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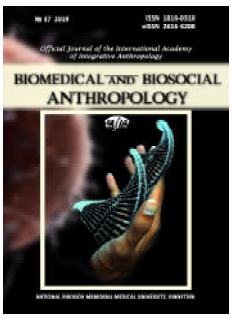

Correlations between linear dimensions of the lumbar intervertebral discs and somatometric parameters in the youth and young adult males (18-28 years) in norm

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The research for new vertebro-somatometric correlations will significantly improve the possibilities of methods for individualizations of the normal parameters and will accelerate the introduction of scientific developments into the daily practice of clinicians, radiologists, neurosurgeons and other specialists. The aim of research is to investigate the peculiarities of relationships between partial linear dimensions of the lumbar intervertebral discs, their total sizes and relative indicators with somatometric parameters in the youth and young adult males in norm. The linear dimensions of the lumbar intervertebral discs (height, sagittal and transverse sizes) were measured noninvasively on the MRI images in the axial, sagittal and coronal plains. The somatometric investigation was performed individually with measuring of the general (length and weight of body) and particular sizes (the longitudinal sizes, the transverse sizes, the circumferences, pelvic sizes and skinfolds thickness). The bony, muscle and fat components of the body mass were calculated. Correlation analysis was performed in the "Statistica 6.1" license package. The arithmetic means of absolute correlation coefficients between particular and total individual sizes of IVD_{L1-L2}, IVD_{L2-L3}, IVD_{L3-L4}, IVD_{L4-L5} and relative quantity with somatometric parameters were calculated with following results: arithmetic means of absolute correlation coefficients for particular individual sizes are within 0.080 - 0.150; for total sizes - 0.240; for ratio of the total sizes to the mass-growth coefficient - 0.490. Analysis of arithmetic mean values of absolute correlations with somatometric parameters in youth and young adult males in the norm (17-28 years) showed a gradual increase in the values of correlation coefficients and an increase in the number of significant correlations with maximum values in relative indicators. Thus, in youth and young adult males aged 18-28 years, the features of the relationship of somato-anthropometric parameters with the linear dimensions of the intervertebral discs of the lumbar spine in the norm were studied. The numerous relationships between the partial (height, sagittal and transverse sizes) linear dimensions and total sizes of the lumbar intervertebral discs in the youth and young adult males in norm (17-28 years) with their somatometric parameters were found. Thus, the use of relative indicators can be more acceptable in the subsequent mathematical modeling of individual indicators, in particular, the parameters of the intervertebral discs.

Keywords: *intervertebral discs, somatometric parameters MRI, correlation coefficient.*

Introduction

Lower back pain is directly associated with intervertebral disc degeneration [7, 15, 19]. Early detection by medical specialists of patients at risk for the development of vertebrological disease is therefore essential [12, 18, 23, 29, 33]. The use of the noninvasive analysis of morphological properties, normative absolute and relative linear intervertebral discs dimensions for interpretation of the radiological results can improve the evidentiary direction of preclinical spine pathology manifestations definition, facilitate differential diagnosis, dynamic clinical observation and treatment effectiveness [10, 16, 35]. The constitutional and anatomical variations, the spondylometric parameters particularity of the functional spinal unit elements form an important prerequisites of spine pathology origin [20]. The obtained results of interrelations between linear intervertebral discs (IVDs)

sizes with somatometric parameters for detection of spine pathology are used. Nowadays one can find numerous studies concerning this scientific problem. However, researching correlations between partial linear dimensions and total sizes of IVDs with somatometric parameters of girls and women of the first adult age in Ukrainian studies are underrepresented.

The aim of research is to investigate the peculiarities of relationships between partial linear dimensions of the lumbar intervertebral discs, their total sizes and relative indicators with somatometric parameters in the youth and young adult males in norm.

