

## The effect of one session massage in the lower limb muscle on flexibility, power and agility tests performance in soccer players

Mostafaloo A<sup>\*1</sup>

Received: 05/02/2011

Revised: 08/07/2011

Accepted: 12/20/2011

1. Islamic Azad University, Minoodasht Branch, Minoodasht, Iran

Journal of Jahrom University of Medical Sciences, Volume 10, Number 2, Summer 2012

J Jahrom Univ Med Sci 2012; 10(2):16-21

### Abstract

#### Introduction:

This study aimed to determine the effect of one session massage of the lower limb on flexibility, power and agility performance tests.

#### Materials and Methods:

For this purpose, 15 soccer players (age  $23.5 \pm 2.4$  years, height  $170.5 \pm 3.3$  cm, weight  $65.5 \pm 6.0$  kg) were selected randomly to participate in this study. The subjects performed the Sit and Reach, Toe-Touch, Vertical Jump and 4×9 tests in two stages before and after the massage. They warmed up themselves by 5-min jogging before testing. Massage was performed on the lower limbs in both Petrissage and Tapotement methods for 15 minutes. Each test was performed three times and the best record was accepted. To determine the effect of massage on each performance test, the mean values in the pre- and post-tests were analyzed by paired t-test at  $P < 0.05$  level of significance.

#### Results:

Results showed a significant increase in flexibility tests records by  $7.8 \pm 6.3\%$  and  $7.9 \pm 5.1\%$  for Sit and Reach and Toe-Touch tests, respectively ( $P < 0.05$ ). However, the record of Vertical Jump and 4×9 tests had no significant change.

#### Conclusion:

In general, if massage can improve the muscle length without any adverse effects on power and agility muscle performance, this hypothesis can, therefore, be proposed that acute massage is a better technique for warming up before a power or agility event compared to other techniques that reduce power and agility muscle performance.

**Keywords:** Massage, Flexibility, Athletes

motion (ROM) in one or more body joints which can be increased by stretching the soft tissue surrounding the joint. Flexibility is an important factor in most athletes and can significantly increase the

#### Introduction:

Satisfactory daily activities and athletic abilities without experiencing early fatigue require fitness and flexibility. Flexibility can be described as a range of

\* Corresponding author, Address: Islamic Azad University Minoodasht Branch, Minoodasht, Golestan province, Iran  
Post cod: 36497-49816

extremities massage on boosting, speed, and flexibility.

Flexibility has been demonstrated as a ability to move freely in different direction and sometime, amplitude of the ROM in one or a group joints. Testing the flexibility is possible by many ways. In the direct method, static equipment such as goniometer, electro-goniometer and Linton's flexibility scale are used. Sometime the flexibility or the hamstring muscles are tested by anterior and inferior flexion exercises. Nowadays, with different reasons, sport managers need to know their athletes fitness state by a routine protocol. The question is whether massage can be an effective way for improving flexibility, boost energy and specific abilities such as anterior and inferior flexion, vertical jumping and 4x9 running results. Thus, the aim of this study is to determine the effect of one session of lower extremity massage on flexibility, specific abilities.

### **Materials and Methods:**

#### **Subjects**

This study was a semi-experimental field survey. The study population, consisted of football players in the first division in Golestan provenience, Iran; which 15 players were randomly selected. Any subject with pain or trauma to the knee, ankle or thigh in both legs or any history of dislocation or fracture in lower extremities in the last 6 months, history of neurologic, rheumatologic, muscular or any other systemic illnesses such as cardiopulmonary diseases problems was excluded from the study. The subjects were encouraged to perform their best ability. The athletes were asked not to perform any heavy exercise in a 48 hour period before the study and do not consume anything except water.

#### **Information mastery**

All subjects were willingly included into the study and signed their consent prior to the study. All personal information was

abilities of any athlete. Having exercises regarding flexibility can increase the stretching ability of the muscle tendon units. Losing flexibility can result in non-harmonic movements and make the athlete prone to muscular injuries. Alter demonstrated that stretching exercises can decrease the severity and duration of tendon-muscle injuries in the joints and furthermore showed that 17 flexibility can prevent the athletes from injuries. Thus, higher flexibility is correlated with better movement and decreased sport injuries.

