MUSCLE POWER AND SPEED-POWER
PHYSIOLOGICAL BASIS OF QUALITIES

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Annotation: Exercises that are close to or equal to the maximum isometric strength of a muscle are, in particular, strength exercises. For example, gymnastic exercises such as "standing on the hands", "cross", "front balance" in the rings, weightlifting exercises performed with a barbell close to the maximum or maximum weight, among others, and the muscle strength decreases. During the performance, the type of speed-strength exercise, which is characterized by a relatively large force and speed of muscle contraction, an external load equal to 40-70% of the maximum isometric force, ie high-strength exercises (short-distance running, jumps) is included.

Keywords: Muscle, sports, speed, strength, balance, exercise, maximum, distance, static, anatomical, movement.

The higher the speed of motion, the smaller the apparent force, and vice versa. Different sports fit different points on the power-speed curve. Exercises that are close to or equal to the maximum isometric strength of a muscle are, in particular, strength training. For example, gymnastic exercises such as "standing on the hands", "cross", "front balance" in the rings, weightlifting exercises performed with a barbell close to the maximum or maximum weight, among others, and the muscle strength decreases. During the exercise, a type of speed-strength exercise (short-distance running, jumping), which is a type of speed-strength exercise with a large force, ie 40-70% of the maximum isometric force, which shows a relatively large force and speed of muscle contraction. With a small mass (less than 40% of the maximum isometric force), a great speed is
achieved in the movement from one place to another, where the muscle strength shown is relatively small. Such exercises (for example, throwing a small ball in one place, movements of unloaded limbs) are suitable for speed. Under conditions of isometric contraction, muscles exhibit maximum static force. Maximum static and maximum voluntary static force of muscles. An isometric contraction of a muscle represents the maximum possible tension for itself. At the same time, the following three conditions must be met:

1) activation of all movement units (muscle fibers) of this muscle;
2) it has a complete tetanus mode in all units of motion;
3) muscle contraction at rest.

In this case, the isometric contraction of a muscle corresponds to its maximum static force. The maximum force exerted by a muscle depends on the number of muscle fibers that make up the length of the muscle and their thickness. The number and thickness of the fibers determine the total thickness of the muscle, or in other words, the surface area of the muscle cross-section (anatomical cross-section). The ratio of muscle composition to its anatomical cross-section is called the relative strength of the muscle. This force is measured in Newtons, or kilograms, per 1 cm². Therefore, when we talk about a person's muscle strength, we are talking about his maximum voluntary strength (in pedagogical practice, the equivalent concept - "absolute muscle strength"). This force depends on two factors: the muscles (peripheral) and the coordinating (central-nervous) factor. The muscle (peripheral) factors that determine the maximum voluntary force include:

1) conditions of mechanical action on the force of gravity - the shoulder of the muscle force and the angle of action of this force on the bone force;
2) muscle length, - muscle tension depends on its length;
3) the greater the sum of the cross-sections of the arbitrary muscles in which the cross-section (thickness) of the activated muscles is reduced, the greater the resulting muscle strength under the same conditions;
4) Muscle composition - the ratio of muscle fibers in fast and slow contracting muscles.

Coordinating (central nervous) factors include the unit of central nervous coordination mechanisms that control the musculoskeletal system - intramuscular coordination mechanisms and muscle coordination mechanisms. Using these mechanisms, the central nervous system controls the maximum voluntary force of a muscle, i.e., the force of voluntary contraction of a muscle determines how close it is to muscle composition. In fact, the maximum voluntary strength of any muscle group in a single joint depends on the contractile strength of many muscles. Perfection of muscle coordination is manifested in the adequate selection of "necessary" musculoskeletal and limiting the "unnecessary" activity of musculoskeletal muscles in other joints and increasing the activity of muscle antagonists that provide fixation of adjacent joints. Thus, muscle management is a complex task for the central nervous system when it is required to show maximum voluntary strength. From this it is clear why, under normal conditions, the maximum voluntary strength of muscles is less than their muscle composition. The difference between a muscle's strength and its maximum voluntary force is called the strength deficit.

The better the central control of the musculoskeletal system, the lower the strength deficit of the muscle group. The magnitude of the power deficit depends on three factors:

1) psychological and emotional state of the subject (according to the instructions);
2) the required number of muscle groups that are activated at the same time;
3) depends on the level of sophistication of their voluntary management. The first factor is that in some emotional states a person can show such a force that it is much greater than its maximum capacity under normal conditions. Such emotional (stress) situations include, in particular, the state of the athlete during the competition. Under experimental conditions, a significant increase in maximal voluntary force (i.e., a decrease in power deficit) is found in cases where a strong emotional response is produced in the athlete under study, found during his strong
motivation, e.g. . Masalan, faqat qo‘lning bosh barmog‘ini ishga tushiruvchi mushakning When measuring maximum voluntary strength, the strength deficit in different participants is 5-15% of the maximum of these muscles. It is known that when the maximum voluntary force of the muscle that activates the thumb and flexes its phalanx is determined, the power deficit increases by 20%. With maximum voluntary contraction of the calf muscles, the strength deficit is 30% .

