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Comparing the effectiveness of an eight-week period stretching PNF, and dynamic stretching on hamstring muscle flexibility

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ABSTRACT

The aim of this study was to investigate the effect of dynamic stretching and PNF (SRHR by static muscle contraction by 5 and 10 seconds), the flexibility of the hamstring muscles boys (18 to 24 years). For this purpose, 30 male students, a random sample of three groups (stretching dynamics 10 people, stretching PNF for the SRHR, with 5 seconds of contraction static muscle, 10 people, and stretching PNF for the SRHR, with 10 seconds of contraction static muscle, n = 10), were studied in groups of three, separately, for the first 8 weeks of strength training, dynamic, PNF (as SRHR, with 5 and 10 seconds, static contraction of the muscles) did. Before and after the training period, the pre-test and post-test, the samples were taken, the data using paired T-test for the three groups separately, and for each of the three groups, with each analysis variance, the significance level was analyzed 0/05. Consequently, in this study three methods of stretching, dynamic stretching and PNF (SRHR method with 5 and 10 seconds, static contraction of muscles), increase the flexibility of the hamstring muscles, and this difference is significant, there is no tension between the three methods.

Keywords: dynamic, flexibility, hamstring, PNF, stretching

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INTRODUCTION

Muscle flexibility, which is one of the main components of fitness, has long attracted the attention of sportsmen, athletes, physical education teachers, specialists, and rehabilitation was Physiotherapist [1]. Use stretching exercises to increase flexibility, typically based on the notion that exercise may help decrease the incidence, duration and severity of joint injuries, tendon or muscle Ay[1]. The stretching exercises to improve flexibility, an important part of any physical activity, is [2]. Increase range of motion (ROM), and flexibility makes prevention, sports injury and performance optimization, and optimal athletic performance is [3]. Traction Physiologically, by removing the effect of muscle skills, inflexible antagonist muscle groups, and rising temperatures Muscle-tendon units, due to increased local blood flow, and improve the elasticity of the muscle can exert a protective effect [4]. Field stretching technique is very important, because the body position during the stretch, and it's time to maximize the effects of stretching, MI. Pay special attention to stretching exercises to improve flexibility of the muscles of two joints, such as the biceps femoris of the hamstring muscle group is important. In many people, especially athletes and adults, lack the desired flexibility of the joints, and soft tissues of the body due to position, and the biomechanics of the body [5]. Despite the enthusiasm in the medical community and patients about the tension there, but there is still considerable debate about the ability to achieve these goals are [6]. Several methods include static stretching, dynamic neuromuscular facilitation, deep receptors (PNF) increase in range of motion have been shown [7]. Dynamic stretching is a technique which involves an impulsive move, jump or stretch is over, instead of maintaining the status as the static stretching is done, people frequently turn limbs into a state of tension and release should be identified. This technique uses the body moment, the range of motion in the joints occur. Dynamic stretching, stretching in response to reflection, to improve, to gain muscle fast is over, and the subject of many books, has been demonstrated [8]. Dynamic stretching, static stretching is apparently over, the flexibility of the hamstring muscles, is less effective e.g. Chan, et al.,2001). .vabrit Et al (1997), as Bonar et al (2004) also showed that, both static and dynamic stretching increase hamstring flexibility, and increase range of motion are. Some studies also showed that ballistic stretching is effective in rapidly increasing the length of the shortened muscles, but review articles show that the risk of provoking a dynamic method, and this method is not reliable [9]. Stretching exercises, PNF, due to a combination of maximum voluntary contraction static, passive elasticity, in addition to developing joint flexibility and range of muscle tension, increased strength, muscle endurance reducers [10]. According to Kent and Wes facilitate deep neuromuscular following, accelerating the spread or development of neuromuscular mechanisms through deep receptors [11.] A brief contractions before static stretching of a muscle-based approach facilitates deeper stretching, neuromuscular, in order to increase the flexibility of the form [12]. Aqania (1998), in another study, to evaluate and compare the effect of static and dynamic stretching on hamstring muscles and increase range of motion of the knee in adults payment. His first 36 people who have limited flexibility, hamstring muscles were purposively selected, and randomly divided into 3 groups of 12. The first method is static stretching, dynamic stretching of the second group, to practice, and the third group as control any activity, did. Group 1 and 2 for 30 days, and in two sessions, morning and evening, stretching exercises intended to pay, according to the results of pre-test and post-test using a statistical procedure T-TEST researchers showed that, the effect of both static and dynamic stretching techniques on hamstring muscles and increase range of motion at the surface (0/05%> P) is a statistically significant difference [13]. Bondi et al (1998) showed that, 30 seconds of static stretching, range of motion than dynamic stretching, more than double the increase [14.] Fland and Marin (2004), the effect of static contraction intensity (20 to 100%), the tensile method CRPNF, the development of the hamstring stretch, was investigated. 72 men with a mean age of 22.6 years, in four groups of 1 to 20% MVIC, 2 to 60% MVIC, 3 to 100% MVIC, and a control group. The subjects of groups 1 to 3, three pull CRPNF 6 seconds, with particular intensity, once a day for 5 days, did. The results showed that the increase in flexibility between the experimental groups did not differ, but were significantly higher than the control node. Thus, they concluded that the tension CRPNF, using submaximal contractions, the size of the maximum contraction in range of motion is good and risk of injury may be caused by stretching PNF, isometric maximum voluntary contraction, decrease [7]. Results of Schmidt et al (1999) showed that the effect of two periods of 6 and 12 seconds, the contraction of the stationary voluntary maximum flexibility Hamstring, despite the significant increase flexibility, both methods was not significant [15]. A number of studies have SRHR way, had done his research, and each has a different time, to keep the static Contraction (MVIC), have been reported [5]. As a result, the effective period of static contraction, this method should be investigated. If a shorter time MVIC, the same increase in range of motion (ROM), in comparison with a longer time to produce, coaches and athletes may spend less time in a way that is preferred. Therefore, in this study, the main question is which of the two methods of dynamic stretching, pnf stretching method (SRHR), which increases the flexibility of the hamstring

