COMPARATIVE ANALYSIS OF THE ANTHROPOMETRIC PROFILE OF ADOLESCENT ATHLETES

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Abstract

The article presents data on the anthropometric profile of martial arts athletes and teenage football players from Tashkent city youth sports schools. The results of the study showed that athletes of various sports aged 12-14 years demonstrate variability in the anthropometric profile. These differences emphasize the importance of an individual approach to preparation and training depending on specific sports tasks.

Keywords

Athletes, adolescents, anthropometric profile, body mass index, Erisman index, Pignet index, dynamometry, deadlift strength, vital capacity.

Command

Anthropometry plays an important role in assessing the physical data of athletes. Anthropometric indicators (height, body weight, body mass index (BMI), limb length, chest circumference and other body parts) are often used to predict athletic performance and optimize training programs [1,3]. Given the differences in physiological requirements of different sports, there is considerable interest in comparing anthropometric data of athletes from different disciplines, in particular football players and martial artists [2]. Football is a sport that requires athletes to have a high level of endurance, coordination, speed and strength [4]. Research shows that the anthropometric profile of adolescent football players includes average height and body weight, with much attention paid to the percentage of fat mass and muscle mass (Malina RM , et al ., 2019). Martial arts (e.g. judo, karate, taekwondo and wrestling) require athletes to develop strength, flexibility, explosiveness and coordination (Detanico D., Kons RL, 2020). Studies of adolescent martial artists show that they often have higher muscle mass and overall physical strength than football players (Camic CL, et al ., 2022). The anthropometric profile of adolescent athletes varies significantly depending on the sport [5]. Football players demonstrate a lighter and more resilient body type, while martial artists are characterized by more massive muscles and increased strength. These differences emphasize the importance of an individual approach to preparation and training depending on specific sporting tasks [6].

Objective: To conduct a comparative analysis of anthropometric indicators of teenage football players and martial artists.

Materials and methods. The study involved 115 male athletes of various sports aged 12 to 14 years. The first group included 63 combat athletes (boxing, Greco-Roman wrestling and judo), with an average age of 13.19±0.20 years. The second group included 52 football players, with an average age of 12.75±0.20 years. The anthropometric profile of the athletes included studies of height-weight indicators, chest circumference, hand and back dynamometry, and vital capacity of the lungs. The index indicators of body mass, chest and body strength were calculated.

Mathematical analysis of the data was carried out using the method of variation statistics using the software package « Microsoft Excel ". The arithmetic mean (M), standard error (m), absolute values (%), and Student's t-test with standard error (p) were calculated at a significance level of $p < 0.05$. The results were calculated using the small sample method, following the rules of statistical processing of medical and biological data.

Results. Based on the obtained results of statistical data processing, the average group values of anthropometric indicators of teenage football players and martial artists were calculated (Table 1). The analysis of the obtained results, which are presented in Table 1, revealed the

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features of the anthropometric indicators of athletes involved in martial arts and football. In general, all athletes are characterized by harmonious physical development and proportional physique for this age. However, when comparing height, body weight, chest circumference, strength of both hands and back in the two study groups, reliable differences were noted. Thus, the height of football players is significantly higher compared to martial artists (158.73 ± 1.80, 152.78 ± 1.42), p ≤ 0.05. The body weight of martial artists was 45.30 ± 1.05 kg, which is significantly lower (P < 0.05) than the body weight of football players 51.06 ± 1.74. When analyzing the strength indicators of adolescents, statistically significant differences in the magnitude of absolute strength were revealed (p < 0.05). The strength of the right hand of the rowers-football players was 35.58±1.09 kg, which is significantly higher than the strength of the right hand of the martial artists - 29.52 ± 0.94 kg. The strength of the left hand of the football players (30.04±1.02 kg) is significantly higher than the strength of the left hand of the martial artists, 26.67 ± 1.03 kg , p < 0.05. The chest circumference indicators also differed significantly. Thus, the OC at rest in football players (83.42 ±1.06) is significantly higher compared to martial artists (72.73 ± 0.95). Similarly, the same significantly significant differences in OC on inhalation and on exhalation. No significant differences were observed when determining the chest excursion index of athletes. On average, the chest excursion value of athletes in both study groups was 4.3 cm. When comparing the strength of the back muscles, significantly higher values were noted in football players (68.04±2.64; 51.51 ± 1.18), p≤0.05.

Table 1

Anthropometric indicators of adolescent athletes depending on the type of sport

Indicator	Football players (n = 52)	Martial artists (n = 63)	t	p
Height, cm	158.73 ± 1.80	152.78 ± 1.42	2.60	0.01
Body weight, kg	51.06 ± 1.74	45.30 ± 1.05	2.83	0.007
OGK (at rest), cm	83.42 ± 1.06	72.73 ± 0.95	7.51	0.00
OGK (on inhalation), cm	86.27 ± 1.09	75.37 ± 0.93	7.61	0.00
OGK (on exhalation), cm	81.90 ± 1.05	71.35 ± 0.96	7.41	0.00
Chest span, cm	4.44 ± 0.13	4.06 ± 0.15	1.88	0.201
Dynamometry, kg (right hand)	35.58 ± 1.09	29.52 ± 0.94	4.20	0.00
Dynamometry, kg (left hand)	30.04 ± 1.02	26.67 ± 1.03	2.32	0.027
Back muscle strength, kg	68.04 ± 2.64	51.51 ± 1.18	5.72	0.00

The BMI indicator reflects the ratio of body weight and length and is used to assess body density. No significant differences in BMI were observed in adolescents of different sports (Table 2). Thus, the body mass index of football players was 19.95 ± 0.38, martial artists 19.32 ± 0.26 and are characterized as normal values. Reliably significant differences were noted when comparing the indicators of body strength and chest development (Table 2). In the group of

football players, the Erisman index is characterized as good chest development (4.06 ± 0.52), in the group of martial artists (-3.66 ± 0.49) as low chest development, since the average indicator (-3.66 ± 0.49) for this age characterizes narrow-chestedness . The results of the assessment of the strength of the physique established reliable significant differences between the study groups. Thus, the calculation of the pinye index in football players determined the average strength of the physique (24.25 ±1.20), while in the group of martial artists this indicator (34.75 ±0.80) is characterized as a weak physique (Table 2).

Table 2

Index indicators of body proportions of adolescent athletes depending on the type of sport Indicator

Indicator	Football players (n = 52)	Martial artists (n = 63)	t	p
Body mass index	19.95 ± 0.38	19.32 ± 0.26	1.39	0.180
Erisman Index	4.06 ± 0.52	-3.66 ± 0.49	10.79	0.008
Pignet index	24.25 ± 1.20	34.75 ± 0.80	7.02	0.000

Conclusions

Analysis of anthropometric indicators in adolescent athletes helps to identify individual criteria for adaptation of the body to physical activity performed according to the sport. The anthropometric profile of adolescent athletes varies significantly depending on the sport. Football players aged 12-14 years demonstrate a heavier and more resilient body type, while martial artists of the same age are characterized by less massive muscles and reduced strength. These differences emphasize the importance of an individual approach to preparation and training depending on specific sports tasks.

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