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ANTHROPOLOGICAL METHODS FOR DETERMINING A MAN'S CONSTITUTIONAL TYPE

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ANNOTATION

The work presents the results of anthropometric examination of 605 men of the first period of maturity (21-35 years old), indicating the possibility of identifying the height, weight, and constitutional affiliation of unknown men by their remains.

Keywords: anthropology, identity, height, weight, constitutional affiliation, men.

Anthropological research plays a significant role in forensic medicine, particularly in identifying personality, gender, age, ethnicity, and paternity. Comprehensive research (by forensic pathologists, dentists, radiologists, anthropologists) in identifying unknown individuals is considered positive. A forensic anthropologist can be included in all stages of identification, from restoration and initial processing to final evaluation. Radiological specimens of the femur have been developed to determine age based on human remains. The automated analysis of the human face during the identification of the unknown is described. The height and age of the deceased are determined by the size of the femur and shoulder bones. Anthropometry is a simple and reliable method for quantitative determination of body size and the ratio of body length and width, the circumference and thickness of fat folds. It is proven that gender, age, ethnicity, and place of residence influence anthropometric indicators. The anthropological contribution to the judicial sciences is multifaceted. It is preferable to integrate many sciences (anthropology, mineralogy, genetics) to address forensic medical osteological identification of age and sex. Determining the quantity and density of bone mineral composition using absorpsionometry is important in anthropological identification. Regression equations for evaluating growth based on bone remains have been established. It was noted that the height of the corpses is greater than the height of the living. Contactless three-dimensional determination of body parameters has been developed. Considering the relevance and importance of the problem, the purpose of this study is to identify regional prognostic criteria for identifying the height, weight, and constitutional affiliation of men.

Materials and methods: In 605 men of the first period of maturity (21-35 years), the degree of conjugation (according to Pearson's coefficient) between body size, component composition, and constitutional affiliation was studied, and the nature and linear regression equations of the studied relationships were determined. Since the determined parameters have a normal distribution, parametric calculation methods were used. Statistical data processing was performed using Statistica for Windows 6.0.

Results and discussion: Correlation analysis revealed numerous functional ($0.99>r\geq0.9$; $p<0.05$), strong ($0.89>r\geq0.7$; $p<0.05$), and medium ($0.69>r\geq0.5$; $p<0.05$) relationships between male body indicators. This is important for the forensic examination of dismembered corpses. Using regression analysis allows for the identification of linear equations between body parameters, which can be used to identify the height, weight, and body type of unknown men based on their remains. Thus, a strong correlation was established between height and body area ($r=0.80$; $p<0.05$) and bone mass ($r=0.74$; $p<0.05$). A functional correlation ($r=0.92$; $p<0.05$) is observed only with lower limb length. Using the linear regression equation (Height, in cm = 49.72+1.38 x Leg height, in cm), it is possible to identify the height of unknown men by the remains of their lower limbs with a high degree of reliability. Strong correlations were found between men's body weight and shoulder girth ($r=0.88$; $p<0.05$), forearm ($r=0.84$; $p<0.05$), wrist ($r=0.75$; $p<0.05$), lower leg ($r=0.85$; $p<0.05$), chest ($r=0.86$; $p<0.05$), ankle ($r=0.71$; $p<0.05$), shoulder diameter ($r=0.71$; $p<0.05$), hip ($r=0.78$; $p<0.05$), longitudinal chest diameter ($r=0.76$; $p<0.05$), fat ($r=0.74$; $p<0.05$), and bone ($r=0.8$; $p<0.05$) mass, and the Pigne index ($r=-0.88$; $p<0.05$). Functional correlation ($r>0.9$; $p<0.05$) in body weight is noted with hip circumference (Fig. 2), hip circumference, and body area. Using linear regression equations, it is possible to identify the weight of unknown men by hip circumference (Weight, kg = − 39.76+2.04 x Hip circumference, cm) or buttocks (−95.13+1.79 x Buttocks circumference, cm) with a high degree of reliability. During the forensic examination of the remains of unknown men, the identification of the somatotype and body type is important. When identifying the somato type according to V.V. Bunak and V.P. Chettsov, it is necessary to know the indicators of fat, muscle, and bone mass. The conducted correlation and regression analyses revealed strong correlations in men with body weight ($r=0.74$; $p<0.05$), thickness of all fat folds ($r=0.70$-0.88; $p<0.05$), hip circumference ($r=0.79$; $p<0.05$), buttocks ($r=0.76$; $p<0.05$), and the Pigne index ($r=-0.79$; $p<0.05$). A functional correlation ($r>0.90$; $p<0.05$) between fat mass and the thickness of the fat fold on the abdomen (Fig. 3) and the iliac crest is noted. Using linear regression equations, it becomes possible to determine the fat mass of unknown men based on the thickness of the abdominal fat fold (Fat mass, in kg = 2.76+5.56 x Thickness of the abdominal fat fold, in cm) or the iliac crest (Fat mass, in kg = - 0.38+14.15 x Thickness of the iliac crest fat fold, in cm) with a high degree of reliability. In men, strong correlations were found with forearm circumference (r=0.87; p<0.05), wrist circumference (r=0.76; p<0.05), lower leg circumference (r=0.87; p<0.05), chest circumference (r=0.82; p<0.05), ankle circumference (r=0.73; p<0.05), hip diameter (r=0.77; p<0.05), longitudinal chest diameter (r=0.75; p<0.05), bone mass (r=0.80; p<0.05), and the Pigne index (r=-0.83; p<0.05). A functional correlation (r>0.90; p<0.05) between muscle mass and men's body weight, shoulder girth (4-rasm), thighs, buttocks, and body area was noted. Using linear regression equations, it is possible to determine the muscle mass of men by shoulder circumference (Muscle mass, kg = -27.02+2.28 x Shoulder circumference, cm) or hip circumference (Muscle mass, kg = -32.40+1.31 x Hip circumference, cm) with a high degree of reliability.

