ELEMENTS OF BIOMECHANICS OF THE GYMNAST'S MUSCULOSKELETAL SYSTEM

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Annotaion: *Centrifugal overloads during supporting rotations experienced by the gymnast's body can be very significant and, in combination with the radial effect of gravity, can exceed the force of gravity several times during fast movements.*

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The biokinematic chain (BKC) usually refers to human limbs. However, the gymnast's body, taken as a whole, also represents a BKC, the links of which are all movably articulated body segments. Each pair of adjacent links of the BKC thus constitutes a biokinematic pair.

Depending on the nature of the working position, the gymnast's body can be an open, closed or free BKC. Open BKC is the most typical. It occurs in all cases when the gymnast is in hanging positions, handstands and footstands. The high mobility of the legs, combined with their energy potential, once again emphasizes their role as the main working link of the BKC. The gymnast's body rarely finds itself in the position of a closed ball joint, since the mobility of the links in these cases is sharply reduced and the possibilities of supplying them with energy, as well as controlling movement, are minimal.

Finally, cases where the gymnast's body is a free BKC are very typical. These are unsupported positions in which the end links of the gymnast's body have the greatest mobility. The gymnast's supporting apparatus is specific. The support functions of a gymnast can be performed by almost all parts of the gymnast. In hangs, support is used with the hands, elbows, hips, kneecaps, and feet. In the supports and seat - forearms, shoulders and entire arm, head and neck, hips, pelvis. In stands - with legs and one leg "half toes", hands, one hand, fingers, forearms, shovels, head, etc. However, the most typical for gymnastics are working positions with support from the arms (hands), which most clearly emphasizes the specifics of gymnastics as a sport. The ability to use hand support is closely related to the morphology of the upper limbs. The conditions for supporting the hands are very diverse in different working positions and accordingly change when moving from one work

ing position to another. Analyzing the diagram, you can, for example, see that from a hang (stand) with an underhand grip around the supporting hand, only rotation with pronation of the hand is possible. In this case, a turn of 1800 brings the gymnast into an overhand grip, a turn of 3600 into a reverse grip, and a turn of 5400 into a hanging from behind with an overhand grip. This is the maximum rotation possible around one arm while maintaining the overall grip and working position. Turns with supination of the hand follow the same laws. The same happens when working positions change in hanging (stands) from behind and other working positions. Transitions from one working position to another, made without releasing the hands or turning, also follow certain regularities. They require actions such as flexion (extension) and twisting of the shoulder joints. All changes in working positions on other apparatus: uneven bars, pommel horse, are subject to similar completely unambiguous laws. Knowledge of these patterns helps to solve a number of practically important issues of movement technique, their modeling, targeted development of mobility in joints, as well as issues of terminology and judging in gymnastics.

The main questions of the geometry of a gymnast's body masses are questions about the localization of the gymnast and body inertia during rotational movements.

The center of gravity of the gymnast's body characterizes the distribution of masses in the latter. The constitutional features of body distribution in gymnasts and female gymnasts, associated, in particular, with the brachymorphic type of body structure, do not have a significant impact on the technique of exercises and the process of their development. The only exceptions are such types of exercises as leg swings on a horse, where the mass-geometric features of the body structure (especially the legs) can significantly influence the success of the task. It is also known that turns around the longitudinal axis are more successfully mastered by students who, other things being equal, have relatively higher height (S. D. Ustinov).

The most typical question is about the distribution of a gymnast's body mass when changing the working posture of the body. You can see that depending on the nature of the exercise and the working posture, the position of the c changes significantly. t. t- both in relation to the gymnast's body itself and in relation to the support. In equilibrium positions c. t. t is placed above the support. When swinging, it moves freely. It is also characteristic that the c.t.t., as an imaginary point of application of the resultant of all external forces, can be located outside the gymnast's body.

The moment of inertia of a gymnast's body is one of its most important mass geometric characteristics. As you know, in gymnastics rotation around the frontal axis

of the body predominates. The pose gradually changes from a position with a longitudinal bending of the body to a straight position and then to a position of extreme grouping. It can be seen that both values, given the moment of inertia relative to the possible grip axis, change in the same way: the moments of inertia reach their maximum values in a straight position of the body, and their minimum values when grouping. Of greatest practical interest are the values of the moment of inertia relative to the central.

REFERENCES:

1. Alisherovich, Tashpulatov Farkhad. "THE ROLE OF SPORTS IN THE DEVELOPMENT OF PERSONALITY OF YOUNG ATHLETES."

2. Carmen Pârvu , Bogdan Constantin Ungurean , Cristina Gabriela Zamfir , Zukhro Bahadirovna Khamraeva , Daniel Gabriel Alistar The Impact of Technology on Improving the Learning Process in Physical Education Lessons for Medically-Exempt Pupils. http://bioclima.ro/Journal.htm

3. Алишерович Т.Ф. Работоспособность и утомляемость в процессе обучения //Журнал Universal Science Research. – 2023. – Т. 1. – №. 10. – С. 247-251.

4. Хамраева З. ТЕОРЕТИЧЕСКИЙ И ПРАКТИЧЕСКИЙ РОСТ ПРОГНОЗНЫХ СПОСОБНОСТЕЙ В ФИЗИЧЕСКОЙ КУЛЬТУРЕ И СПОРТЕ //International Bulletin of Applied Science and Technology. – 2023. – Т. 3. – №. 2. – С. 88-93.

5. Khamraeva Zukhro Bahadirovna. THE IMPORTANCE OF PHYSICAL EDUCATION IN A HEALTHY LIFESTYLE. Ethiopian international of multidisciplinary research. -2023//Volume: 10, Issue 10// p. 164-167

6. Khamraeva Zukhro Bahadirovna. The Role of Women in the Development of Physical Education in the New Uzbekistan. Journal of Ethics and Diversity in International Communication// | www.openaccessjournals.eu | Volume: 3 Issue: 4//p.31-35

7. Xamraeva Zuxro Baxodir qizi. Regulation of Educational Activities in the Field of Physical Education and Sports. CENTRAL ASIAN JOURNAL OF THEORETICAL AND APPLIED SCIENCES//https://cajotas.centralasianstudies.org//. P.28-36

8. Khamraeva Zukhro Bahadirovna. PEDAGOGICAL CATEGORIES OF PHYSICAL EXERCISES IN PHYSICAL EDUCATION CLASSES TAUGHT IN HIGHER EDUCATIONAL INSTITUTIONS. https://doi.org/10.37547/ijp/Volume03Issue04-13// p.71-75