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Research Article

Different stretching methods of the quadriceps muscles on agility performance in female cricket players of 13-15 years age

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Abstract

Background: Stretching is widely used for various therapeutic purposes, fitness programs, & athletic events. Quondam research shows that stretching may have the pernicious result on performance, therefore precise knowledge of its effects on performance is important to take adequate stretching techniques into consideration for sports training and therapeutic interventions.
Need of study: The purpose of our study was to inspect the changes resulting in agility performance from various stretching techniques (static stretching & muscle energy technique) descriptor for the quadriceps muscle group.
Method: 60 female cricket players of age 13-15 years were selected to perform the stretching techniques (no stretch, static stretch & muscle energy technique for quadriceps) on three successive days & completed the agility T-test after the three stretching techniques were executed.
Result: The mean of agility t-test time were: control group (no stretch) =16.93 seconds, static stretch group=16.3 seconds, muscle energy technique group=16.18 seconds. The test of significance ANOVA shows no statistical significant difference, F=2.8, p=0.05, for the control group (no stretch), static stretching, and muscle energy technique in agility T-test times. Statistical T-test analysis reveals that there is a significant difference between no stretch (control group) and MET group, p-value 0.02 & non-significant difference between no stretch (control group) & static stretch group, p-value 0.057 & static stretch & MET group, p-value 0.72.
Conclusion: To conclude, results of our study evince that there is no significant effect on agility after receiving the different stretching techniques with respect to quadriceps muscle.
Keywords: Agility, static stretch, muscle energy technique, cricket players.

1. Introduction

Stretching is a therapeutic activity done to increase the extensile properties of soft tissue structures &, thereby enhance the flexibility by elongating contractures or hypomobile structures.[1, 2, 3] Static stretching is a technique in which the contracted or hypomobile structure is held in a lengthened position beyond the point of resistance for a specific period of time. The duration of static stretch is pre-determined prior to stretching or is based on the patient's tolerance and response during the stretching procedure.[4] In research studies the term "static stretching" has been linked to durations of a single stretch cycle ranging from as few as 5 seconds to 5 minutes per repetition when either a manual stretch or procedure is employed.[5-9]

Muscle energy techniques are manipulative procedures that have evolved out of osteopathic medicine & used to elongate fascia & muscles & improve mobility of joints. The procedure recruits voluntary muscle contraction done by the patient in specifically determined direction against the opposite force applied by the therapist. [10]

Agility plays a cardinal role in various sports activities; it involves swiftly changing directions with regard to the area involved in the sports place with speed and precision. Agility involves co-ordinate working of the whole body systems by using static & dynamic balance, reflexes, strength, speed & endurance. [11]

Cricket players need to be expeditious across the space of the two wickets during their batting in order to score optimum runs for the team, the bowlers require speed and agility for proper execution of their bowling action and sway required, the outfield is utmost huge and the fielders have to be swift to cover the fielding space to catch the ball and save runs for the team & need to be agile to dive or earn those precious catches, & acquiring different positions after the over is completed.[12]

Thus agility plays an important role in cricket players.

All four quadriceps are powerful extensors of the knee joint. They are crucial in walking, running, jumping and squatting. [13] Functions of the quadriceps are torque production of knee extension and hip flexion during walking and running. [13]

Thus agility and stretching techniques being the backbone, the study commences.

Need to study: The purpose of our study was to inspect the changes resulting in agility performance from various stretching techniques (static stretching & muscle energy technique) described for the quadriceps muscle group.
Aims & objective: 1. To find out the time performance by the female high school cricket athlete in agility performance in response to different stretching techniques. 2. To compare the effects of no stretching, static stretching, & muscle energy technique (MET), of the quadriceps on agility after performing the agility T-test.

2. Method

2.1 Study setting: Providence Girls' High School auditorium, Nagpur.
2.2 Study design: Interventional study.
2.3 Sample selection: 13-15 years female high school cricket athletes (N=60), Age matched normal & healthy female individuals (N=60)
2.4 Sample size: Total number of subjects 60.

And the same 60 subjects were subjected to the protocols selected.

