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COMPARATIVE ANALYSIS OF STATIC AND DYNAMIC STRETCHING: THE EFFECT OF PRE-TRAINING PROTOCOL ON VERTICAL JUMP HEIGHT AND IMPACT VELOCITY

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Abstract. This article studies the effects of static and dynamic stretching exercises on the physical performance of athletes based on a comparative analysis. During the study, the effects of stretching protocols used before training on vertical jump height and impact velocity were scientifically evaluated. It was found that static stretching, while providing muscle relaxation, can in some cases reduce explosive power indicators. Dynamic stretching, on the other hand, is noted to improve jump and impact velocity by increasing muscle activity and preparing the neuromuscular system for training. The article substantiates that the correct selection of stretching methods during sports training is an important factor in increasing sports performance and reducing the risk of injuries. The results of the study are of practical importance for coaches, athletes, and physical education specialists.
Keywords: static stretching, dynamic stretching, vertical jump, impact velocity, training protocol, sports physiology, muscle activity, explosive power, sports training, physical load.

In the modern sports training system, pre-training exercises are one of the most important factors that directly affect sports results. In particular, stretching exercises are widely used to activate the functional state of muscles, reduce the risk of injuries and maximize the athlete's physical capabilities. Stretching exercises serve to increase the elasticity of muscles and tendons, expand the amplitude of joint movements and prepare the body for the main physical load. Currently, static and dynamic types of stretching are the most commonly used methods in sports practice. However, scientific views on the effect of these methods on sports results differ, and this issue is being studied as one of the current topics in sports physiology and sports pedagogy. Static stretching is based on keeping the muscle stretched in a certain position for a long time, and mainly serves to increase muscle relaxation and flexibility. This method is considered effective in the post-workout recovery process. However, some studies have shown that prolonged static stretching exercises before training can temporarily reduce the explosive power of muscles. This is especially important in sports that require vertical jumping, fast running, or powerful impact. Because excessive muscle relaxation can negatively affect the activity of the neuromuscular system.

Dynamic stretching, on the other hand, is performed on the basis of active movements, gradually preparing the muscles for high-amplitude movements. This method accelerates blood circulation, increases body temperature, and activates the central nervous system. For this reason, many coaches recommend using dynamic stretching before training or competition. The effectiveness of dynamic stretching is highly appreciated, especially in sports that require explosive power, speed, and coordination. Indicators such as vertical jump height and impact velocity are one of the main criteria reflecting the level of functional training of an athlete, and

studying the effect of stretching protocols on these indicators is of great scientific and practical importance[1].

In sports practice, there is no single opinion on which type of stretching should be used before training. Some coaches emphasize that static stretching protects muscles from injuries, while others note that dynamic stretching is more effective in improving sports results. Therefore, it is important to conduct a scientific comparative analysis of the advantages and disadvantages of these two methods. In particular, determining the effect of stretching exercises on indicators such as vertical jump height and impact velocity is of great theoretical and practical importance in developing optimal training protocols for athletes.

This article will provide a comparative analysis of the effects of static and dynamic stretching exercises on the physical performance of athletes, in particular, on vertical jump height and impact velocity. It will also highlight the impact of properly organizing pre-training stretching protocols on sports performance.

In the system of sports training, pre-training preparatory exercises play an important role in forming the functional state of the athlete. Stretching exercises are widely used, in particular, to activate muscle activity, increase joint mobility and reduce the risk of injuries. Static and dynamic types of stretching are the most commonly used methods in modern sports practice, which have different effects on the athlete's physical capabilities. In recent years, the effect of these types of stretching on such indicators of explosive strength and agility as vertical jump height and impact speed has become a separate object of research in sports physiology.

Condition	Vertical Jump (cm)	Strike Speed (km/h)	% Performance Change
Baseline	50	120	0%
Static Stretching	48	115	-4%
Dynamic Stretching	54	128	+7–8%

Static stretching is based on holding a muscle in a stretched position at a certain amplitude for several seconds. Typically, these exercises are used to increase muscle elasticity, reduce muscle tone, and improve the recovery process. In athletes, static stretching increases the flexibility of muscles and tendons and expands the amplitude of movement. Static stretching is especially important in sports such as gymnastics, ballet, figure skating, and martial arts. Because these sports require high-amplitude movements. However, scientific studies have shown that prolonged static stretching before training can temporarily reduce the explosive power capabilities of muscles. This is explained by a decrease in the neuromuscular activity of the muscles. When the muscle is too relaxed, its ability to contract quickly decreases. As a result, the athlete cannot show maximum results when performing vertical jumps or powerful kicks. Especially in sports such as volleyball, basketball, and football, vertical jump is one of the important factors determining the result of sports. Therefore, the issue of using static stretching before training is a subject of various debates among sports experts[4].