Bone mass has strong correlations with height (r=0.74; p<0.05) and weight (r=0.81; p<0.05), forearm circumference (r=0.70; p<0.05), wrist circumference (r=0.82; p<0.05), buttock circumference (r=0.75; p<0.05), shoulder diameter (r=0.80; p<0.05), forearm diameter (r=0.78; p<0.05), ankle circumference (r=0.75; p<0.05), and muscle mass (r=0.80; p<0.05). A functional relationship (r>0.90; p<0.05) between bone mass and hip diameter (Fig. 5) and body area is noted. Using linear regression equations, it is possible to determine the bone mass of men by hip diameter (Bone mass, in kg = -12.90+2.51 x Hip diameter, in cm) with a high degree of reliability. Additional criteria for determining somatotypes according to V.V. Bunak and V.M. Chettsov are: shoulder and pelvic diameter, transverse and longitudinal chest diameters, chest and buttocks circumference. When dismembered body parts are found, it is important for forensic medical experts to determine missing parameters based on existing ones. Thus, shoulder diameter correlates with standing height (r=0.58; p<0.05), weight (r=0.62; p<0.05), shoulder girth (r=0.62; p<0.05), forearm (r=0.63; p<0.05), wrist (r=0.60; p<0.05), and ankle (r=0.62; p<0.05), shoulder (r=0.52; p<0.05) and chest diameter (r=0.56; p<0.05), lower limb length (r=0.63; p<0.05), body area (r=0.68; p<0.05), muscle (r=0.66; p<0.05), and bone (r=0.59; p<0.05) mass, and Tanner index (r=0.98; p<0.05). Men's pelvic diameter has fewer correlations and reliably correlates with height (r=0.57; p<0.05), weight (r=0.66; p<0.05), hip circumference (r=0.62; p<0.05), buttocks (r=0.69; p<0.05), ankles (r=0.59; p<0.05), chest (r=0.57; p<0.05) and shoulder diameter (r=0.53; p<0.05), lower limb length (r=0.56; p<0.05), body area (r=0.71; p<0.05), fat (r=0.53; p<0.05), muscle (r=0.64; p<0.05), and bone mass (r=0.58; p<0.05).**.** The transverse diameter of the chest correlates with men's body weight (r=0.67; p<0.05), shoulder girth (r=0.58; p<0.05), hip circumference (r=0.62; p<0.05), chest (r=0.67; p<0.05), buttocks (r=0.63; p<0.05), shoulder (r=0.57;