Group A: 20 subjects performed no stretch on the first day of the data collection, after 24 hours static stretching was done on the second day, & after 24 hours MET was done on the third day.

Group B: 20 subjects performed static stretching on the first day, after 24 hours MET was performed the second day, & after 24 hours no stretch was done on the third day and the readings were taken.

Group C: 20 subjects performed MET on the first day, after 24 hours on second day no stretch was done and the readings were taken, & after 24 hours static stretching was done on the third day.

2.5 Inclusion Criteria: A member of the women's cricket camp or team, normal & healthy individual of age 13-15 years.

2.6 Exclusion Criteria: Bilateral or unilateral lower limb injuries in duration of last 6 months, which will thwart the subject to give their best performance during agility T-test.

Permission from the institution was taken before initiating the study, & an information sheet along with informed consent was given to the subjects as well as the to the institution. A veritable demonstration of each stretching technique, agility T-test was given to the subjects & subjects were made to perform the agility T-test to get acquainted to the test before the final data collection was begun.

After each protocol subjects performed the agility T-test. [11]

2.7 Stretching protocols

2.7.1 Control group: No stretching was performed; the subject sat for 3 minutes. [11]

Static stretching: The subject actively flexes the knee joint while holding it with her hand near her ankle and with the other the subject holds the chair in front of her for balance; each leg was stretched for 30 seconds, three times for a total of one minute thirty seconds. The therapist stands and supervises for the correct completion of the technique noting the 30 second increase each time for each extremity. [11] (Figure 1)

Fig 1: Subject performing the active static stretching of quadriceps.

2.7.2 Muscle energy technique: The subject lies prone; a cushion below the abdomen is kept to help prevent lordosis. The therapist stabilizes the pelvis of the subject and with other hand holds the ankle, flexes the leg at hip and knee. (Fig 2)

Breathing instructions are given which include inhaling while building up isometric contraction, holding breath for 7-10 seconds while maintaining the contraction, followed by exhaling as the subject slowly stops contracting & inhales & exhales fully one more time after termination of all efforts (subjects are asked to let go).

2.7.3 Technique: Contraction is followed on exhalation by taking the muscle to stretch through the new barrier by taking the heels towards the buttocks with subjects help stretch is hold for 30 seconds, repeated for the other leg. [10]

Fig 2. Muscle energy technique for quadriceps muscle (post isometric relaxation).

2.7.4 Agility T-Test: This test enables the therapist to measure the subjects four directional agility, while the subject maintains her balance and speed & the test is completed with accuracy. There are four cones (A,B,C,D) placed on the ground in a T shape pattern where cone A & B are at a distance of 10 yards, cone B to C & cone B to D at a distance of 5 yards respectively. (Figure 3)

2.7.5 Procedure: The subject begins from cone A as the therapist commands the subject to start (the therapist starts the stopwatch as soon as the command of start is given to the subject), to cone B and then touches the base of cone B with right upper extremity, the subject shuffles to cone C and touches its base with her left hand, then shuffles to cone D and touches its base with right hand, the subject then shuffles back to cone B & touches the base with her left hand, & then sprints back to cone A without turning her body. The stopwatch is stopped as the subject reaches the cone A. (Figure 3)

The trial will not be considered if the subject crosses her one foot in front of her other foot, doesn't touches the bases of the cones properly, & fails to look forward all over during the test. [14]

Fig 3: Subject performing the agility t-test.

3. Result

Table 1: Frequency distribution table of agility t-test in response to all three techniques

Class Interval (Time in Sec)	No of stretch (Control group) Frequency (no of individual subject)	Static stretching frequency (No of individual subject)	MET frequency (No of individual subject)
13	0	3	5
14	6	7	7
15	10	11	13
16	8	14	9
17	12	9	12
18	13	8	4
19	4	5	7
20	7	3	3

The class interval which represents the data in group which is arranged in series of eight different timings in seconds from 13-20 lower limit and upper limit respectively of agility T-test performed after each stretching technique by the individual subjects that is represented by the frequency.