Dynamic stretching, on the other hand, is aimed at gradually preparing the muscles for a working position using active movements. In these exercises, the athlete performs shaking, rotating and actively stretching movements of the legs and arms at different amplitudes. Dynamic stretching activates blood circulation in the body, increases muscle temperature and

prepares the neuromuscular system for an active work mode. Therefore, many coaches recommend using dynamic stretching before competitions and intensive training.

The main advantage of dynamic stretching is that it does not weaken the ability of muscles to contract quickly. On the contrary, the muscles become active, and the athlete's explosive power indicators improve. Since the height of the vertical jump also depends on the explosive power of the muscles, after dynamic stretching, athletes improve their jumping results. In addition, in sports such as football, taekwondo, karate and boxing, the speed of the impact also depends on the rapid activity of the muscles. Dynamic stretching can also increase the force and speed of impact, as it increases the speed of muscle reaction[5].

The vertical jump is one of the main criteria for assessing the strength of the lower body muscles of an athlete. Jump height is closely related to the explosive strength of the thigh, calf, and gluteal muscles. Studies have shown that athletes' jump height increases when they perform short-term dynamic stretching exercises before training. This is due to improved blood circulation in the muscles, acceleration of nerve impulses, and the activation of the muscles. Static stretching, on the other hand, increases muscle elasticity, but in some cases can reduce jump height.

The speed of the blow is also one of the important indicators reflecting the technical and physical fitness of the athlete. The speed of the blow depends not only on muscle strength, but also on neuromuscular coordination. Especially in sports such as martial arts and football, the fast and accurate execution of the blow is of great importance. Dynamic stretching activates the muscles and increases the activity of the central nervous system. As a result, the muscles contract faster and the speed of the blow increases. Static stretching, on the other hand, causes temporary relaxation of the muscles, which in some cases can lead to a decrease in reaction speed.

The effect of stretching exercises on sports results also depends on their duration and intensity. Static stretching that lasts too long leads to a decrease in muscle tone. Therefore, in modern sports practice, short static stretching lasting 10–15 seconds is recommended before training. Dynamic stretching is usually performed for 5–10 minutes based on active movements. This helps to optimally activate the muscles[6].

From the point of view of sports physiology, dynamic stretching helps to accumulate elastic energy in the muscles. This is especially important in jumping and striking movements. Muscles and tendons store elastic energy and then convert it into explosive movement. As a result, the athlete can jump higher or hit harder. In static stretching, excessive muscle relaxation can lead to a decrease in elastic energy.

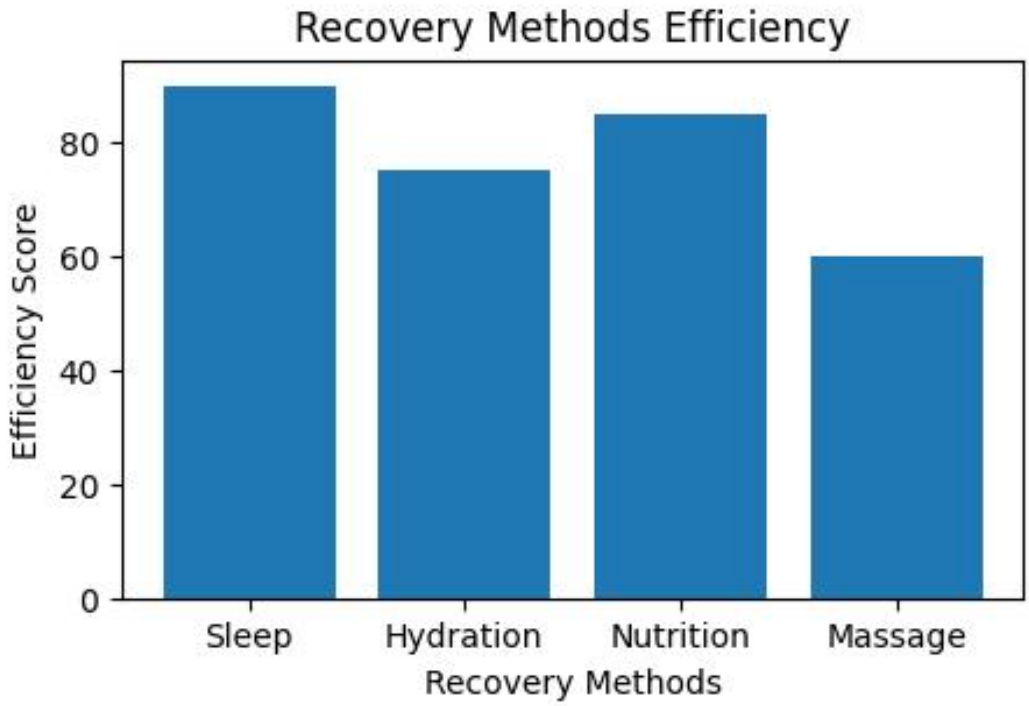
The effectiveness of stretching protocols also varies depending on the type of sport. For example, in gymnastics and dance sports, flexibility is a key requirement. Therefore, the proportion of static stretching is high. In football, basketball and volleyball, dynamic stretching is used more often, since speed and explosive power are important. In martial arts, the complex use of both types of stretching gives good results.