Third factor. The role of this factor has been proven in various experiments. For example, it has been shown that isometric exercises performed in a certain position of the hand lead to a significant increase in the maximum voluntary force measured in that position. If the measurements are made in other positions of the hand, then the increase in the maximum arbitrary force is small or not at all. If the increase in maximal voluntary force was due solely to an increase in the cross-section of the muscle being exercised (peripheral factor), it would also be found in measurements in any position of the arm. Therefore, the increase in maximal voluntary strength in this case depends on the more perfect central control of the muscular apparatus in this case, than in the pre-workout. The role of the coordinating factor is also seen in the study of the relative voluntary force, which is determined by dividing the maximum voluntary force by the size of the muscle cross-section. For example, after 100 days of training using isometric exercises, the maximum voluntary strength of the exercising arm increased by 92%, and their cross-sectional area increased by -23%. Accordingly, the relative voluntary strength averaged 6.3 people. Because it is possible to measure the anatomical cross-section of a muscle, for most muscles it is not an absolute voluntary force (ratio of maximum voluntary force to physiological cross-section) but a relative voluntary force (ratio of maximum voluntary force to anatomical cross-section). ) is determined. In sports pedagogy, the concept of "relative strength" is determined by the ratio of the maximum voluntary force to the weight of the athlete. The effect of the right arm on the maximum voluntary force, the cross-sectional area of the muscles of the right and left arms, and the ratio of the maximum voluntary force after a hundred days of strength training: 1 - performed the exercise; 2 - increased to 10 kg / cm2
from muscles not exercised. As a result, systematic exercise can help improve voluntary muscle management.

The maximum voluntary strength of the non-exercised arm muscles also increased slightly due to the latter factor, as the cross-sectional area of these arm muscles did not change. This suggests that a more perfect central control of the muscles may be manifested in relation to symmetrical muscle groups (the phenomenon of ‘carrying’ the effect of exercise). ‘Less volatile’). Their contribution to the overall strength of the muscles is especially significant, because each of them contains a lot of muscle fibers. Highly mobile muscle fibers are thicker, have more myofibrils, and as a result, their contractile force is greater than that of slow-moving units. From this it is clear why the maximum voluntary force depends on the muscle composition: the more fast-moving muscle fibers they contain, the higher their maximum voluntary force. When an athlete is faced with the task of developing greater muscle strength during a competitive exercise, he or she should use exercises that require greater muscular strength during training (not less than 70% of maximum voluntary strength). In this case, the performance of voluntary exercises with muscles is improved and, in particular, the internal muscle coordination mechanism is adapted to ensure the addition of as much as possible of the major muscles, including the more advanced system, fast-moving fibers.

