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Original article

Effect of different warm up protocols (deep feelings, massage, dynamic traction) on different levels of blood lactate and anaerobic power of athlete students

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Abstract

The aim of this study is to investigate the effect of different warm-up protocols (deep feelings, massage, dynamic traction) on different levels of blood lactate and anaerobic power of athlete students. The present study was quasi-experimental, with pre and post-test design and a control group and also three experimental groups. After announcing, 36 students who have had at least three years of professional sports experience were chosen among qualified students and they were set randomly in four groups of deep feelings, massage, dynamic traction, and control. Wingate test was used to measure anaerobic power. The 894E Monark performed the test Ergo medic as a Wingate test. The blood lactate of the participants of each group were measured in separate sessions using the German Scott Lactometer (using hand blood sample). We used two methods of petrissage and testament in the massage group. In the deep feelings group, the 11+ protocol designed by FIFA to improve performance and prevent player injury was used to warm up and five major muscles (Quadriceps femoris muscle, Hamstring, Hip flexor muscle, Hip Extensor muscle, Ankle Extensor) were stretched. The results show that there was a significant difference between the results of an anaerobic power test and blood lactate in those four groups. Based on the Tuki test and attention to the mean of post-test records compared to the pre-test, the two groups of dynamic traction and deep feelings compared to the control group had significantly welled performance in anaerobic power and blood lactate (P<0/05) and there was no significant difference in the massage group compared to the control group (P>0/05). As a result, it can be said that all three methods of warming up including dynamic traction, massage, deep feelings improve the performance of the participants in the anaerobic power and blood lactate test compared to the control group and performing the students of deep feelings and dynamic traction group in terms of anaerobic power and blood lactate is better than massage group.

Keywords: Warm-up protocols, deep feelings, massage, dynamic traction, blood lactate, anaerobic power

Introduction

Success in any sport requires specific physiological and physical abilities. Since most sports require short-term, fast-paced activities with maximum power efficiency, improving physical strength is a key factor in the success of many champions. Scientific experience shows that athletes need to warm up before engaging in strenuous and severe sports and participating in competitions through the use of basic physical activity

to increase heartbeat, increase body temperature and activate energy production systems with the aim of gaining more points.

Many different warm-up methods were invented and developed (1). In some sporting events where explosive power and maximum power have a particular importance, the level of these factors play a decisive role in the performance of the athletes, so warming up in such activities is more important (2). Warming up is one of the ergogenic aids that improve muscle function by increasing temperature, muscle energy metabolism, increasing the elasticity of tissue and peripheral blood flow and improving the function of the nervous and neuromuscular recall of motor units (3,4). Stretching is one of the warm-up methods that has been used from past until now to improve athletic performance (5).

Recent research has shown that static stretching before anaerobic events such as maximum power generation, strength, power, vertical jump, fast running, agility and reaction time, reduces performance (6) versus dynamic traction while having the properties of static stretching in injury prevention, facilitates the production of explosive energy and increases performance through increasing neuromuscular activity (7).

Accordingly, in recent years, the use of dynamic traction in the warm-up program has increased. We also use other methods such as massage and deep feelings exercises as other methods of warming up. We have described massage as a method of body tissues, with rhythmic pressure and trauma aimed at increasing health and creating a good feeling. Massage has soothing and stimulating properties that can be considered as a potentially effective factor in the performance of an athlete in some different situations, such as before, during and after a workout or competition (8).

In their research, (5), noted that shorter periods of dynamic traction don't have a detrimental effect on performance, and longer periods of dynamic traction improve performance. In fact, the longer the period of dynamic traction, the more positive the effects. (9), also showed in his research that the use of dynamic traction when warming up, increases performance; so the researcher suggested that the combination of dynamic traction with the warm-up program may be beneficial in athletic performance. Although many believe that lactic acid is responsible for fatigue and exhaustion in all sports, it should be noted that this substance accumulates only during very intense and short-term muscle activity within the muscle fibers (10).