muscles, more effective.

MATERIALS AND METHODS

Thirty male students of Islamabad Gharb district, by test AKET (test opening on the knee), the hamstring muscles flex the non-dominant leg (knee active range of motion of opening non-dominant foot) were limited to less than 70 degrees, the subject were included in the study. Subjects were randomly assigned to three experimental groups static, dynamic and neuromuscular facilitation (PNF), the method (hold-relax) were used.

Measuring Tools

In this study, in order to measure the subjects' non-dominant leg hamstring muscle flexibility, open-test on the knee (AKET), was used by the test, the non-dominant knee active range of motion of opening each individual, by an oblique metal feet, the temperature was measured, and the non-dominant leg hamstring flexibility, were recorded. Measured way so that, subject to a flat, rigid surface to lay down, lie. Before running the test, the subject, the start of the test (ie, the non-dominant hip and knee to bend to 90 degrees), pretending to be three signs anatomical locations, including the outer ankles, feet, bones lat epicondyle femur, tibia and large bumps, Norma meter to measure, by touching the non-dominant leg, it was marked with a pen. Then for the start of the test, the subject's dominant foot by straps taped to the hip and pelvis, the anterior superior spines, the beds were closed, while the knee was completely flat. Then the non-dominant hip and knee to 90 degrees bent, and ankles were normal at 90 degrees of hip flexion, using the mid-axillary line, the great prominence of the femur, or thigh lat epicondyle, and 90 ° of knee flexion, the greater tuberosity of the femur, lat epicondyle of femur, ankle and foot by the external oblique m, set up, and by placing metal barrier in the anterior part of the thigh, the situation throughout the test, maintain time. In this situation, the subjects were asked to practice active open your knees, slowly and evenly, while the anterior part of the thigh was in contact with an obstacle, as far as possible do. At this point, the angle of the knee activation by bevel meters, using anatomical landmarks lat epicondyle of the femur (where the oblique axis m), and the large bumps in the femoral and external Ankle Foot (anatomical location, set Norma arms m) was measured, but at the time of registration results, 90 degrees of knee flexion (the start of the test) was considered as zero degrees, and the angle is then activated as the angle of the knee, or the flexibility of the hamstring muscles, the temperature was recorded