Dependence of voluntary muscle strength and endurance. There is a complex relationship between the indicators of voluntary strength and endurance (“local” endurance) of muscles. The maximum voluntary strength and static endurance of a muscle group are related: the greater the maximum voluntary strength of that muscle group, the longer the selected tension can hold (the greater the “absolute local endurance”). In experiments, a different relationship between voluntary strength and endurance is found when different people under test develop the same relative muscle tensions, e.g., 60% of their maximum voluntary strength. In this case, the stronger the person being examined, the greater the muscle tension in absolute size. In these cases, the average work time (“relative local endurance”) is often the same in people with different maximum voluntary strengths. Maximum
voluntary strength and dynamic endurance performance do not indicate that there is no direct contact between non-athletes and different athletes. For example, in both men and women, the strongest leg muscles are in the discos, but they have the lowest dynamic endurance. People who run medium and long distances are no different from non-athletes in terms of leg muscle strength, but athletes have very high dynamic local endurance. However, no high dynamic endurance was observed in their arm muscles. All this indicates a high degree of specificity of the exercise: the necessary functional properties of the muscles, which are the basis of the athlete's training, increase. More exercise aimed at developing muscle strength improves the mechanisms that help improve these qualities, has less effect on muscle endurance, and vice versa. Working hypertrophy of muscles. Because the strength of a muscle depends on its cross-section, its enlargement is accompanied by an increase in the strength of that muscle. An increase in muscle cross-section due to exercise is a percentage redistribution of rapid fibers in the outer head of the quadriceps muscle of the working, various athletes, and non-athletic number (left); isometric strength of the leg muscles relative to body weight (light triangles) and vertical velocity when jumping upwards (black triangles). increase) occurs at the expense of. When muscle fibers become too thick, they can be mechanically broken down and "extra" fibers can be formed. During strength training, the number of mechanically broken fibers increases. Working hypertrophy of muscle fibers can be divided into two types - sarcoplasmic and myofibrils. Sarcoplasmic working hypertrophy is a thickening of muscle fibers, often due to an increase in the size of the sarcoplasm, ie their irreversible part. This type of working hypertrophy is caused by an increase in the amount of non-contractile (especially mitochondrial) proteins and metabolic reserves of muscle fibers: glycogen, nitrogen-free substances, creatine phosphate, myoglobin, etc. A significant increase in the number of capillaries as a result of exercise can also lead to a slight thickening of the muscle. Weak and rapidly oxidized fibers are more prone to sarcoplasmic hypertrophy. This type of working hypertrophy has little effect on the increase in muscle strength, but significantly increases their ability to work for a
long time, ie increases their endurance, depending on. At the same time, the density of myofibrils in muscle fibers increases. Such working hypertrophy of muscle fibers leads to a significant increase in muscle composition of the muscle. The absolute strength of the muscle also increases significantly, and during the first type of working hypertrophy, it either does not change at all, or decreases slightly. Muscle fibers are more prone to myofibril hypertrophy. In the same way, muscle fiber hypertrophy is a combination of the two types named, each of which predominates. The predominant development of this or that type of working hypertrophy is determined by the nature of muscle training. Performing long-term dynamic exercises with a small force load on the muscles, which develops endurance, mainly causes the first type of worker hypertrophy. Exercise with high muscle tension (more than 70% of the maximum voluntary strength of the muscle groups you are exercising), on the contrary, contributes to the development of more first-class working hypertrophy. The basis of working hypertrophy is the rapid synthesis and rapid breakdown of muscle proteins. Androgens (the male sex hormone) play an important role in managing muscle mass, especially in the development of muscle hypertrophy. They are produced by the cortex (ovaries) and the adrenal cortex, and in women - only the cortex of the adrenal glands. This means that men have more androgens in their bodies than women. Like other types of exercise, strength training does not change the ratio of the two main types - fast and sluggish muscle fibers. has the property of modifying by reducing the percentage of glycolytic fibers. At the same time, as a result of strength training, the degree of hypertrophy of fast muscle fibers is greater than that of slow oxidized fibers, although endurance training leads to hypertrophy of weak fibers in the first place. This difference suggests that the degree of hypertrophy of a muscle fiber worker depends on both the amount of its use in training and the nature of the occurrence of hypertrophy. fast muscle and weak
muscle fibers are also involved in these muscle contractions. However, even small amounts of reflux are sufficient to increase the working hypertrophy of fast fibers, indicating that they (relative to weak fibers) are more prone to the development of working hypertrophy. The high percentage of fast fibers in the muscles, during improper strength training, serves as an important basis for a significant increase in muscle strength. have a much higher potential. Preparation exercise is associated with a large number of repetitions of muscle contractions that have relatively little strength, and they are mainly provided by the activity of weak muscle fibers. Therefore, in this type of exercise, it is understandable that fast muscle fibers, especially fast glycolytic fibers, have a more pronounced working hypertrophy of weak muscle fibers. 