Materials and methods

The Bioethics Committee of the National Pirogov Memorial Medical University (Vinnytsia) didn't find in research materials anything contrary basic bioethical norms of the Helsinki Declaration, the Council of Europe Convention on Human Rights and Biomedicine (1997), the relevant provisions of the WHO and the laws of Ukraine.

Anthropometric measurements are a non-invasive and inexpensive method to assess patients' nutritional status and have been suggested for wide use in clinical practice [31]. Individual somatometric investigation was performed for each person. General (body length and body weight) and particular sizes (the longitudinal, the transverse and the circumference sizes, pelvic sizes and skinfolds thickness) according to the Bunak V. procedure were measured [4]. The bony, muscle and fat components of the body mass were estimated by the method of Matiegka J. [21] and the American Institute of Nutrition (AIN) [32].

The lumbar spine MRI [26, 27] in the juniors and early adulthood males in norm (17-28 years) with the measuring of anterior-posterior diameter, frontal diameter and vertical size of the lumbar IVD was carried out. The anterior height, medial height and posterior height of the IVDs in sagittal plane of MRI of the lumbar spine data were measured. Average height (height) of each lumbar IVDs was calculated as an arithmetic mean of the IVDs height in front, central and back portions on midsagittal plane of lumbar MRI data. The total IVD size of investigated girls and women of the first adulthood was calculated as a sum of sagittal size (anterior-posterior diameter), transverse size (frontal diameter) and height (vertical size) for each lumbar IVD. The statistical analysis was performed by using the Pearson's correlation coefficient (r) in the licensed statistical software "Statistica 6.1". To assess the strength of the correlation, the Robert Chaddock system [8] was used.

Results

It is established, that average heights IVDs have only wery weak reliable Pearson's correlation coefficient with somatometric measures.

The transverse size IVD_{L1-L2} has weak positive reliable Pearson's correlation coefficient (r) with body length (r=0.332), with muscle component of the body mass (r=0.314).

The transverse size IVD_{L2-L3} has weak positive reliable Pearson's correlation coefficient (r) with body length (r=0.312), with muscle component of the body mass (r=0.376).

The transverse size IVD_{L3-L4} has weak positive reliable Pearson's correlation coefficient (r) with body length (r=0.329), with suprasternal height (r=0.333), with pubical height (r=0.307), with shoulder height (r=0.349), with dactylon height (r=0.302).

The transverse size IVD_{L4-L5} has weak positive reliable Pearson's correlation coefficient (r) with body length (r=0.326), with suprasternal height (r=0.347), with dactylon height (r=0.319), with muscle component of the body mass (r=0.327).

The sagittal size IVD_{L1-L2} has weak positive reliable Pearson's correlation coefficient (r) with body length (r=0.309), with suprasternal height (r=0.333), with pubical height (r=0.307), with shoulder height (r=0.349), with dactylon height (r=0.302), with biceps skinfold (r=0.321), with volar forearm skinfold (r=0.379), with calf skinfold (r=0.326), with muscle component of the body mass (r=0.354).

The sagittal size IVD_{L2-L3} has weak positive reliable Pearson's correlation coefficient (r) with body length (r=0.318), with volar forearm skinfold (r= 0.339), with chest skinfold (r=0.363).

The sagittal size IVD_{L3-L4} has weak positive reliable Pearson's correlation coefficient (r) with body length (r=0.332), with distancia spinarum (r=0.310), with volar forearm skinfold (r=0.325), with muscle component of the body mass (r=0.303).

The sagittal size IVD_{L4-L5} has weak positive reliable Pearson's correlation coefficient (r) with body length (r=0.361), with suprasternal height (r=0.317), with shoulder height (r=0.376), with dactylon height (r=0.316), with chest skinfold (r=0.310), with muscle component of the body mass (r=0.319).

