



ISSN: 0975-833X

RESEARCH ARTICLE

A STUDY TO EVALUATE THE ACUTE EFFECT OF VARIOUS STRETCHING IN WARM-UP ROUTINES ON VERTICAL JUMP PERFORMANCE IN AMATEUR BASKETBALL PLAYERS

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ARTICLE INFO

Article History:

Received 16th May, 2013
Received in revised form
29th June, 2013
Accepted 15th July, 2013
Published online 23rd August, 2013

Key words:

Dynamic stretching;
Ballistic stretching;
Warm-up,
Vertical jump,
Basketball players.

ABSTRACT

Background and Purpose: A recent study reported promising clinical results using dynamic stretching and ballistic stretching as a warm-up exercise in improving vertical jump performance for basketball players. **Objectives:** This study aims to determine the acute effect of dynamic and Ballistic stretching in a warm up routines on vertical jump height in amateur basketball players.

Methodology: In This experimental study sixty subjects of amateur basketball players with a mean age of 22.46±1.21, were randomised to Dynamic stretching, Ballistic stretching and control group randomly. Each subject were pretested for vertical jump on one day and for 7days each subject received 10 min jog warm-up and Dynamic and Ballistic stretching groups received Stretches addressed the major muscle groups of the lower body (Gluteal, Hamstrings, quadriceps, adductors, hip flexors, gastrocnemius and soleus) stretches performed in both the legs for Fifteen repetitions per leg for three sets followed by post test for vertical jump everyday for a week.

Results: The results analyzed using ANOVA showed that there was significant variations $p < 0.05$ in the mean improvement of all the groups considered thus accepting the experimental hypothesis stating that there is significant difference with stretching protocols in improving the vertical jump performance of Amateur Basket ball players. Mean improvement values of the amateur basket ball players belonging to group Dynamic stretching, Ballistic stretching and control group (1.42, 0.97, and 0.25) shows Group-A players trained with Dynamic stretching had a significant improvement with their vertical jump performance when compared to the group trained with Ballistic stretching and the control group.

Conclusion: This study shows acute effect of both Dynamic stretching and Ballistic stretching have got beneficial effect in improving the Vertical jump performance of amateur Basketball players. But acute effect of Dynamic stretch has superior hand in improving the Vertical jump performance of amateur Basketball players.

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INTRODUCTION

The vertical jump is an explosive activity a number of athletes are required to perform in many different sports such as basketball, soccer, and volleyball, Vertical jump plays a key factor in many sports and they are always trying to achieve. Basketball is one of the most popular sports around the world. However, it is also the highest contributor to sport and recreation related injuries. Injuries that occur most often in amateur affect the upper extremities (over 55%), because of underdeveloped motor skills and limited technique for catching a ball.^{1,2,3} American college of sports medicine still recommends various stretching protocol before and after the competition. A pre-stretch cause's leg muscles to produce greater forces that decelerate the downward movement, and will reverse the direction of the movement upward. This will consequently produce greater velocity and force at takeoff and greater jump height⁴. In the literature described by Michael Yessis, there are many beneficial stretches that can improve Activity Performance in Basketball players⁵. Research by Sharman *et al* concluded PNF stretching and Ballistic stretching yielded the short-term benefits.⁶ Research by Weerapong *et al*. was designed to find the Short and Long term effects of stretching on the body but there is a dearth of evidence to choose various stretching in warm up routine on vertical jump performance in basketball players⁷. It is not clear from prior research about the effects of various warm up protocol on Amateur Basket ball players vertical

jump performance¹. The objective of this research is to examine if there is a difference in vertical jump performance of basketball players who are put through a Dynamic stretching and Ballistic stretching in warm-up regimen and players who do not perform any stretching exercises in warm-up regimen.

