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KOZAR O., PETRUS B., KHIMYCH V., REIS T.
Mukachevo State University, Mukachevo, Ukraine

ADAPTIVE CHANGES IN MORPHOLOGICAL INDICATORS OF CHILDREN'S ATHLETICS FOOTPRINTS

Purpose - to obtain statistical data on the size characteristics of the feet of children 12-16 years of age and on their basis the establishment of the features of morphological indicators that characterize the transverse arch of the feet (the values of the lateral and medial angles of the right and left foot).

Scientific novelty - establishment of regularities in changing the parameters of the longitudinal and transverse arch of the foot of the young athletes, depending on the sport specialization and the nature of the cyclic treadmill.

Practical value - development of rational internal form of special footwear for children of athletes of the age group of 12-16 years, which ensures the effective performance of athlete's exercises.

Keywords: track and field athletics, racing movement, transverse arch of the foot, morphological indices, regularities

During training and competition, young athletes use shoes that do not fully meet the requirements for children's athletic shoes, since the size and completeness of the range of imported footwear in our market does not correspond to the parameters of the feet of Ukrainian children, as confirmed by a large number of trainers in Ukraine. It is known that the use of inappropriate footwear can have a detrimental effect on the development of child's foot during regular training and competitions. The database in the footsteps of modern children of athletes is insufficient, which prevents the development of a pad and shoes for the children of this category, which makes this work relevant.

Objectives. The objects of research are selected boys and girls of 12-16 years of children's and youth sports schools in the cities of Mukachevo, Uzhgorod and Berehovo. For reliable data, during anthropometric surveys, a sampling was carried out according to a suitable methodology, a total of 300 children, of which 180 sprinters (running for short distances) and 120 stallions (running on long distances), selected from different classes in accordance with age category.

The main objective of the anthropometric research is to obtain statistical data on the size characteristics of the feet of children 12-16 years of age and on their basis the establishment of the features of morphological indicators that

characterize the transverse arch of the feet (the values of the lateral and medial angles of the right and left foot) .

To achieve this goal, the research objectives were formulated:

- to determine the dynamics of morphological indicators of feet in boys and girls of different sports specializations (sprinters and starrers) at intervals in one and three months;
- to establish the regularities in changing the parameters of the longitudinal and transverse arch of the foot of the young athletes, depending on the sports specialization and the nature of the cycling treadmill;
- to carry out a comparative analysis of the morphological characteristics of stop sprinters and starrers in rectilinear and non-straight-line cyclic racing motions.

Methods and methods of anthropometric and biomechanical studies of foot athletes.

For the research of the anthropometric parameters and features of the size characteristics of the athlete's foot, a pantograph was used. For additional measurements, metric devices for measuring foot were used.

The method of stripping off allows you to objectively assess the shape and size of the foot support surface and the state of its vaults and to investigate changes in the lateral and medial angles (Fig.1,2).

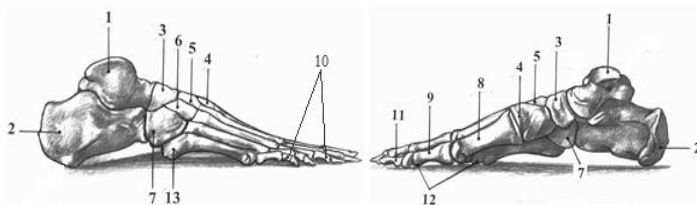


Fig. 1. View from the side of the lateral side of the lower limb (a) and its medial side (b): 1 - trowel bone; 2 - heel bone; 3 - boat bone; 4 - the first wedge-shaped; 5 - second wedge-shaped; 6 - third wedge-shaped; 7 - cuboid bone; 8 - five tubular bones; 9 - the main phalanx; 10 - middle phalanx; 11 - nail phalanx; 12 - sesameiform bones.

The plotogram characterizes all features of the structure of the foot and reflects morphofunctional deviations of the lateral side of the lower limb (wrapped towards this plane) and its medial side (wrapped up to the middle of the plane) .

The lateral and medial angles are important morphological characteristics of the foot: the lateral angle - the deviation of the 5th finger, and the medial - the first finger. If the medial angle is greater than 18° and the lateral angle is greater than 12°, the lower cross section of the foot is lowered. On the basis of this, the structure of the foot of the athlete changes and there are various pathologies [1,2].