Total size IVD_{L1-L2} has positive reliable Pearson's correlation coefficient (r) with muscle component of the body mass (r=0.523), with body length (r=0.427), with suprasternal height (r=0.412), with shoulder height (r=0.392), with dactylon height (r=0.353), with transverse lower-sternal size (r=0.319), with calm arm circumference (r=0.366), with upper forearm circumference (r=0.355), with lower forearm circumference (r=0.380), with thigh circumference (r=0.390), with calf circumference (r=0.475), with lower leg circumference (r=0.310), with foot circumference (r=0.428), with chest circumference (inspiration) (r=0.394), with chest circumference (full expiration) (r=0.359), with chest circumference (mid expiration) (r=0.356), with muscle component of the body mass (AIN) (r=0.338).

Total size IVD_{L2-L3} has positive reliable Pearson's correlation coefficient (r) with muscle component of the body mass (r=0.560), with body length (r=0.361), with

muscle component of the body mass (AIN) (r=0.392), with suprasternal height (r=0.393), with shoulder height (r=0.388), with dactylon height (r=0.410), with transverse mid-sternal size (r=0.369), with transverse lower-sternal size (r=0.375), with distancia trochanterica (r=0.347), with calm arm circumference (r=0.406), with upper forearm circumference (r=0.444), with lower forearm circumference (r=0.338), with thigh circumference (r=0.429), with calf circumference (r=0.390), with foot circumference (r=0.350), with chest circumference (inspiration) (r=0.437), with chest circumference (full expiration) (r=0.368), with chest circumference (mid expiration) (r=0.401), with volar forearm skinfold (r=-0.331).

Total size IVD_{L3-L4} has positive reliable Pearson's correlation coefficient (r) with muscle component of the body mass (r=0.587), with suprasternal height (r=0.542), with shoulder height (r=0.507), with pubical height (r=0.351), with body length (r=0.445), with body surface area (r=0.338), with dactylon height (r=0.494), with transverse mid-sternal size (r=0.416), with transverse lower-sternal size (r=0.384), with distancia trochanterica (r=0.414), with tense arm circumference (r=0.336), with calm arm circumference (r=0.390), with upper forearm circumference (r=0.495), with lower forearm circumference (r=0.383), with thigh circumference (r=0.487), with calf circumference (r=0.428), with lower leg circumference (r=0.307), with foot circumference (r=0.435), with chest circumference (inspiration) (r=0.460), with chest circumference (full expiration) (r=0.350), with chest circumference (mid expiration) (r=0.389), with bony component of the body mass (r=0.433), with muscle component of the body mass (AIN) (r=0.432).

Total size IVD_{L4-L5} has positive reliable Pearson's correlation coefficient (r) with muscle component of the body mass (r=0.553), with shoulder height (r=0.579), with body length (r=0.408), with suprasternal height (r=0.487), with pubical height (r=0.374), with dactylon height (r=0.464), with trochanteric height (r=0.362), with transverse mid-sternal size (r=0.463), with transverse lower-sternal size (r=0.358), with distancia trochanterica (r=0.353), with calm arm circumference (r=0.336), with upper forearm circumference (r=0.425), with thigh circumference (r=0.443), with calf circumference (r=0.340), with foot circumference (r=0.471), with chest circumference (inspiration) (r=0.379), with chest circumference (full expiration) (r=0.383), with chest circumference (mid expiration) (r=0.371), with bony component of the body mass (r=0.377), with muscle component of the body mass (AIN) (r=0.466).

Ratio of the total sizes IVD_{L1-L2} to weight-length factor has high positive reliable Pearson's correlation coefficient (r) with ectomorphic component (r=0.824) and high negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with body mass (r=-0.800), with tense arm circumference (r=-0.739), with upper forearm circumference (r=-0.740), with waist circumference (r=-0.762), with chest circumference (inspiration) (r=-0.738), with chest circumference (full expiration) (r=-0.707), with chest circumference (mid expiration) (r=-0.730), with weight-length rate (r=-0.891), with BMI (r=-0.890).