Improper organization of stretching exercises before training can have a negative effect on the athlete's body. Stretching that is too strong or prolonged causes microtraumas in the muscles. In addition, excessive muscle relaxation also affects the quality of technical movements. Therefore, stretching exercises should be selected based on the athlete's age, level of preparation and the nature of the sport.

Coaches and sports specialists should use an individual approach when developing stretching protocols. Each athlete has different muscle elasticity, physical fitness and recovery ability. Therefore, some athletes may show high results even after static stretching, while others, on the contrary, experience a decrease. The most effective stretching method for an athlete can be determined through individual monitoring.

Modern studies also evaluate combined stretching protocols as effective. In this case, a short static stretch is performed at the beginning of the workout, and then the muscles are activated with dynamic exercises. This method helps to maintain flexibility and not reduce the explosive power of the muscles. This approach is especially effective for professional athletes[5].

Stretching exercises are also important from the point of view of sports psychology. Dynamic stretching brings the athlete into a mentally active state, increases motivation and prepares for the competition. Static stretching, on the other hand, has a calming effect and helps the muscles relax. Therefore, when choosing stretching protocols, it is necessary to take into account the psychological state of the athlete.



In general, static and dynamic stretching are important components of the sports training system. Their effect on vertical jump height and impact speed varies, depending on the type of sport, the purpose of the training and the individual characteristics of the athlete.

While dynamic stretching is more effective in increasing explosive power and agility, static stretching is an effective tool in the process of flexibility and recovery. Therefore, the scientific and comprehensive use of these two methods in modern sports training is an important factor in improving sports results.

References

1. Salomov R.S. Jismoniy tarbiya nazariyasi va uslubiyati. – Toshkent: O‘qituvchi, 2012. – 297 b.

2. Salamov R.S. Jismoniy tarbiya nazariyasi va uslubiyati (darslik). – Toshkent: Ilm Ziyo, 2015. – 296 b.

3. Kerimov F.A. Sport trenirovkasi nazariyasi va uslubiyati. – Toshkent: Ilm Ziyo, 2018. – 312 b.

4. Goncharova O.V. Yosh sportchilarning jismoniy sifatlarini oshirish. – Toshkent: O‘qituvchi, 2005. – 176 b.

5. Xonkeldiyev Sh.X. Jismoniy tarbiya nazariyasi va metodikasi. – Toshkent: Fan, 2014. – 240 b.

6. Abdullayev A., Xoldorov T. Sport mashg'ulotlari nazariyasi va amaliyoti. – Toshkent: Cho‘lpon, 2016. – 284 b.

7. Karimov Z.T. Yengil atletika va sport tayyorgarligi asoslari. – Toshkent: O‘zbekiston, 2017. – 198 b.

8. Yusupov M.M. Sport fiziologiyasi asoslari. – Toshkent: Ilm ziyo, 2019. – 265 b.

9. Utegenov J.J. (2026). FORMATION OF A HEALTHY LIFESTYLE FOR WOMEN LIVING IN UNCOMFORTABLE CLIMATE CONDITIONS OF THE ARAL SEA REGION THROUGH PHYSICAL-MASS SPORTS EVENTS. International Multidisciplinary Journal for Research & Development, 13(03), 458–41. Retrieved from https://www.ijmrd.in/index.php/imjrd/article/view/5335