'ndalang section surface Performance of muscle compositions Not involved in sports, .2. Physiological basis of speed-strength qualities (strength) Maximum strength (sometimes called "explosive force") is the result of an optimal combination of strength and speedladi. The more power an athlete exerts, the greater the force he exerts on the projectile or his body, because the final velocity of the projectile (body) is determined by the strength and speed of the impact exerted on it. may increase due to the increase in speed. Usually, the maximum increase in strength is due to an increase in muscle strength. The force component of strength (dynamic force). Muscle strength, which is measured under the dynamic mode of muscle activity (concentric or eccentric contraction), is defined as dynamic force. It is determined by the voltage applied to the mass during the concentric contraction of the muscle or by the decrease in the motion of the mass during the eccentric contraction of the muscle (tension with the opposite sign). It is based on the law of physics, according to which \( F = m \cdot a \). In this case, the muscle strength shown depends on the magnitude of the mass moving from one place to another: within certain limits, the magnitude of the force increases with increasing mass of the moving body; a subsequent increase in mass does not occur with an increase in dynamic force. During the measurement of dynamic force, the athlete participating in the experiment performs a coordinated complex movement outside and inside the muscle. Therefore, the performance of dynamic strength varies
significantly in different athletes and differs greatly from the performance of isometric (static) strength when re-measured in the same person. Of course, such a comparison is made during the maximum tension of the athlete participating in the experiment in both positions and when the angle of the joint is the same. Muscles tend to exhibit a dynamic force that is much greater than the maximum isometric force in the eccentric contraction mode. The greater the speed of movement, the greater the dynamic force generated by the muscles in the displacement mode. There is a moderate correlation between the indicators (correlation coefficient is around 0.6-0.8). Increasing the dynamic force as a result of dynamic training may not increase the static force. All this shows the peculiarity of the exercise: the use of a particular type of exercise (static or dynamic) leads to the maximum increase in results in this type of exercise. growth is determined during exercise, where the movement is performed at a certain speed. One type of muscle force is explosive force, which describes the rapid onset of muscle strength. It determines the height of a long jump with the legs in the correct position, or the long jump from a standing position, and the speed of movement with the maximum possible speed when running short distances. The gradient of force (i.e., its rate of growth) is used as an indicator of the force of an explosion. It is defined as the ratio of the maximum force manifested to the time it takes to reach it, or the time it takes to reach any selected level of muscle strength (absolute gradient) or half of the maximum force, or any other part of it (relative gradient of force). The strength gradient is higher in sprinters than in non-athletes or endurance exercisers. The differences in the absolute strength gradients are particularly large. will depend. Isometric exercises increase static force and change the force of abrupt movement less, which is determined by the index of force gradients or by the indicators of jumping (high jump with the legs held straight or long jump from a standing position). Therefore, the physiological mechanisms responsible for sudden force are different from the mechanisms that determine static force. Among the coordinating factors in the manifestation of acute force are the nature of the impulses of motoneurons of active muscles - the frequency of their impulses at the
beginning of the discharge and the synchronization of impulses of different motoneurons. The higher the initial frequency of motoneuron impulses, the faster the muscle strength increases. Changes in the "force-speed" relationship and relative changes in the moment of force in different methods of exercise 0 ° / s - isometric exercise, 40 ° / s and 160 ° / s - isokinetic exercise with the specified motion speed. In athletes and non-athletes, changes in isometric force at the beginning of the voluntary contraction of the triceps (above) and in the contraction of the triceps (below) and the maximum speed of this change. The force of isometric contraction is expressed as a percentage of the maximum force, and the velocity as a percentage of the maximum force in ms. In highly qualified representatives of the speed force types of sports, the main mass of muscle fibers is fast fibers. These fibers, during exercise, undergo hypertrophy faster than weak fibers. Therefore, in relation to those who exercise or in other sports, especially those that require endurance, the main mass of muscle fibers in the representatives of speed-strength sports is fast fibers (or takes up much more space in the cross section). The number of non-athletes and non-athletes - men and women - in the cross section of the outer head of the quadriceps muscle, the percentage of the area occupied by the fast muscles. The speed component of power. According to Newton's second law, the greater the voltage (force) applied to a mass, the greater the speed at which the mass moves. Thus, the force of contraction of a muscle affects the speed of movement: the greater the force, the faster the movement. Sprinter running speed depends on two factors: the magnitude of the acceleration (running speed) and the maximum speed. The first factor, sporting, determines how fast the running speed increases. For short distances in running (10-15 m), it is very important for sports that require maximum speed of movement from one position to another. For longer distances, the maximum running speed is more important than the magnitude of the acceleration. If an athlete has a high level of both factors of speed, it gives him a great advantage in sprinter distances. These two factors of running speed are not related to each other. Acceleration is slow in some athletes, but they have a large maximum speed, while
others, on the contrary, have a high acceleration, and a relatively small maximum speed. is calculated.

REFERENCES

10. Шукруллаев Ж.М. Ўқувчи ёшларни волейбол спорт турига танлаб олишнинг методик хусусиятлари. ACADEMIC RESEARCH in EDUCATIONAL SCIENCES. №1. 2020 2-октябр.


14. Утенбергенов А.К. Общие физиологические принципы физического образования и спорта. Европейский журнал молекулярной и клинической медицины, 2020, том 7, выпуск 9, страницы 2366-2371

15. Шукруллаев Журабек Максадбаевич. Кластер ёндашув асосида волейболчиларнинг жисмоний кўрсаткичларини ривожлантириш. Халқ таълими. № 5 2021 йил 57-59-бет.

16. Утенбергенов А.К. Шукруллаев Ж. М. PRELIMINARY STAGES OF DIDAKTIKS IN THE PROCESS OF AKMEOLOLOGIKAL APPROACH TO VOLLEYBALL SPORTS. 28-31. METHODICAL RESEARCH JOURNAL.