Ratio of the total sizes IVD_{L1-L2} to weight-length factor has moderate negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with transverse mid-sternal size (r=-0.600), with calm arm circumference (r=-0.683), with lower forearm circumference (r=-0.519), with thigh circumference (r=-0.629), with calf circumference (r=-0.564), with body surface area (r=-0.695), with mesomorphic component (r=-0.671), with muscle component of the body mass (AIN) (r=-0.614), with muscle component of the body mass (r=-0.538).

Ratio of the total sizes IVD_{L1-L2} to weight-length factor has weak negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with distal femur width (r=-0.349), with transverse lower-sternal size (r=-0.492), with anterior-posterior chest size (r=-0.352), with shoulder width (r=-0.371), with distancia trochanterica (r=-0.410), with lower leg circumference (r=-0.350), with neck circumference (r=-0.477), with triceps skinfold (r=-0.336), with subscapular skinfold (r=-0.414), with chest skinfold (r=-0.337), with abdominal skinfold (r=-0.329), with suprailiac skinfold (r=-0.339), with endomorphic component (r=-0.373), with bony component of the body mass (r=-0.334), with fat component of the body mass (r=-0.385).

Ratio of the total sizes IVD_{L2-L3} to weight-length factor has high positive reliable Pearson's correlation coefficient (r) with ectomorphic component (r=0.834) and high negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with body mass (r=-0.819), with upper forearm circumference (r=-0.733), with waist circumference (r=-0.758), with chest circumference (inspiration) (r=-0.754), with chest circumference (full expiration) (r=-0.735), with chest circumference (mid expiration) (r=-0.735), with body surface area (r=-0.722), with weight-length rate (r=-0.900), with BMI (r=-0.889), with fat component of the body mass (r=-0.404).

Ratio of the total sizes IVD_{L2-L3} to weight-length factor has moderate negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with transverse mid-sternal size (r=-0.538), with tense arm circumference (r=-0.745), with calm arm circumference (r=-0.695), with lower forearm circumference (r=-0.573), with thigh circumference (r=-0.644), with calf circumference (r=-0.644), with mesomorphic component (r=-0.662), with muscle component of the body mass (r=-0.565), with muscle component of the body mass (AIN) (r=0.629).

Ratio of the total sizes IVD_{L2-L3} to weight-length factor has weak negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with wrist width (r=-0.333), with transverse lower-sternal size (r=-0.494), with anterior-posterior chest size (r=-0.422), with shoulder width (r=-0.413), with distancia cristarum (r=-0.340), with distancia trochanterica (r=-0.413), with lower leg circumference (r=-0.386), with neck circumference

(r=-0.499), with endomorphic component (r=-0.411), with bony component of the body mass (r=-0.343), with foot circumference (r=-0.359), with triceps skinfold (r=-0.349), with subscapular skinfold (r=-0.444), with chest skinfold (r=-0.365), with abdominal skinfold (r=-0.355), with suprailiac skinfold (r=-0.387).

Ratio of the total sizes IVD_{L3-L4} to weight-length factor has very high negative reliable Pearson's correlation coefficient with weight-length rate (r=-0.915) and with BMI (r=-0.909).

Ratio of the total sizes IVD_{L3-L4} to weight-length factor has high positive reliable Pearson's correlation coefficient (r) with ectomorphic component (r=0.867) and high negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with body mass (r=-0.829), with body surface area (r=-0.725), with waist circumference (r=-0.754), with chest circumference (inspiration) (r=-0.761), with chest circumference (full expiration) (r=-0.758), with chest circumference (mid expiration) (r=-0.758), with tense arm circumference (r=-0.732), with calm arm circumference (r=-0.719), with upper forearm circumference (r=-0.731).

Ratio of the total sizes IVD_{L3-L4} to weight-length factor has moderate negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with transverse mid-sternal size (r=-0.532), with transverse lower-sternal size (r=-0.503), with lower forearm circumference (r=-0.566), with thigh circumference (r=-0.637), with calf circumference (r=-0.640), with mesomorphic component (r=-0.669), with muscle component of the body mass (r=-0.568), with muscle component of the body mass (AIN) (r=-0.614).