Physical fitness, especially warming up for a race or workout, is one of the most important things which scientists have studied about its effect on blood lactate concentrations. (11), came to this conclusion that the selected program of warming up for 10 and 15 minutes has caused a significant increase in blood lactic acid among male students in physical education at Tehran University. Also, the results of Ayoubi and his colleagues' research show that immediately after plyometric exercises, the level of CK serum activity in the groups of massage, dynamic traction and control increased significantly. The level of CK activity returned to baseline level 48 hours after the workout, except for the massage group, but in the massage group, it was significantly higher than the baseline level. There was no significant change in the level of LDH serum activity of the groups (11). Regarding the intensity and duration of warm-up, it is said that warm-up should be such that it increases the general and deep temperature of tissues and muscles, provided that it does not cause fatigue to athletes, because the purpose of basic workout is to prepare the athlete for strenuous exercise (12).

Therefore, it can be said that choosing the warm-up method is effective in the effect on the amount of strength, endurance, and agility, especially blood lactate concentration. Considering the importance of the effect of warm-up type and time on the indicators of readiness and endurance and the reactions to the physical characteristics of athletes, the present study seeks to investigate the effect of different warm-up protocols (deep feelings, massage, dynamic traction) on blood lactate concentrations and anaerobic power in athletic students.

Methodology

The present study was quasi-experimental, with pre and post-test design and a control group and also three experimental groups. After announcing, 36 students who have had at least three years of professional sports experience were chosen among qualified

Table 1. Average and standard deviation of general characteristics of research participants

Variable	Group			
	Control	**Massage**	**Deep feeling**	**Dynamic traction**
Age	23.14±1.4	2.68±1.7	22.45±0.89	23.05±0.92
Height	170.21±4.1	171.12±3.7	168.94±2.9	170.61±4.2
Weight	68.14±4.7	70.68±6.1	69.45±5.2	71.05±4.6

students and they were set randomly in four groups of deep feelings, massage, dynamic traction, and control.

According to the PAR_Q health questionnaire, the participants did not have medical restrictions to participate in sports activities. In addition, the participants had regular and organized workout programs in six months leading up to the research time and they did not have any injuries in the lower limbs. Participants then completed a written consent form for participating in the study. The height and weight of the participants were measured with a wall height gauge with an accuracy of half a centimeter and a digital balance with an accuracy of one-tenth of a kilogram, and then the body mass index was obtained. We measured the participant's blood lactate of each group in separate sessions using the German Scott Lactometer (using hand blood sample).

Finally, the anaerobic power and blood lactate concentration of the volunteers were measured in two sessions with a time interval of 48 hours, so that in the first session, after 5 minutes of running, the anaerobic power and blood lactate of all participants were measured. Then in the second session, the participants of three experimental groups performed the anaerobic test and lactometer test again after 15 minutes of specific warm-up. Each test was repeated three times and we considered the best record for anaerobic power and blood lactate as the well _being of the participants.

Anaerobic power test

The 894E Monark performed the test Ergo medic as a Wingate test. The athletic students first performed a warm-up operation on the bicycle for 5 to 10 minutes. Then, with the alarm sound (it is tested for 30 seconds) independent of the rotation speed of the pedal, and according to its weight, the maximum power is calculated based on the maximum cadence that the person has achieved.(24)

Deep feelings protocol

Deep feelings group used the 11+ protocol designed by FIFA to improve performance and prevent player injuries. This protocol includes 27 types of exercises, of which we chose 11 exercises with 10 to 15 seconds of rest between each movement based on the practice feature, to be equal to other groups in terms of warmup time. These exercises include running forward, turning the thigh inward, running in a zigzag pattern, running fast back and forth, one fixed leg, alternating legs alternately, Hamstring interventions, standing balance on one leg, squat with lifting, vertical jump and jump In different directions.

Msssage protocol

In the massage group, we used two methods of petrification and testament, which were performed by two massage instructors. We performed the massage on the posterior lower limbs for 10 minutes and on the anterior lower limbs for 5 minutes. The posterior and anterior lower extremity massages applied to the Gluteal muscles and Hamstring muscles, respectively, and also to the back of the leg and front of the thigh. Participants received posterior lower limb massages while lying in the supine position and anterior lower limb massages while lying in the open arch position. The total duration of the massage was 15 minutes (3).