MATERIALS AND METHODS

Subjects

Subjects were recruited from various colleges. Amateur basketball players were invited to participate in this study. Subjects were eligible to participate if they were between 20 and 25 years of age and both male and female were considered. Exclusion criteria subject report of previous soft tissue injury, fracture in the lower limb, and previous surgery over the past 2 years to lower limb. Musculoskeletal or neurologic lower extremity involvement that interfered with physical activity, additional exclusion criteria required special testing for Subject with inflammatory condition to lower limb. Sixty (60) Amateur basketball players were participated in the study as voluntary. All the volunteers had been informed about procedures of the tests and gave their written informed consent to participate. The protocol was approved by the institutional review board. Sixty Participants were randomly assigned to a control group and 2 experimental groups. Group (A) Active Dynamic stretching (n=20), Group (B) Active Ballistic stretching (n=20) and Group (C) control group having no stretching (n=20).

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Testing

Each volunteer carried out vertical jump test as pre-test on the day of informed consent and post test were conducted after every intervention for seven days .All groups performed a standard 10min jog warm up.

Vertical Jump test

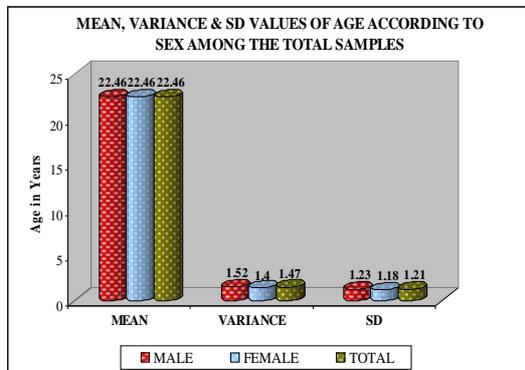
In Vertical jump test Initially subject stand facing the wall and reaches up with the hand closest to the wall, keeping the feet flat on the ground, the point of the fingertips is marked on wall, then the subject stands away from the wall and jumps vertically as height as possible using both arms and legs to assist in projecting the body up wards, attempt to touch the wall at the highest point of the jump then the difference between two marking is measured using inch tape, then three trials of vertical jump test is performed.

Stretch Interventions

A Supervised Stretch intervention was carried out immediately on completion of the 10 min jog warm up. Stretches addressed the major muscle groups of the lower body (Gluteal, Hamstrings, quadriceps, adductors, hip flexors, gastrocnemius and soleus. stretches performed in both the legs for fifteen repetitions per leg for three sets for seven days followed by post test using vertical jump test. 1) The Group (A) Dynamic Stretching carried out a series of lower-body dynamic stretches (controlled movement through the active range of motion for each joint) at a jogging pace. Straight Leg March (Hamstrings stretch), Flick backs (Quadriceps Stretch) , High knees (Gluteal and hamstring stretch), Straight leg skip (gastrocnemius and soleus) ,These four Dynamic stretches are performed in both the legs for Fifteen repetitions per leg for three sets for seven days followed by vertical jump test. 2) The Group (B) Ballistic Stretching is performed in a manner of create momentum and move faster into a stretched position in an attempt to force it beyond its normal range of motion. Stretching the same muscle as those performed by the group A. 3) Group (C) a control condition was not given stretching.

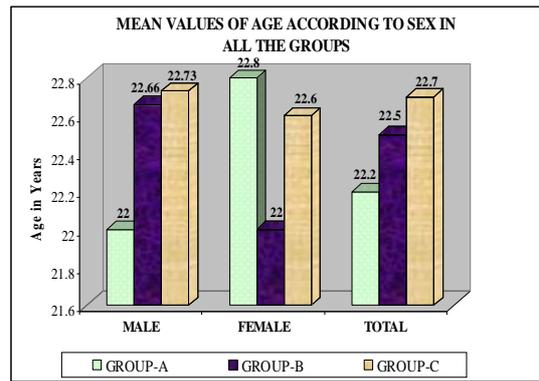
Data analysis

In this study Analysis of Variance (ANOVA) was used as a statistical tool for the analysis of variations in the performance of vertical jump test between the three different groups (A, B & C) trained using dynamic stretching, ballistic stretching and no stretching (control) respectively. An alpha level of P<0.05 was used as the level of significance for the test. Dependent ‘t’ tests were also used to find the significant differences of the performances of vertical jump test within the groups on everyday basis till 7 days. Descriptive statistics (mean and standard deviation) were also calculated for the demographic variables of age and sex beyond the vertical jump performance.