Ratio of the total sizes IVD_{L3-L4} to weight-length factor has weak negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with wrist width (r=-0.324), з with anterior-posterior chest size (r=-0.431), with shoulder width (r=-0.408), with distancia trochanterica (r=-0.394), with endomorphic component (r=-0.390), with fat component of the body mass (r=-0.374), with lower leg circumference (r=-0.387), with neck circumference (r=-0.497), with foot circumference (r=-0.332), with triceps skinfold (r=-0.327), with subscapular skinfold (r=-0.427), with chest skinfold (r=-0.349), with abdominal skinfold (r=-0.336), with suprailiac skinfold (r=-0.370).

Ratio of the total sizes IVD_{L3-L4} to weight-length factor has very high negative reliable Pearson's correlation coefficient with weight-length rate (r=-0.919) and with BMI (r=-0.910).

Ratio of the total sizes IVD_{L4-L5} to weight-length factor has high positive reliable Pearson's correlation coefficient (r) with body mass (r=-0.836), with body surface area (r=-0.734), with mesomorphic component (r=-0.711), with tense arm circumference (r=-0.731), with calm arm circumference (r=-0.716), with upper forearm circumference (r=-0.733), with waist circumference (r=-0.755), with chest circumference (inspiration) (r=-0.769), with chest circumference (full expiration) (r=-0.719), with chest circumference (mid expiration) (r=-0.739).

Ratio of the total sizes IVD_{L4-L5} to weight-length factor has moderate negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with lower forearm circumference (r=-0.628), with thigh circumference (r=-0.623), with calf circumference (r=-0.655), with muscle component of the body mass (r=-0.550), with muscle component of the body mass (AIN) (r=-0.574).

Ratio of the total sizes IVD_{L4-L5} to weight-length factor has weak negative reliable Pearson's correlation coefficient (r) with following somatometric measures: with transverse mid-sternal size (r=-0.487), with transverse lower-sternal size (r=-0.489), with anterior-posterior chest size (r=-0.422), with shoulder width (r=-0.354), with distancia trochanterica (r=-0.401), with lower leg circumference (r=-0.388), with neck circumference (r=-0.485), with triceps skinfold (r=-0.401), with subscapular skinfold (r=-0.437), with chest skinfold (r=-0.346), with abdominal skinfold (r=-0.359), with suprailiac skinfold (r=-0.373), with endomorphic component (r=-0.419), with fat component of the body mass (r=-0.387).

Table 1. The arithmetic means of absolute correlation coefficients between particular sizes, total sizes of IVD_{L1-L2}, IVD_{L2-L3}, IVD_{L3-L4}, IVD_{L4-L5} and in the youth and young adult males in norm (17-28 years).

Parameters	The arithmetic means of absolute correlation coefficients
Average height IVD_{L1-L2}, mm	0.069
Average height IVD_{L2-L3}, mm	0.074
Average height IVD_{L3-L4}, mm	0.065
Average height IVD_{L4-L5}, mm	0.113
Transverse size IVD_{L1-L2}, mm	0.137
Transverse size IVD_{L2-L3}, mm	0.159
Transverse size IVD_{L3-L4}, mm	0.146
Transverse size IVD_{L4-L5}, mm	0.162
Sagittal size IVD_{L1-L2}, mm	0.151
Sagittal size IVD_{L2-L3}, mm	0.139
Sagittal size IVD_{L3-L4}, mm	0.142
Sagittal size IVD_{L4-L5}, mm	0.159
Total size IVD_{L1-L2}, mm	0.223
Total size IVD_{L2-L3}, mm	0.230
Total size IVD_{L3-L4}, mm	0.262
Total size IVD_{L4-L5}, mm	0.255
Ratio of the total sizes IVD_{L1-L2} to weight-length factor	0.427
Ratio of the total sizes IVD_{L2-L3} to weight-length factor	0.445
Ratio of the total sizes IVD_{L3-L4} to weight-length factor	0.436
Ratio of the total sizes IVD_{L4-L5} to weight-length factor	0.438