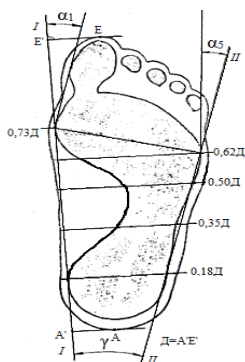


Fig. 2. Dimensional signs of the foot, which are determined according to the planogram: I-I - tangential, which is carried out from the medial side of the imprint of the foot on the most prominent points; II-II - tangential, which is conducted through the most protruding points of the imprint of the foot from the lateral side; D - length of the foot; γ - the angle formed by the tangent I-I and II-II; α_1 - medial angle of the position of the first finger, (degrees); α_5 is the lateral angle of the position of the fifth finger, (degrees).

Results and discussions

Morphological characteristics of the structure of the feet in boys and girls of various sports specialties (sprinters and steers) were determined and analyzed in straight and non-straight-line cyclic racing movements.

As the results of the observations have shown, in young sprinters all angular characteristics on the left and right feet are more important than girls. The lateral angle of the left foot in young men - sprinters is greater than the right at 0.3° at the beginning of the study, and in three months reaches a difference of 0.9° . Girls - sprinters have the same pattern: at the beginning of the observation, the lateral angle of the left foot is greater than the given right angle at 0.3° , and in three months - 0.7° .

There is a significant increase in the lateral angle of the left foot of sprinters of boys and girls in three months at non-linear cyclic jogging movement. At the same time, in providing the spring function of the foot actively involved both vaults - longitudinal and transverse.

The medial angle of the anterior section of the right foot in young men - sprinters, on the contrary, is more than the left foot on 0.3° , in three months - the difference has increased to 0.4° . In girls, in the initial state, the medial angle of the anterior part of the right foot is 0.3 degrees higher than in the left one, and after three months the difference reaches 0.6° .

Thus, in the sprinters of both sexes, the lateral and medial parts of the anterior section of the left and right feet vary unevenly. This may be due to the biomechanical features of the sprint run, when the main part of the load falls on the anterior foot, with the left foot to a greater extent, the support lies on the lateral section, and in the right foot - on the medial. In the process of monitoring both girls and boys there is an increase in angular parameters by an average of 10-12%.

The results of the analysis of morphological characteristics of the feet in athletes- steers also indicate a different character of the dynamics of lateral and medial angles in boys and girls.

Thus, the character of the cyclic jogging movement (straightforwardness and non-linearity), as well as sports specialization (sprinters and steers) change the morphological characteristics of the foot. In this case, certain features of the indicators of the transverse arch of the foot are formed.

Conclusion. Sport specialization of athletes largely determines the features of the foot reaction to physical activity, as well as its morphological parameters. Changing the size of the load on the foot naturally manifests itself in the restructuring of its physiological properties and morphological characteristics.

In this work anthropometric measurements of the feet of boys and girls aged 12-16 years old in children's and youth sports schools were conducted. The dynamics of changes in morphological indicators was established by a measurement of the respondents' stop after 1 and 3 months.

Depending on the gender of athletes, the type of specialization and the nature of the cyclic jogging movement (linear or indirect), the regularities in changing the angular indices of the feet of this category of athletes are formulated. The dynamics of the parameters characterizing the transverse arch of the stop - the value of the lateral and medial angles of the right and left foot are determined.

On the basis of the comparative analysis of the morphological characteristics of stop sprinters and stallions in rectilinear and non-straight-line cyclic racing motions, the following is established:

a) intensive interval cyclic racing movements characteristic of the sprint run lead to a decrease in the transverse arch of the feet, which is manifested by an increase in the angular parameters of the anterior foot;

b) with non-rectilinear cyclic racing races in athletes, regardless of specialization, the morphological parameters of the foot change more to a degree than athletes with rectilinear ones, while the active participation of both groups in the provision of spring function is noted.

Thus, the character of the cyclic jogging movement (straightforwardness and non-linearity), sports specialization (sprinters and steers, the athlete's position) change the morphological characteristics of the foot. The results of this study on the characteristics of morphofunctional indicators of stop-athletes will allow them to consider them when developing a rational inner form of pads and shoes for athletes of the specified category.

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