous performance of cognitive task, as well as on more rigid mechanisms of these two parameters regulation.

2. At performing the second, more complex, cognitive task among all spatio-temporal parameters in young men and young women, only the support base, toe-in-out, step length difference was not significantly changed compared to ordinary walking. The other parameters have changed significantly. The integral indicator of walking quality (FAP) declined sharply by 30.4 % in young men and 33.4 % in young women, indicating a major reorganization of basic mechanisms for regulating of walking stability with the participation of spinal and supra-segmental structures under the influence of powerful outputs from the highest cortical centers.

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ВІКОВІ ОСОБЛИВОСТІ ХОДЬБИ ПРИ ОДНОЧАСНОМУ ВИКОНАННІ КОГНІТИВНИХ ЗАВДАНЬ

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Ходьба розглядається як комплексний когнітивний акт. Мета дослідження - аналіз вікових особливостей ходьби людини та її зміни при виконанні додаткових когнітивних завдань. За допомогою системи GAITRite® (CIR Systems Inc., Clifton, NJ) вивчали просторово-часові показники ходьби в 608 осіб обох статей віком 12-43 роки при звичайній ходьбі з довільною швидкістю та при виконанні додаткових когнітивних завдань: 1) послідовно без повторень називати відомі тварини; 2) починаючи з числа 100, послідовно віднімати 7 і називати отриманий результат. Статистичну обробку результатів проводили в ліцензійному пакеті "STATISTICA 5.5". При виконанні першого, простішого, завдання в усіх вікових групах просторові показники не мали достовірних змін. Більшість часових параметрів змінилися: збільшився загальний час крокового циклу, збільшилася тривалість переносу ніг, тривалість одиної та подвійної опори. Отже, утримати рівновагу при ходьбі з одночасним називанням тварин допомагають триваліший загальний період опори, зниження темпу й швидкості ходьби. Незмінність ширини бази опори та кутів розвороту стоп свідчить про те, що величин функціональної бази опори та кутів розвороту стоп достатньо для збереження пози та рівноваги при ходьбі з одночасним виконанням когнітивного завдання, а також про більш жорсткі механізми регуляції цих двох параметрів. Часові показники ходьби є лабільнішими, ніж просторові параметри. З віком, особливо у представників жіночої статі, зменшується процент зниження інтегрального показника якості, "нормальності" ходьби (FAP): у дівчаток на 15,3 %, у дівчат на 14,4 %, у жінок середнього віку на 7,4 %. При виконанні другого, складнішого, арифметичного завдання у юнаків і дівчат тільки ширина бази опори, кути розвороту стоп, різниця між довжиною кроку правою й лівою ногою достовірно не змінилися. Середня швидкість, кількість кроків за хвилину, довжина звичайних і подвійних кроків, співвідношення довжини кроків до довжини відповідної ноги зменшилися. Кількість кроків, усі часові параметри, частка тривалості опори збільшилися. Показник FAP критично знижувався на 30,4 % у юнаків і на 33,4 % у дівчат, що свідчить про зниження рівня підтримки рівноваги та зниження стабільності тіла під час руху при виконанні когнітивного завдання під час ходьби та збільшення ризику падіння. Тому значне зниження FAP можна використовувати як діагностичний критерій в неврологічній практиці.

Ключові слова: просторові та часові параметри ходьби, різні вікові групи, ходьба з додатковим когнітивним завданням.