p<0.05) and pelvic diameter (r=0.57; p<0.05), body area (r=0.63; p<0.05), muscle mass (r=0.62; p<0.05), and the Pigne index (r=-0.60; p<0.05). The longitudinal diameter of the chest correlates with men's body weight (r=0.76; p<0.05), fat fold thickness of the abdomen (r=0.50; p<0.05), and iliac crest (r=0.52; p<0.05), shoulder girth (r=0.72; p<0.05), hip circumference (r=0.71; p<0.05), lower leg (r=0.70; p<0.05), chest (r=0.67; p<0.05), buttocks (r=0.72; p<0.05), ankles (r=0.64; p<0.05), shoulder diameter (r=0.59; p<0.05), hip diameter (r=0.64; p<0.05), body area (r=0.71; p<0.05), fat (r=0.61; p<0.05), muscle (r=0.76; p<0.05), and bone (r=0.64; p<0.05) masses, and the Pigne index (r=-0.69; p<0.05). Chest circumference correlates with men's body weight (r=0.87; p<0.05), abdominal fat fold thickness (r=0.6; p<0.05), shoulder circumference (r=0.8; p<0.05), forearm circumference (r=0.8; p<0.05), wrist circumference (r=0.6; p<0.05), hip circumference (r=0.8; p<0.05), lower leg circumference (r=0.66; p<0.05), buttock circumference (r=0.8; p<0.05), shoulder diameter (r=0.6; p<0.05), hip circumference (r=0.6; p<0.05), chest circumference (r=0.67; p<0.05), body area (r=0.78; p<0.05), fat (r=0.63; p<0.05), muscle (r=0.8; p<0.05), and bone (r=0.65; p<0.05) masses, and the Pigne index (r=-0.9; p<0.05). Hip circumference correlates with weight (r=0.94; p<0.05), abdominal fat fold thickness (r=0.66; p<0.05), hip (r=0.61; p<0.05), iliac crest (r=0.66; p<0.05), shoulder circumference (r=0.79; p<0.05), forearm (r=0.77; p<0.05), wrist (r=0.70; p<0.05), hip (r=0.94; p<0.05), lower leg (r=0.80; p<0.05), chest (r=0.79; p<0.05), ankle (r=0.67; p<0.05), shoulder diameter (r=0.63; p<0.05), hip (r=0.73; p<0.05), ankle (r=0.59; p<0.05), chest (r=0.63; p<0.05), pelvis (r=0.69 p<0.05), body area (r=0.89; p<0.05), fat (r=0.79; p<0.05), muscle (r=0.92; p< The diameter of the shoulders and pelvis, the transverse diameter of the chest, are mainly moderately correlated with anthropometric indicators. In the chest and buttocks circumference, there are strong correlations with the circumferential dimensions of the shoulder, forearm, hip, body area, bone mass, and Pigne index, as well as functional correlations with men's weight and muscle mass. In addition, an important fact is the strong connection between the chest circumference and the buttocks (Fig. 6), which makes it convenient for experts to determine one size by another.

Therefore, the most The informative additional indicators of the somato type are chest circumference (Chest circumference, in cm = 19.02+0.82 x Hump circumference, in cm) and buttocks (Hump circumference, in cm = 20.38+0.77 x Chest circumference, in cm).