Qualitative assessment of the relationships between partial sizes, total sizes and ratios of the total sizes IVDs to weight-length factor with somatometric parameters were performed by calculating of the arithmetic means of absolute correlation coefficients between particular sizes, total sizes of IVD_{L1-L2}, IVD_{L2-L3}, IVD_{L3-L4}, IVD_{L4-L5} and relative quantities with somatometric parameters.

The calculated arithmetic means of absolute correlation coefficients between particular sizes, total sizes of IVD_{L1-L2}, IVD_{L2-L3}, IVD_{L3-L4}, IVD_{L4-L5} and relative quantities with somatometric parameters in the youth and young adult males in norm (17-28 years) are represented in the table 1.

Discussion

There are many studies by domestic and foreign authors dedicated to the study of morphometric parameters of the vertebral segments anatomicaly and in vivo, using by medical imaging methods. These studies were measured the parameters of intervertebral discs and vertebral bodies, vertebral and intervertebral foramina, processes, facet joints, etc. [3, 9, 24, 28, 30, 34].

The spinal column is the supporting structure of the torso, because both the whole structure and its individual elements are formed integrally and harmoniously connected with the body. The presence correlations of individual partial parameters of the spine and its individual elements with somatometric parameters are proof the harmony. In our study, reliable direct weak correlation of sagittal (anterior-posterior) and transverse sizes of D_{L1-L2}, D_{L2-L3}, D_{L3-L4}, D_{L4-L5} intervertebral discs with somatometric parameters were found with predominance of the sagittal dimensions.

Degeneration of intervertebral discs is accompanied by a decrease in the height of the intervertebral discs [2] and changes of lumbar lordosis [14], presence of scoliosis [11, 17, 22], which can be clinically manifested by low back pain, which, according to various authors, is degenerative-dystrophic changes in lumbar spine, the share of which, among the causes of low back pain, is 93-99 % [1, 5, 6, 25].

However, in our study we did not find reliable correlations of the average height D_{L1-L2}, D_{L2-L3}, D_{L3-L4}, D_{L4-L5} with somatometric parameters in adolescents and men of the first adult age, which should be considered.

Therefore, in contrast to other studies that used the cross-sectional area of the intervertebral disc and the volume of the intervertebral disc, we used the sum of the linear dimensions of the intervertebral discs. Studies of the correlation coefficients of the sum of the linear dimensions of the intervertebral discs with somatometric parameters in adolescents and men of the first adult age showed that higher correlations (with a maximum value of r=0.587 for intervertebral disc D_{L3-L4} with muscle mass component) and correlation with greater the number of somatometric parameters.

The study of correlation coefficients also demonstrated a qualitative predominance of relationships with complex somatometric indicators over partial ones [13]. Thus, the idea of using relative indicators of the sum of sizes, the correlation coefficients of which significantly exceeded the correlation coefficients of partial and total indicators. The calculation showed that the relative indicators of the sum of the sizes D_{L1-L2}, D_{L2-L3}, D_{L3-L4}, D_{L4-L5} and mass-growth coefficient in youth and young adult males (18-28 years) have significant very strong and strong correlations with somatometric indicators.

Thus, the use of relative indicators for further mathematical modeling of individual indicators, in particular, the parameters of the intervertebral discs may be more acceptable.

The studying of interrelations between somatometric parameters with spondylometric dimensions of the lumbar, thoracic and cervical functional spinal units is a perspective one and can be used for the development of the further mathematical modeling to individualize norm, for prediction and early detection of pathological changes of the spinal motor segments.