In control group 13 students took 18 seconds & no student took 13 seconds. In static stretching 14 students took 16 seconds & 3 students took 13 seconds & 3 students took 20 seconds. In muscle energy technique 13 students took 15 seconds & 3 students took 20 seconds to complete the agility T-test.

Table 2: Showing mean time and p-value of agility t-test

Group	Mean ±SD	P Value
Control Group VS. Static Stretch Group	16.93 ± 1.8	0.057 (Non Significant)
Control Group VS. MET Group	16.3 ± 1.8	0.02 (Significant)
Static Stretch VS. MET Group	16.18 ± 1.93	0.72 (Non Significant)

The mean of agility t-test time were: control group (no stretch) = 16.93 seconds, static stretch group= 16.3 seconds, muscle energy technique group = 16.18 seconds.[15]

3.1 Test of significance

The test of significance ANOVA shows no statistical significant difference, F=2.8, p=0.05, for the control group (no stretch), static stretching, and muscle energy technique in agility T-test times.[16]

Statistical T-test analysis reveals that there is significant difference between no stretch (control group) and MET group, p-value 0.02. Non-significant difference between no stretch (control group) & static stretch group, p-value 0.057 & static stretch & MET group, p-value 0.72.

4. Discussion

Stretching is widely used for various therapeutic purposes, fitness programs, & athletic events. Quondam research shows that stretching may have pernicious result on performance, therefore precise knowledge of its effects on performance is important to take adequate stretching techniques into consideration for sports training and therapeutic interventions.

The study was carried out to compare the effects of different stretching techniques of quadriceps muscle on agility performance in female high school cricket athletes.

60 selected groups of athletes performed the stretching protocols & the agility T-test which was an effective & easy measure to compare the time performance for each stretching group.

In our study the observation consists of total 60 subjects of age group 13 years who performed agility T-test after stretching techniques were advocated to each subject, & time was recorded in seconds.

The class interval which represents the data in group which is arranged in series of eight different timings in seconds from 13-20 lower limit and upper limit respectively of agility T-test performed after each stretching technique by the individual subjects that is represented by the frequency.[8]

In control group 13 students took 18 seconds & no student took 13 seconds.

In static stretching 14 students took 16 seconds & 3 students took 13 seconds & 3 students took 20 seconds.

In muscle energy technique 13 students took 15 seconds & 3 students took 20 seconds to complete the agility T-test.

The test of significance ANOVA was done: Analysis of the results showed p=0.05 which reveals there is no significant difference among the three treatment protocols on agility performance.

Another test of significance was the statistical T-test analysis which shows the following result:

Control group vs. static stretch group p-value 0.057 which is non-significant.

Control group vs. MET group p-value 0.02 which is significant.

Static stretch group vs. MET group p-value 0.72 which is non- significant.

T-test analysis reveals that there is significant difference between control and MET group & non-significant difference between no stretch (control group) & static stretch group & static stretch & MET group.

Results of our study are alike to the study done by Little and Williams who examined "the effects of different stretching protocols during warm-ups on high-speed motor capacities in 18 professional soccer players". They examined the effects of no stretching and static stretching on agility performance. However, their design differed as they incorporated a dynamic stretch rather than muscle energy technique. And also, the agility protocol was performed on a zigzag course, versus the T-test in their study. These authors concluded that there was no difference between the control and static stretching groups. This result is similar with the results revealed in the study; however, the authors did report that the dynamic stretch protocol produced significantly faster agility performance than did both the control and static stretch groups. [17]

Whereas Wallmann[18] et al and Church[19] reported significant decreases in vertical jump height after bouts of static stretching and PNF stretching, respectively.

The results of our study shows that there is no significant difference on agility after stretching (no stretch, static stretch & MET) the quadriceps muscle, hence it may be upon the trainers, athletes whether to or not to undertake stretching methods as a part of their programs.

5. Conclusion

To conclude, results of our study evince that there is no significant effect on agility after receiving the different stretching techniques with respect to quadriceps muscle, hence it may be upon the trainers, athletes whether to or not to undertake stretching methods as a part of their training or fitness programs. [11]

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