Dynamic protocol

After 5 minutes of soft running, the group stood up and, according to the instructions of Hoogh and

Yamaguchi (13), performed dynamic traction movements with 15 repetitions, each of which was performed for two seconds. Five major muscle groups (Quadriceps femoris muscle, Hamstring, Hip flexor muscle, Hip Extensor muscle, Ankle Extensor) were stretched (4,13).

As on the first day, the control group did not perform any special workout program and after 5 minutes of soft running, they performed the physical fitness test (just as other groups did). Descriptive statistical methods were used to describe the data. The normality of data distribution was investigated by Shapiro's WILK test and the Lone test was used to test the homogeneity of variances.

Considering that the data have the distribution of naturalness and homogeneity of variances were also established, so to investigate the effect of the independent variable on dependent variables, one-way statistical analysis of variance test and Toki follow-up test was used. All SPSS software version performed statistical tests 22 and the significance level of the tests was P<0/05. We should note that before performing the statistical test, first the difference between the post-test scores and the pre-test scores of the volunteers was obtained in all the variables studied, and then the goat data were used to perform the variance analysis test.

Results

Based on the results of the statistical test, there was a significant difference between the results of the anaerobic power test (P=0/0001) in four groups. Based on the results of Tuki research test and considering the average post-test records compared to the pre-test, the two groups of dynamic traction and deep feelings compared to the control group performed significantly better in this test (P=0/006, P=0/002) and no significant difference was observed in the massage group compared to the control group (P=0/61) Also, the anaerobic power test record was significantly better in the dynamic traction group and the deep feelings compared to the massage group (P=0/04, P=0/02) and there was no significant difference between deep feelings and dynamic traction groups.

Also, based on the results of the statistical test, there was a significant difference between the results of the blood lactate test (P=0/0001) in four groups. Based on the results of the Tuki follow-up test and attention to the mean of post-test records compared to the pre-test, the two groups of dynamic traction and deep feelings compared to the control group performed significantly better in this test (P=0/0001, P=0/001) and no significant difference was observed in the massage

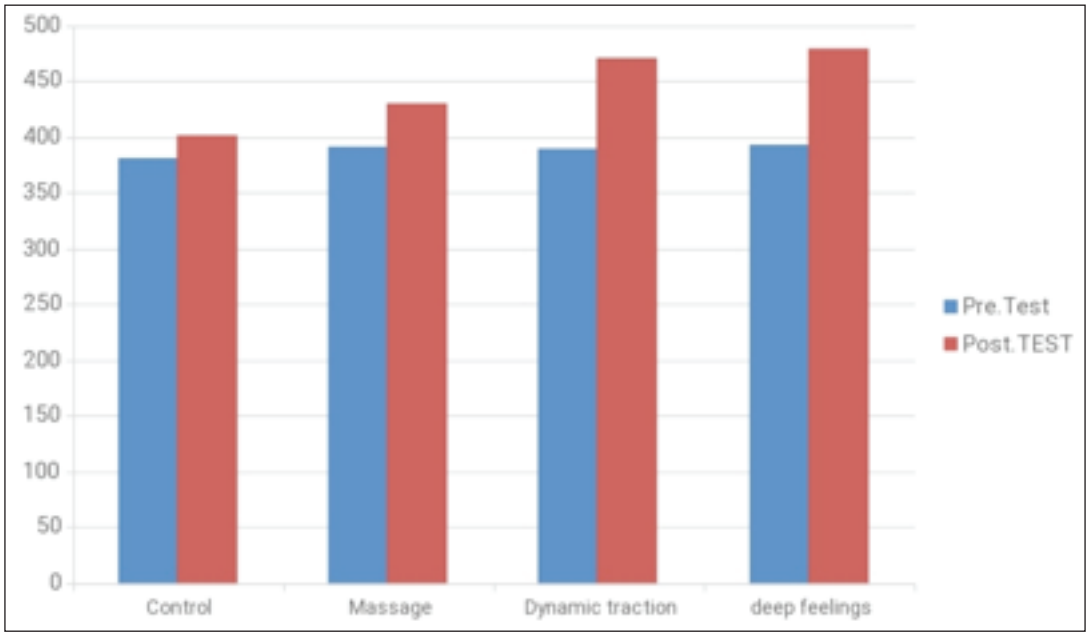

Figure 1. Intergroup comparison of the difference between the mean of pre-test and post-test anaerobic power