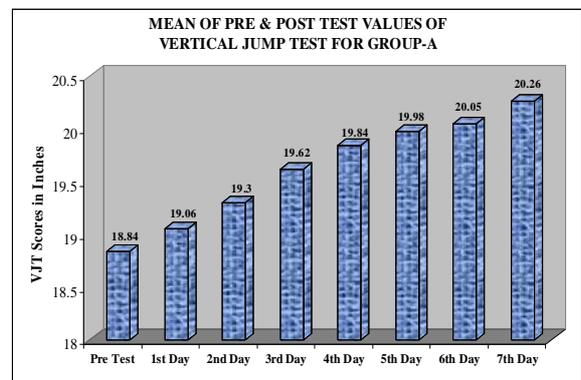
RESULTS AND INTERPRETATION

Sixty amateur basket ball players with a mean age of 22.46±1.21 were selected for the study. The mean, variance and standard deviation values of the age among the total samples are shown



Group A

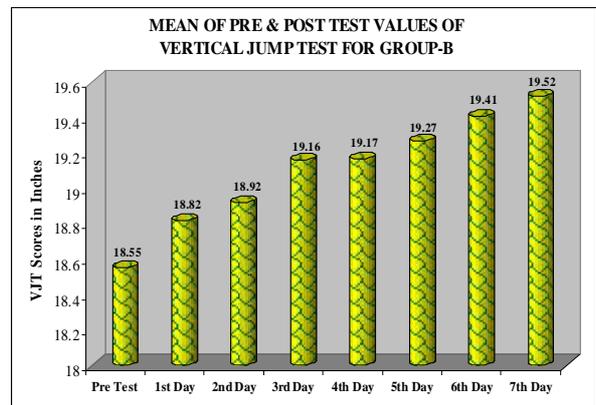
Group A shows ‘t’ values are greater at p<0.05, which is significant & hence dynamic stretching had an effective improvement in the vertical jump performance from Day-1 to Day-7.



Above graph can infer that the group A -dynamic stretching had an effective improvement in the vertical jump performance from Day-1 to Day-7.

GROUP B

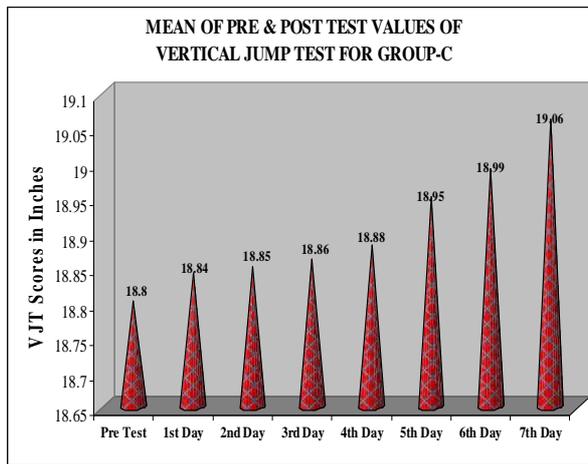
Group-B Ballistic stretching - calculated ‘t’ values are greater at p<0.05 on 1st, 3rd, 5th, 6th & 7th days only, which is significant & hence had an effective improvement in the vertical jump performance of