Practices implemented

After recording demographic characteristics, including height, weight and age. Active range of motion knee leg opening non-dominant or non-dominant leg hamstring flexibility, ie they enable the opening test of the knee (AKET), by Norma m was measured. After pre-test training for each group, the next day was started. Exercise five times a week, for eight weeks in all three groups. After eight weeks, all three groups of test subjects was conducted. At this point, the flexibility of the hamstring muscles, were re-evaluated. Between the final and last day of training, each group was considered a day away. It should be noted that the pre-test and post-test participants prior to implementation of any type of heating device or method, not used. They also recommended that, during the period of study abroad programs, research activities, particularly stretching exercises refrain.

Schedule a training session

In each training session, the subjects for 10 minutes (including 5 minutes of slow jogging, and 5 minutes of stretching and stretching movements), their bodies were warm. Dynamic stretching g The person sitting on the bed, and full contact with the board vertical feet down the bed, and fixed at the knees by Esling, the person was asked to, but do not put your hands on each other, on two occasions with an interval of two closely rest, thirty times the rhythmic forward and backward move. The front of the place where pain and tension in the hamstring and calf appear (e.g. Kisner. E.g. kelby, 2002).

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Group stretching PNF (SRHR)

Two groups stretching exercises, stretching SRHR-PNF (5 and 10 seconds maximum static contraction) in accordance with (1.3) and using the auxiliary did.

Table 1: Group PNF stretching program with SRHR)), (5 and 10 seconds, static contraction maximum), in a training session

Total repeating, at every turn	The number of replications in each	Rest time between each turn	Number of times (Set)
3	3	—	First and second weeks
6	3	1 minute	Third and fourth week
9	3	1 minute	The fifth and sixth weeks
12	3	1 minute	Week Seventh and Eight

Stretching exercises SRHR-RNF, in groups of two from a rescue, and following the protocol provided in Table 2 implemented.

Table 2: schedule different sections, one for each iteration of

Passive hamstring stretch by the supplementary	Hamstring contraction introverts	Static contraction of the hamstring muscles	Passive hamstring stretch to pain threshold	Training groups
S5	S5	S5	S5	Group 1
S10	S10	S10	S10	Group 2

A shift from training, assisted by a person, the subject lay on his back, and while most of his flat feet, and completely drawn on the ground there, SRHR-PNF method is a four-part training program, was implemented [16].
A) a person adjunct no dominant leg as high as inactive bring it to the threshold of pain, and was stretched (S10)
B) With the arrest of a person adjunct, subject to his hamstring contraction against a pressure aid that tries to open his hips, he resisted. During this phase, the two groups were different and, in group A and group B s5 s10 seconds.
C) after step (b), with the contraction of the assisted person, introverted subjects contraction of quadriceps muscles, trying to get Ron to do, help people to calm down or push him, was accompanied by (S10)
D) after step (c), a person adjunct orders was contracting, and the subject was resting, but a supplement to his feet, stretching mode would keep. (S10)
Without lowering the legs, and the rest of the steps (b), (c) and (d) two times was

Table 3: Characteristics of participants in terms of height

Number	Maximum	Minimum	The median	SD ± Mean	Statistical Indicators Variable	
10	24	18	19	1/9 ± 19/6	Group 1	Age (yea rs)
10	24	18	20	2/7 ± 21	Group 2	
10	23	18	19	1/8 ± 19/7	Group 2	

Table 3 shows that the highest mean age of 21 years, group 2, and the lowest mean age of 19.6 years in group 1. The minimum age was 18 and the maximum age is 24 years.