Conclusions

1. The arithmetic means of absolute correlation coefficients between particular sizes, total sizes of IVD_{L1-L2}, IVD_{L2-L3}, IVD_{L3-L4}, IVD_{L4-L5} and relative quantities with somatometric parameters in the youth and young adult males in norm (17-28 years) in general are for average heights - 0.080; transverse sizes - 0.150; sagittal sizes - 0.150; total sizes - 0.240; ratio of the total sizes IVDs to weight-length factor - 0.440.

2. Analysis of the arithmetic means of absolute correlation coefficients between particular sizes, total sizes of IVD_{L1-L2}, IVD_{L2-L3}, IVD_{L3-L4}, IVD_{L4-L5} and relative quantities with somatometric parameters in the youth and young adult males in norm (17-28 years) represented their gradual raising. Therefore, the arithmetic means of absolute correlation coefficients between particular sizes (height, sagittal and transverse sizes of IVDs) with somatometric parameters were from 0.080 to 0.150; at the same time coefficient for total sizes become 0.240.

3. The using of ratios of the total sizes IVDs to weight-length factors led to increasing arithmetic means of absolute correlation coefficients with somatometric parameters to 0.440.

4. Indicators of the total sizes and relative coefficients of the total sizes of lumbar IVDs and mass-growth coefficients in the youth and young adult males in norm (17-28 years) have the greatest quantity of reliable correlations with somatometric parameters and their relatively bigger force.

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ОСОБЛИВОСТІ ВЗАЄМОЗВ'ЯЗКІВ СОМАТОМЕТРИЧНИХ ПАРАМЕТРІВ ЮНАКІВ І ЧОЛОВІКІВ ПЕРШОГО ЗРІЛОГО ВІКУ (18-28 РОКІВ) З ЛІНІЙНИМИ ПОКАЗНИКАМИ РОЗМІРІВ МІЖХРЕБЦЕВИХ ДИСКІВ ПОПЕРЕКОВОГО ВІДДІЛУ ХРЕБТА В НОРМІ

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Дослідження нових вертебро-соматометричних взаємозв'язків може розширити можливості індивідуалізації показників норми, прискорити впровадження наукових розробок у повсякденну практику клініцистів, рентгенологів, нейрохірургів та фахівців інших спеціальностей. Мета роботи - визначити особливості зв'язків парціальних показників лінійних розмірів міжхребцевих дисків, суми цих розмірів та відносних показників з соматометричними параметрами у практично здорових юнаків та чоловіків першого періоду зрілого віку. Лінійні показники - висота міжхребцевого диску, сагітальний та поперечний розміри - були неінвазивно виміряні на виконаних МР-томограмах поперекового відділу хребта в аксіальних, сагітальних та коронарних площинах. Соматометричне дослідження проводили індивідуально з вимірюванням загальних (довжини і маси тіла) та парціальних розмірів (поздовжні розміри, поперечні розміри, обхватні розміри, розміри таза і товщина шкірних складок). Були обчислені кісткові, м'язові та жирові компоненти маси тіла. Кореляційний аналіз проводили в ліцензійному пакеті "Statistica 6.1". Отримали наступні результати кореляцій середніх арифметичних значень абсолютних показників кореляцій окремих розмірів D_{L1-L2}, D_{L2-L3}, D_{L3-L4}, D_{L4-L5} з сомато-антропометричними параметрами: для парціальних розмірів (висоти, поперечного та сагітального розмірів) показник склав 0,080 - 0,150, для суми трьох розмірів окремих міжхребцевих дисків - 0,240, для відносного показника суми трьох розмірів до масо-ростового коефіцієнта тіла - 0,490. Аналіз середніх арифметичних значень абсолютних показників кореляцій із соматометричними параметрами у юнаків та чоловіків раннього зрілого віку в нормі (17-28 років) показав поступове зростання значень коефіцієнтів кореляції та збільшення кількості значимих кореляцій із максимальними значенням у відносних показників. Таким чином, у юнаків та чоловіків віком 18-28 років досліджені особливості взаємозв'язків сомато-антропометричних параметрів з лінійними розмірами міжхребцевих дисків поперекового відділу хребта в нормі. Встановлено, що в юнаків та чоловіків віком 18-28 років існують численні взаємозв'язки соматометричних показників як з показниками парціальних лінійних розмірів міжхребцевих дисків поперекового відділу хребта, так і з сумарними розмірами міжхребцевих дисків. Використання відносних показників може бути більш прийнятним для подальшого математичного моделювання окремих показників, зокрема, параметрів міжхребцевих дисків.