Athletes, managers and coaches believe that massage have an important role in treating the athletes during exercise. They also believe that massage have more effects such as increasing blood flow, reducing muscular tension, better feeling and neurologic stimulation which they are all based on personal experiences and observations. In fact, the belief that massage makes the athlete to perform better has been in the mind of sport workers for years, which they call it "muscle relaxation". Furthermore, they believe that massage can lower the non-active antagonist muscles' tension and increase flexibility. However, there are still debates regarding this issue. For example, Victorson-Muler et al have demonstrated that stretching exercise can increase joints ROM. However, Crossman et al have reported one session of hamstring massage can increase the non-active ROM in thigh and lower extremities' joints. Goodwin et al have also reported than controlled 15 minutes massages before warming-up do not have any significant difference in running activity. Hunter et al have demonstrated that lower extremity massage can reduce the Isokinetic force in using the muscles. McChaney et al have compared two types of massage on the foot plantar-flexors which both of them have effects on increasing the ROM in the ankle without any significant difference. Arabasi have also reported acute effects of lower

muscles; Kneading, wringing, skin rolling and pick-up-and-squeeze are the petrissage movements. They are all performed with the padded palmar surface of the hand, the surface of the finger and also the thumbs.

Tapotament massage: a rhythmic percussion, most frequently administered with the edge of the hand, a cupped hand or the tips of the fingers. . It is primarily used to "wake up" the nervous system and also as a stimulating stroke and can release lymphatic build up in the back and gently tap the shoulder of the client. Tapotement is a more stimulating movement in which the fingers, sides or palms of the hands produce light tapping or gentle slapping movements.

Anterior flexion test: in this task the subject are asked to sit and make their feet completely extended and their ankle in a 90 degree position off the wall; then they bend their back only by their vertebrae to put their hands as far as they can from their body on a scaled box hand hold their position for at least 2 seconds. They have to perform this task for 3 times and their best record will be recorded.

Inferior flexion test: in this task, the subjects have to stand on a box and try to bend their-selves and put their hands as far as they can straight though and hold the position for at least 2 seconds. They have to perform this task for 3 times and their best record will be recorded.

Vertical jump test: all subject put their hand into a white matter and mark their most-top reach on a wall while their heel in on the ground; then they jump vertically without any jogging had mark their hand on the wall again, the highest difference out of their 3 tries between the two marks will be recorded. Fox and Matthias have calculated a validity of  $R=0.78$  for this test.

4x9 running test: all subjects were asked to carry a wooden block in a dimension of 5x5x10 cm in a 9 meter distance for 2 times back and forth. The time was measured by a manual chronometer.

entered into a checklist. All the examination were performed in Minoodasht Unit of Azad University's laboratory anthropometric data such as weight and height were measured by a digital scale and routine wall scales. The flexibility was also measures by anterior and inferior flexibility boxes and specific charts for vertical jumps and chronometer for back and forth 4x9 running exercises. Before all tests, all subjects had a 5 minutes jogging warm-up.

### Test protocol

Frist, all subjects were informed about anterior and inferior flexibility and its specific boxes, vertical jumps and its spotted charts and back and forth 4x9 running exercises. Then the protocol was taught to all subjects and they were free to examine the tests for several times. Them all of them were asked to perfume each task for 3 times and their best record was recorded. All subjects had to close their eyes and for best performance and reducing the effect of the soft tissues, a 30 second gap was included between each task.

In the massage part if the protocol, both deep and touching type of massages were included. A duration of 10 minutes for posterior muscles and 5 minutes for anterior muscles were designed for the massage. The massages were performed on gluteus, Hamstring, posterior leg, quadriceps, and muscle between ankle and thigh, respectively. Therefore, the time for posterior part was longer. The massages were performed on both legs synchronically and the massagers used liquid massage oils during the massage. All subjects were laying prone during the posterior massage and supine for the anterior massage. After the 15 minutes of massage, all subjects were asked to perform the tasks one more time with the same situation as the first ones.

Petrissage massage: which are massage movements with applied pressure which are deep and compress the underlying

suitable, we tested pre-test post-test observation by paired samples t-tets by SPSS version 16. A P value less than 0.05 was considered as significant.

### Results:

Before performing data analysis, the variables were checked for normal distribution. K-S test reviles that all variables are distributed normally, thus we used paired t-test fro or comparison.

For describing the results, we used mean and standard deviation in most of the variables. Also Kolmogorov-Smearnov (K-S) test were used to check the normality of the variables distribution. As

Mean age of the players were  $22.5 \pm 2.4$  years their mean height was  $170.5 \pm 3.3$  cm and their mean weight was  $65.5 \pm 6.0$  kg. The test records before and after the massages are demonstrated in table 1.