Table 4: subjects' height indices

Number	Maximum	Minimum	The median	SD ± Mean	Statistical Indicators Variable	
10	179	152	172	8 ± 171	Group 1	Heig ht (cm)
10	178	152	168	7/2 ± 168/2	Group 2	
10	189	164	171	7/9 ± 174/6	Group 2	

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Table 4 shows that the highest average height of 174/6 cm, corresponding to group 3 and lowest in height, with 168/2 was observed in group 2. The minimum height is 152, and the maximum height is 189 cm

Table 5: Statistical weight of subjects

Number	Maximum	Minimum	The median	SD ± Mean	Statistical Indicators Variable	
10	70	50	65	6/25 ± 63/3	Group 1	Weight (kg)
10	72	48	57	8 ± 58/3	Group 2	
10	85	49	64	10 ± 66/3	Group 2	

Table 5 shows that the highest mean weight of 66/3, corresponding to groups 1 and 3, and the lowest mean weight of 58/3 in group 2, respectively. The minimum weight of 48, and a maximum weight of 85 kg.

RESULTS

Results of T-test depends, among scores of pre-test-post-test, range of motion of the knee open on the knee (hamstring muscle flexibility), the non-dominant depends on the empirical dynamics (with the mean of 16 degrees from pre-test to post-test), and the experimental group PNF, static muscle contraction by SRHR with 5 and 10 seconds, respectively (with the mean 20/1, 29/47 pre-test and post-test) showed significant differences (0/05> P). (table 6-7-8) However, analysis of variance in experimental group dynamics, experimental PNF method SRHR, with 5 and 10 seconds, static contraction of the muscles showed that the mean scores of the opening of the active knee range of motion (flexibility hamstring muscles), the non-dominated group, there were no significant differences in test ($P \leq 0/05$). (Table 9).

Table 6: T-test for hamstring stretching range (degrees), the pre-test and post-test experimental group (dynamic)

Variable	Mean	SD	**SE_m**	**SE_D**	**df**	**t**	**p**
Pretest After the test	69/5 85/5	9 10/2	2/87 3/4	1/12	9	16/14	0/05 0/000

Table 7: T-test for hamstring stretching range (degrees), the pre-test and post-test experimental group, (PNF method SRHR, with a 5 second static contraction of muscles)

Variable	Mean	SD	**SE_m**	**SE_D**	**df**	**t**	**p**
Pretest After the test	72/8 92/9	9/3 13/9	2/94 4/4	2/4	9	9/22	0/000

Table 8 T:-test for hamstring stretching range (degrees), the pre-test and post-test experimental group, (PNF method SRHR, with a 10-second static contraction of muscles)

Variable	Mean	SD	**SE_m**	**SE_D**	**df**	**t**	**P**
Pretest After the test	**73/83** **103/3**	7/1 11/3	2/94 3/58	2/4	9	8/96	0/000

Table 9: By analysis of variance, comparing the mean pre-test, the experimental group

Source of variation	The sum of squares	df	The mean square	F	P
Between-group	392/6	2	196/3		
Intra-group	1971/7	27	73	2/69	0/05
Total	2364/3	29			

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RESULTS AND DISCUSSION

The results showed that the method of stretching, dynamic stretching and PNF (SRHR by static muscle contraction by 5 and 10 seconds), significantly increases the flexibility of the hamstring muscles in people 18-24 years old, is. Findings regarding the effects of dynamic stretching (second hypothesis), with the former Bondi et al (1998), Tovfigh Aqania(1998), Vabrit et al (1977), Bonard et al (2004), Aspernoga (2001), correspond. Concerning the effect of dynamic stretching exercises, some researchers believe that, due to a greater impact dynamics techniques, increase metabolic rate, which, in turn, leads to increased temperature and thus reduce muscle viscosity, and allow, smooth muscle to contract. Hot muscle to ease, the force exerted is harmonious, the result will lead to increased flexibility [17]. Some studies also showed that ballistic stretching is effective in rapidly increasing the length of the shortened muscles, but review articles show that the risk of provoking a dynamic way there. This method is not reliable [9].