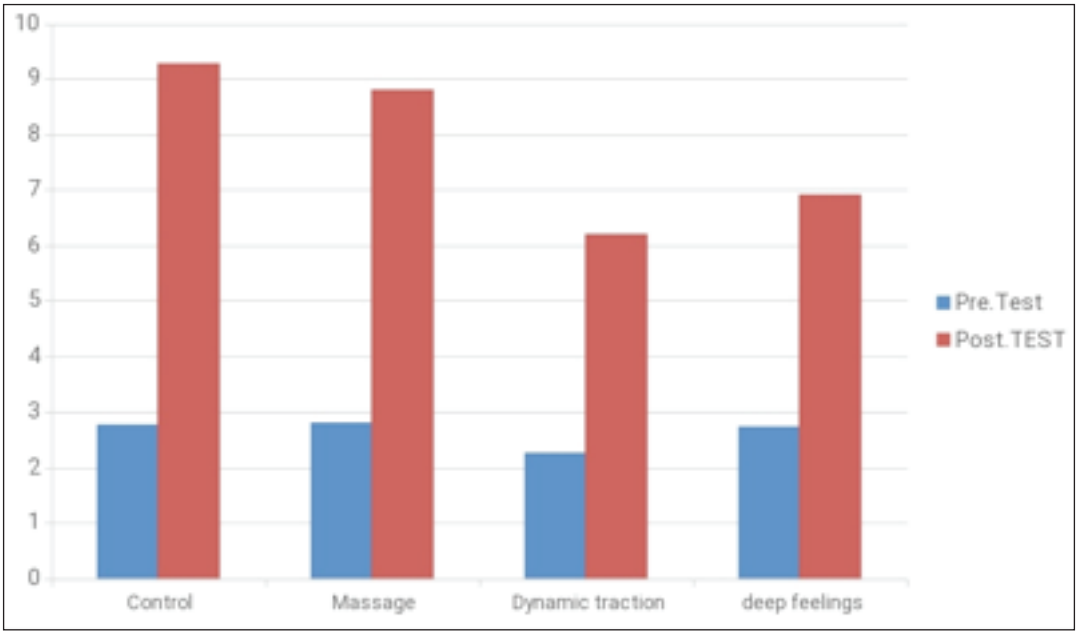

Figure 2. Intergroup comparison of pre-test and post-test blood lactate mean differences

group compared to the control group (P=0/32). Also, the blood lactate test record was significantly better in the dynamic traction group and the deep feelings compared to the massage group (P=0/007, P=0/009) and there was no significant difference between the deep feelings group and the dynamic traction group (P=0/43).

Discussion

The results of the present study showed that the anaerobic power of student-athletes increased significantly after warming up through deep feelings and dynamic traction. And there is no significant increase in the massage group. Also, there is no significant difference between the two groups of deep feelings and dynamic traction with the massage group. And the average difference in anaerobic power between the deep feelings and static traction groups is not significant. This means that the two methods of deep feelings and dynamic traction have improved the anaerobic power of athletic students.

However, there is no significant difference between the two methods. However, it can be said that in the deep feelings group, the anaerobic power test performed better than the control group and two other methods. Deep feelings cause a person's information about the state of joint movement and ultimately regulates muscle contraction to move the joint and strengthen .

The receptors for this sensation are in the muscular spindles and the lumbar, ligaments, joints, and skin and information are transmitted through thick-walled myelin fibers whose cell body is located in the dorsal roots of the spinal cord (14). Starting a workout session with deep feelings exercises stimulates the nerve receptors and helps the person benefit from the reflection of these exercises. This reflection justifies the increase in productive force in activities that stimulate muscle spindle receptors before we perform them. The deep feelings exercise in this study included some 11+ exercises. The design of these exercises is such that includes the properties of dynamic traction exercises, strength, balance power and central body stability exercises (15). Therefore, a multifaceted warm-up program is expected to improve physical performance.