Table 1: The mean and standard deviation of test records before and after massage and their change percentage

	Before Massage	After Massage	Changes in %	P
Anterior flexion	$38.8 \pm 13.8$	$41.3 \pm 14.1$	$7.8 \pm 6.3$	1
Inferior Flexion	$36.7 \pm 12.2$	$39.3 \pm 12.6$	$7.9 \pm 5.1$	0.001
Vertical jump height	$47.2 \pm 6.2$	$48.3 \pm 4.1$	$1.5 \pm 4.8$	0.932
back and forth 4x9 running	$8.22 \pm 0.13$	$8.22 \pm 0.19$	$0.02 \pm 1.6$	0.969

Regarding the results, anterior flexion were increase by 7.8% (CI: -2.4 – 21.4) which was significantly different. inferior flexion were also increase by 7.9% (CI: 0-22.7%) which was also significantly different comparing by before the massage.

However, vertical jump increased from 47.6 to 48.4 cm (1.5%) which was not significant due to high Standard deviation (SD = 4.8). furthermore, the running test results did not differ significantly.

### Discussion:

Our results demonstrated that a 10 minute massage can increase the flexibility (anterior and inferior flexibility) in the athletes; however, running and jumping tests did not differ significantly after the massage.

Regarding the facts, all athletes need a warm-up stage before any sport activity for improving their physiological, biomechanical and psychological performance. However, sport managers do not know yet, which protocol can be better, but as a rule, mostly all coaches

prefer jogging and static stretching tasks as a warm-up phase.

Our results had obvious deviation regarding other studies; Crossman et al have reported one session of hamstring massage can increase the non-active ROM in thigh and lower extremities' joints. Furthermore, McChaney et al have compared two types of massage on the foot plantar-flexors which both of them have effects on increasing the flexibility of the ankle. In the other hand, Hunter et al have demonstrated that lower extremity massage can reduce the Isokinetic force in using the muscles.

Guats et al demonstrated that petrissage and tapotament massage have different effects on soft tissues and it is expected that touching massages have better effect. We have noted that petrissage massage increases the lymph and venous drainage which can export the metabolites into the bloodstream and helps the muscle to be relaxed more effectively. It seems that these factors can improve the muscle fiber and into the whole muscle and increase their flexibility by the means of petrissage massage. Furthermore, tapotament

massage can increase the sub-dermal stimuli and integrity. It is hypothesized that long touching time can impose a overstimulation on the skin receptors and confuses the CNS to provide a concise area for the end-stretching point, which has been published by Magnusson et al. They have demonstrated that the increase in ROM after to massages is mostly due to increased ability to confront the stretch instead of softening the tissue itself.

None of the running or jumping results differs after the massages. Similarly, Goodwin et al have demonstrated that massages do not have any effect on speed running. Harmer et al have also studied a 30 minute whole body massage on professional runners. Their results have also showed no significant difference in their paces. McChaney have also showed no difference in power after massages. Victorson-Muler have demonstrated that 6-15 minutes of petrissage massage can lower the power of the muscle if it aims to increase the relaxation of the muscle. Furthermore, Mikesky et al have also demonstrated that no massage can improve the ability to jump. The indifference results between jumping records before and after the massage oppose the results with static stretching in some studies. They have demonstrated that static stretching can improve power, jumping, balance, reaction time to and landing time. Young et al have showed

that static stretching can decrease the ability to jump. In this case, we can conclude that to improve the ability to jump, static stretching is a better way than massage in a short period of time, which is supported by our study; because we have demonstrated that massage cannot improve jumping abilities despite increasing their flexibility.

### Conclusion:

Our study showed that a 10 minute posterior and 5 minute anterior lower extremity massage may have negative effects on vertical jumping and 4x9 back and forth running tasks. However, it has positive effects on anterior and inferior flexibility. Further studies are needed to exhibit more precise and powerful results to be compared with our study.

Our study had some limitations. Low sample size and not the ability to control the diet, sleep and daily activity of the subject were the most notable limitations of our study. However our subjects were consisted of professional football players which have a regular 3 times a week training session which can influence our results. Furthermore other players may show different results. We recommend performing the similar study on different types of athletes in divided ages and genders which can result in more valuable information to increase the ability of the national athletes.

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