In forensic medical identification of body type according to V.N. Shevkunenko, it is necessary to determine the relative (to growth) body length index. It was established that

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this index has a moderate correlation (r=0.60; p<0.05) with the absolute body length (Fig. 7). Consequently, the Shevkunenko index can be determined by the absolute length of the trunk using the linear regression equation (Shevkunenko Index = 16.20+0.25 x Body length, in cm). Forensic medical identification of body type according to V.M. Chernorutskiy requires knowledge of the Pigne index. Men's Pigne index had strong inverse correlations with men's body weight (r=-0.89; p<0.05), abdominal fat fold thickness (r=-0.71; p<0.05), shoulder girth (r=-0.89; p<0.05), forearm (r=-0.79; p<0.05), lower leg (r=-0.75; p<0.05), buttocks (r=-0.83; p<0.05), body area (r=-0.70; p<0.05), fat (r=-0.73; p<0.05), and muscle mass (r=-0.83; p<0.05). Functional feedback of the Pigne index (r>-0.90; p<0.05) is observed with chest circumference and hips. Using linear regression equations for chest circumference (Pine index = 220,57-2,20 x Chest circumference, in cm) and hip circumference (Pine index = 147,95-2,49 x Hip circumference, in cm), it is possible to determine the body type in unknown men with a high degree of reliability. In forensic medical identification of sexual dimorphism, it is necessary to know the Tanner index. The latter has one functional relationship (r=0.98; p<0.05) with the male shoulder diameter. Consequently, it is also possible to determine the sex dimorphism of unknown men with a high degree of reliability based on the shoulder diameter and the linear regression equation (Tanner Index = -141.2+26.53 x Shoulder diameter, in cm). Regression analysis allows for the calculation of any anthropometric indicator, body component composition, and proportional indices without resorting to numerous measurements, which is especially important in forensic medical practice during the examination of unidentified remains. The possibility of replacing the empirical indicator with the calculated one is confirmed by high values of the accuracy criterion of approximation. Of all the anthropometric indicators characterizing the height of men, the highest values of the correlation coefficient, reliability, and accuracy criterion of approximation were recorded for the length of the lower limb. The obtained linear regression equation showed that when the length of the lower limb changes by 1.0 cm, the height of men changes by 1.38 cm. Among all anthropometric indicators related to weight in men, the highest values of the correlation coefficient, reliability, and accuracy criterion of approximation are in the hip and buttock circumference. From the linear regression equations, it follows that with an increase in hip circumference by 1 cm, the weight of men increases by 2.03 kg, and with an increase in hip circumference by 1 cm, the weight increases by 1.8 kg. Of all the studied anthropometric indicators related to tissue components, the highest values of the correlation coefficient, reliability, and approximation criterion were recorded: fat mass with fat fold thickness on the abdomen and iliac crest, muscle mass with forearm and hip circumference, and bone mass with the distal diameter of the hip. When the fat fold on the abdomen and iliac crest changes by 1 mm, the total fat content changes by 0.55 and 1.42 kg, respectively. This made it possible to create a prognostic table that allows for the identification of fat mass. With a change in forearm and hip circumference by 1 cm, the total number of muscles changes by 2.3 and 1.3 kg, respectively. When the distal diameter of the thigh changes by 1 mm, the total amount of bone mass changes by 0.25 kg, respectively. With a 1.0 cm change in the buttocks circumference, the chest circumference is proportional to 0.8 cm, and vice versa. Of all the anthropometric indicators correlated with the Shevkunenko index in men, the highest values are the correlation coefficient, reliability, and accuracy criterion of approximation at body length, and the Tanner index with shoulder diameter. From the linear regression equations, it follows that with a change in body length by 1 cm, the Shevkunenko index changes by 0.25, and a change in shoulder diameter by 1 cm is accompanied by a change in the Tanner index by 26.53. Of all the anthropometric indicators correlated with the Pigne index in men, the highest values of the correlation coefficient, reliability, and accuracy criterion of approximation are observed at the chest and hip circumference. From the linear regression equations, it follows that with a change in chest circumference and hip circumference by 1 cm, the Pigne index changes by 2.21 and 2.49, respectively. Consequently, using regression equations, knowing the magnitude of one of the traits under consideration, it is possible to determine the magnitude of another paired trait with sufficient accuracy. This circumstance allows for the use of regression equations when determining the values of such characteristics that are difficult or impossible to directly measure under normal conditions. For example, in forensic medical practice, during the examination of body parts of a dismembered male corpse. Thus, the anthropometric indicators of men in the first period of maturity (21-35 years old) are closely interconnected. The identified nature and equations of interrelationships, the compiled prognostic tables must be taken into account when identifying a person in forensic medical practice.

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