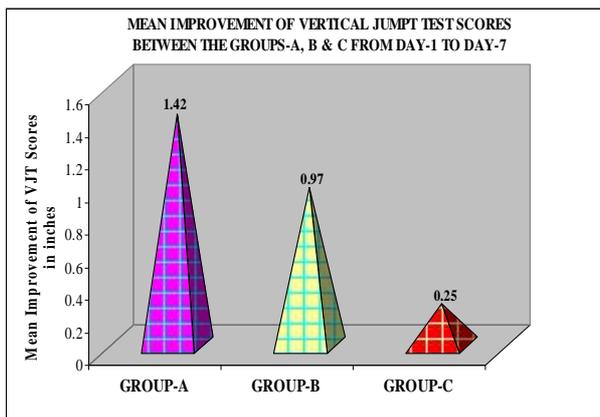
From the graph one can infer that the Ballistic stretching had an effective improvement in the vertical jump performance of Group-B subjects throughout the study period from Day-1 to Day-7.

GROUP C

For group C Calculated ‘t’ values are greater at p<0.05 only on the seventh day measurement, hence control group had a relatively effective improvement only on the last day of the study period.



From the graph one can infer that the control group had a relative improvement at the last days of the study period. ANOVA performed with the mean difference values of vertical jump test taken before and after the 7th day of training between the groups A, B & C shows the calculated 'F' value as greater than the table value at $p < 0.05$. Hence, it is proved that there is a significant variation in the vertical jump performances of the amateur basket ball players of groups A, B & C trained with dynamic stretching, ballistic stretching and no stretching respectively.



Group-A players trained with dynamic stretching had a significant improvement with their vertical jump performance when compared to the group trained with ballistic stretching and the controls with no stretching.

DISCUSSION

The study undertaken included only the college level basketball players; hence this study can't be generalized to all population where a Vertical jump plays a key factor in many sports and they always trying to achieve it such as, soccer and volleyball. Although many training methods are currently in vogue, in order to meet with the growing demands of the sports specific training of the players there is an emergent need of applying the right thing which suits them. The study was detailed and tailored to find the efficacy of which mode of Stretching was better in the two groups using Vertical Jump Test. These results strongly supports the earlier findings of Jeffrey Christopher *et al.* (2000) in which they proposed that dynamic stretching were better for training the sports persons.⁸ Also studies done by Young W *et al.* (1999) supports our results that there is a significant improvement in the dynamic leg strength using dynamic stretching.⁹ Bosco *et al.* (1982) presents information that says stretching has no bearing on the height achieved during a vertical jump performance. This theory contradicts the results of this study. There can be other reasons for improvement of vertical jump performance in the present study, This coincides with information

presented (Goran Markovic, 2007) Although various training methods, including heavy-resistance training, explosive type resistance training, plyometric training, electro stimulation training and vibration training, have been effectively used for the enhancement of vertical jump performance, when aiming to improve vertical jump ability and leg muscle power. In the present study subject would have been used various training methods to strengthen the leg muscle and that might have an influence on the result. This study could be one of the corner stone's for tackling the difficulties arising in the sports specific training regimens in practice. The effectiveness between the two stretching and the findings, we inferred that both groups had better outcome, the group trained with dynamic stretching had superiority over the other.

Limitations of the study

1. This study included less female subjects. So differences between genders are not clarified.
2. The study was limited to vertical jump test to assess vertical jump performance.
3. This study could not explain about how long the effect of vertical jump (sustained) stayed during the basketball game.
4. The effect of stretching beyond 1 week is unknown as there was no follow up.
5. The body mass index and height was not included as a criterion to avoid any discrepancy between the groups.

Suggestions and Further Recommendations

This study used vertical jump test to measure vertical jump performance by its height difference, but other test like force plate and EMG device can be used to measure velocity and also reflect true neuromuscular changes related to stretching and peak muscular power.

Conclusion

This study can be concluded by stating that the Acute effect of both Dynamic stretching and Ballistic stretching have got beneficial effect in improving the Vertical jump performance of amateur Basketball players.

When both the Stretching regimens were taken into consideration for significance, the acute effect of Dynamic stretching has superior hand in improving the Vertical jump performance.

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