Ключові слова: *міжхребцеві диски, соматометричні параметри, МРТ, коефіцієнт кореляції.*

ОСОБЕННОСТИ ВЗАИМОСВЯЗИ СОМАТОМЕТРИЧЕСКИХ ПАРАМЕТРОВ ЮНОШЕЙ И МУЖЧИН ПЕРВОГО ЗРЕЛОГО ВОЗРАСТА (18-28 ЛЕТ) С ЛИНЕЙНЫМИ РАЗМЕРАМИ МЕЖПОЗВОНОЧНЫХ ДИСКОВ ПОЯСНИЧНОГО ОТДЕЛА ПОЗВОНОЧНИКА В НОРМЕ

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Исследование новых вертебро-соматометрических взаимосвязей может расширить возможности индивидуализации показателей нормы, ускорить внедрение научных разработок в повседневную практику клиницистов, рентгенологов, нейрохирургов и специалистов других специальностей. Цель работы - определить особенности взаимосвязи парциальных показателей линейных размеров межпозвоночных дисков, суммы этих размеров и относительных показателей с соматометрическими параметрами у практически здоровых юношей и мужчин первого периода зрелого возраста. Линейные показатели (высота межпозвоночных дисков, сагиттальный и поперечный размеры) были неинвазивно измерены на выполненных МР-томограммах поясничного отдела позвоночника в аксиальных, сагиттальных и коронарных плоскостях. Соматометрическое исследование проводили индивидуально с измерением общих (длины и массы тела) и парциальных размеров (продольных размеров, поперечных размеров, обхватных размеров, размеров таза и толщины кожных складок). Были вычислены костные, мышечные и жировые компоненты массы тела. Корреляционный анализ проводили в лицензионном пакете "Statistica 6.1". Получили следующие результаты корреляций средних арифметических значений абсолютных показателей корреляций отдельных размеров D_{L1-L2}, D_{L2-L3}, D_{L3-L4}, D_{L4-L5} с сомато-антропометрическими параметрами: для парциальных размеров (высоты, поперечного и сагиттального размеров) показатель составил 0,080 - 0,150, для суммы трех размеров отдельных межпозвонковых дисков - 0,240, для относительного показателя суммы трех размеров к массо-ростовому коэффициенту - 0,490. Анализ средних арифметических значений абсолютных показателей корреляций с соматометрическими параметрами у юношей и мужчин раннего зрелого возраста в норме (17-28 лет) показал постепенный рост значений коэффициентов корреляции и увеличение количества значимых корреляций с максимальными значениями у относительных показателей. Таким образом, у юношей и мужчин в возрасте 18-28 лет исследованы особенности взаимосвязей сомато-антропометрических параметров с линейными размерами межпозвонковых дисков поясничного отдела позвоночника в норме. Установлено, что у юношей и мужчин в возрасте 18-28 лет существуют многочисленные взаимосвязи соматометрических показателей как с показателями парциальных линейных размеров межпозвонковых дисков поясничного отдела позвоночника, так и с суммарными размерами межпозвонковых дисков. Использование относительных показателей может быть более приемлемым для дальнейшего математического моделирования отдельных показателей, в частности, параметров межпозвонковых дисков.

Ключевые слова: *межпозвонковые диски, соматометрические параметры, МРТ, коэффициент кореляции.*