Bonard et al (2004) also showed that both static and dynamic stretching techniques, increase muscle flexibility, and increase range of motion of the hip is flexed [18]. Aspernoga (2001), the inconsistency in the results of various studies, the differences in methodology, as well as the methods used for the analysis of the data [19]. The findings regarding the effect of stretching PNF, the increased flexibility of the hamstring muscles (hypotheses II and III), consistent with previous results Kalkhoran 1994, Sedaghati, 1997, Zoalaktaf 2004, Fahimi, 2000, Ghasemi, 2001, Reza Gholizadeh 2001, Raghi, 2002, Mark, 2005, Rowlands 2003, Schmidt 1999, Farbar 2002 , Aspernoga 2001, Fland 2001, Shobk 2004, Bonar 2004, Fland 2004, Funk 2003 and Burke 2001 correspond. In this study, these three methods of stretching, dynamic traction (SRHR-PNF), a contraction of 5 and 10 seconds, was used in this study, the assumption was that as the period of maximum contraction static voluntary contraction (MVIC), applied method SRHR-PNF stretch longer. Will see a greater increase in range of motion, because the inhibition Atvzhnyk, more muscular relief, induce. . However, the tensile, Traction (SRHR-PNF) with 10 and 15 seconds of contraction, no significant difference in the increase in amplitude, was observed. . This is perhaps the first to explore the effect of three periods of static stretching for 30 seconds, static contraction, elasticity (SRHR-PNF), 10 and 15 seconds of extension MVIC in SRHR, it has been compared. These findings, other studies, the relationship between duration of storage of static contraction, and increase range of motion of the knee were examined, supports (Bonar 2004, Schmidt 1999, Nelson 1991, Kornkios 1986 and 1987, Fahimi 2000). Nelson, 1991, the effect of 3.6 and 10 s MVIC, the method of stretching SRHR, on the elasticity of internal rotation, Cornelius 1986 and 1987 Effect 3 and 6, and at 6 and 10 sec MVIC in the range of knee extension of hip, Schmidt (1999), Effects of 1206 sec MVIC, the scope stretches the hips, Bonar 2004, the effects of 3.6 and 12 s MVIC, the draft of HR, on the elasticity of your hips, examined, and no significant differences between the different time periods MVIC, was not observed in the short term. Hardis work in 1985, is the only study which, in its 6-second MVIC, leading to a further increase in the ratio of 3-second stretch in the short term. However, comparison of the results was carried out in this area because of the difference in the applied tensile programs, flexible method of measuring the amplitude and duration of the exercise program is difficult. The results of the present study and understanding 79, suggests that maintaining a static contraction for 15 seconds, no more than 5 seconds, maintaining its advantage. It seems like the MVIC, when applying tension to the PNF, stretching suppress reflection and increase the range of motion, stretching, and probably reflects the negative (inhibition autogenetic) can, with just a 5-second MVIC, and even less cause . Thus, the inhibitory effect of muscular activity is reduced, and easy to follow muscle so that the muscle can be stretched further. Although the tensile SRHR, which has been used in recent research due to the contraction of the muscle introverted, inhibited mutual advantage, and therefore maximum comfort, muscle, muscle tension follows (Nelson 1991), which is better period different concentric contraction, the tension be examined in this way.

CONCLUSION

Consequently, in this study three methods of stretching, dynamic traction PNF (PNF method SRHR, with 10 and 5 seconds of contraction static muscle), increase the flexibility of the hamstring muscles, and however significant differences between the three methods of stretching there. Thus, we can conclude that, to increase the flexibility of the hamstring muscles, depending on the condition and capabilities of researchers and educators, each of the three methods used in this study can be used. The difference must be in the executable program stretching, training sessions, number of repetitions, number of sets and the methods used, as a factor that can affect the results of the various investigations, noted.

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