There are some mechanisms for the optimal effect of deep feelings exercises on the results of an anaerobic power test. One of these mechanisms is the increase

in intramuscular temperature. Although in the present study there was no device to measure muscle temperature, because deep feelings exercises in the present study included running and jumping and zigzag movements, and in general had high-mobility movements, therefore, it is not unreasonable to expect that participants in the deep feelings group experienced a greater increase in body temperature during the movement than in the massage and dynamic traction group.

In a study by (16), we have suggested an increase in muscle temperature because of warming up as a factor in increasing athletic performance. Therefore, according to the results of previous studies and because the increase in intramuscular temperature after deep feelings exercises, increases the transmission of nerve impulses, rate of energy production, releasing of high-energy phosphates, this can be considered a possible factor in further improving the performance of the participants of the deep feelings group (15).

Another mechanism is increasing nervous activity. Increasing neural activity involves two mechanisms called PAP1 and 2 PSD2. Secondary activation to increase strength after contractile activity (PAP) is a type of neural awakening, and by increasing and releasing calcium in muscle fibers and increasing phosphorylation of light chain regulatory myosin, it increases the binding cycle of myosin transverse bridges with actin and increases power generation, especially the speed of development (15).

Concluded that this nervous awakening had a greater effect on the sharp muscle fibers. Regarding that the sharp muscle fibers play an important role in the performance of anaerobic power in energy production, the deep feelings warm-up are more affected by this phenomenon(17).

The second most likely neurological mechanism is an increase in the PSD phenomenon, which is an increase in the posterior spinal nerve root activity after muscle contraction, which increases neural proliferation and, consequently, facilitates neural outputs, thereby increasing energy production (18). We can consider these mechanisms for the positive effect of deep feelings, exercises on muscle strength as an important factor.

One factor that increases athletic performance is proper muscle sequence, which corrects deep feelings exercises, the order in which muscles and joints are involved in activities, and thus increases the performance of athletes (19) and Daneshjo (20) and Pasanen (21) also showed in their studies that the deep feelings warm-up program has been effective in increasing the performance ability of athletes, which is consistent with the results of the present study (21, 20).

One result of the present study was a significant increase in blood lactate immediately after the three warm-up methods, but the rate of change in the dynamic traction and deep feelings groups was significantly lower. These results are consistent with the results of a study by (22), that showed a lower lactate accumulation in active warm-up compared to inactive warm-up. have reported similar results in the warm-up group after strenuous exercise on the ergometer bicycle. In contrast, (23) did not find a significant difference between the effect of dynamic traction and other methods in examining the effect of warm-up protocols on blood lactate. (11) compared the 10 and 15 minutes warm-up programs and reported a significant increase in blood lactate in both groups after strenuous exercise.

Conclusion

As shown in this study, dynamic traction and deep feelings, which are more active warm-up methods than massage, can lead to a lower increase in blood lactate. According to Brunger Ziegler (22), the increase in muscle temperature after active warm-up potentially shows an increase in the blood flow to the working muscle and thus an increase in the share of energy metabolism at the beginning of the exercise. Lactate-less blood responses observed during active warming up may also be associated with lactate withdrawal. Another plausible explanation may be the dilating effect of the arteries by actively warming up and overcoming capillary resistance, which speeds up blood flow to the working muscle by reducing vascular resistance.

Overall, the results showed that all three warm-up methods including massage, dynamic traction, and deep feelings improved the performance of participants in the anaerobic power test and blood lactate test compared to the control group. One limitation of the present study was the lack of access to larger sample sizes. Therefore, it is recommended that in future

studies, the present research protocol be implemented in a larger sample size to get more accurate results. But based on the results of the present study, to achieve better performance of student-athletes, depending on the place and time of activity or competition, deep feelings and massage methods can be used to warm up before the competition. For example, before the race, when there is time and space to warm up, you can use deep feelings to warm up and increase athletic performance. However, during periods between two halves or two sets or workout breaks where there is no time and place to warm up, massage can be used to warm up and increase athletic performance.

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