ВОЗРАСТНЫЕ ОСОБЕННОСТИ ХОДЬБЫ ПРИ ОДНОВРЕМЕННОМ ВЫПОЛНЕНИИ КОГНИТИВНЫХ ЗАДАНИЙ

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Ходьба рассматривается как комплексный когнитивный акт. Цель исследования - анализ возрастных особенностей ходьбы человека и ее изменения при выполнении дополнительных когнитивных задач. С помощью системы GAITRite® (CIR Systems Inc., Clifton, NJ) изучали пространственно-временные показатели ходьбы у 608 добровольцев обоих полов в возрасте 12-43 года при обычной ходьбе с произвольной скоростью и при ходьбе с когнитивным заданием: 1) последовательно без повторений называть животных; 2) начиная с числа 100, последовательно отнимать 7 и называть полученный результат. Статистическую обработку результатов проводили в лицензионной программе "STATISTICA 5.5". При выполнении первого, более простого, задания во всех возрастных группах пространственные показатели не имели достоверных изменений. Большинство временных параметров изменились: увеличилось общее время шагового цикла, увеличилась продолжительность переноса ног, продолжительность одиночной и двойной опоры. Таким образом, удержать равновесие при ходьбе с одновременным называнием животных помогают более длительный общий период опоры, снижение темпа и скорости ходьбы. Неизменность ширины базы опоры и углов разворота стоп свидетельствует о том, что величин функциональной базы опоры и углов разворота стоп достаточно для сохранения позы и равновесия при ходьбе с одновременным выполнением когнитивного задания, а также о более жестких механизмах регуляции этих двух параметров. Временные показатели ходьбы более лабильны, чем пространственные показатели. С возрастом, особенно у представителей женского пола, уменьшается процент показателя "нормальности" ходьбы (FAP): у девочек на 15,3 %, у девушек на 14,4 %, у женщин среднего возраста на 7,4 %. При выполнении второго, более сложного, арифметического задания у юношей и девушек только ширина базы опоры, углы разворота стоп, разница между длиной шага правой и левой ногой достоверно не изменились. Средняя скорость, количество шагов в минуту, длина обычных и двойных шагов, соотношение длины шагов к длине соответствующей ноги уменьшились. Количество шагов, все временные параметры, процентная доля продолжительности опоры увеличились. Показатель FAP критически снижался на 30,4 % у юношей и на 33,4 % у девушек, что свидетельствует о снижении уровня поддержания равновесия и снижении стабильности тела во время ходьбы с одновременным выполнением когнитивного задания и увеличение риска падения. Поэтому значительное снижение FAP можно использовать как диагностический критерий в неврологической практике.

Ключевые слова: пространственные и временные параметры ходьбы, разные возрастные группы, ходьба с дополнительным когнитивным заданием.

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For publication, scientific articles are accepted only in English only with translation on Ukrainian or Russian, which contain the following necessary elements: UDC code; title of the article (in English, Ukrainian and Russian); surname, name and patronymic of the authors (in English, Ukrainian and Russian); the official name of the organization (institution) (in English, Ukrainian and Russian); city, country (in English, Ukrainian and Russian); structured annotations (in English, Ukrainian and Russian); keywords (in English, Ukrainian and Russian); introduction; purpose; materials and methods of research; research results; discussion; conclusions; bibliographic references.

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The introduction reflects the state of research and the relevance of the problem according to the world scientific literature (at least 15 references to English articles in international journals over the past 5 years). At the end of the entry, the purpose of the article is formulated (contains no more than 2-3 sentences, in which the problem or hypothesis is addressed, which is solved by the author).

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The section should allow other researchers to perform similar studies and check the results obtained by the author. If necessary, this section may be divided into subdivisions. Depending on the research objects, the ethical principles of the European Convention for the protection of vertebrate animals must be observed; Helsinki Declaration; informed consent of the surveyed, etc. (for more details, see "Public Ethics and its Conflict"). At the end of this section, a "statistical processing of results" section is required, which specifies the program and methods for processing the results obtained by the automobile.

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In the discussion, it is necessary to summarize and analyze the results, as possible, compare them with the data of other researchers. It is necessary to highlight the novelty and possible theoretical or practical significance of the results of the research. You should not repeat the information already listed in the "Introduction" section. At the end of the discussion, a separate paragraph should reflect the prospects for using the results obtained by the author.

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5-10 sentences that summarize the work done (in the form of paragraphs or solid text).

"Acknowledgements"

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