Effect of Concentric Versus Eccentric Hamstring Strength Training in Improving Anaerobic Strength among Football Players

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ABSTRACT
Objective: Football sports involves bouts of sprinting strength in hamstring strength in hamstring muscle as it is important component in improving performance which can be applied to football sport. The purpose of this study is to know the effectiveness of concentric or eccentric hamstring strength training exercise (isotonic) in improving anaerobic strength among football players.

Design and setting: A pretest and post test experimental comparative study. The subjects were used to examine the differences in concentric exercise and eccentric exercise with hamstring curl apparatus for duration of 6 weeks in 12 sessions each.

Subjects: Thirty subjects of male football players at recreational level were divided into two groups A concentric exercise group and eccentric exercise group given training in isotonic with hamstring curl exercise apparatus and training was given with duration of 6 weeks for 12 sessions. The procedure was done in Physiotherapy Department at college of physiotherapy, Saveetha university.

Outcome Measurement: 40 yards dash test was done for evaluating anaerobic strength is used to compare pre-test and post-test values of both groups.

Results: Statistical analysis shows significant difference in pre and post test score done by both the groups.

Conclusion: The results of the study indicate that group B which received eccentric training had significant effects in improving anaerobic performance.

1. Introduction
Hamstring strength is important in football player’s incensed muscle power output during intermittent and sprint exercises are also applicable t football and other sports associated with high intensity intermittent sprinting1, 2.

Hamstring injuries remain a significant cause of injuries in sprinters. The time lost through a hamstring injury can cause major disruption to an elite athlete training and competition schedule3.

In sprint gait cycle during the forward swing phase the activity of the hamstrings increase as they eccentrically restrain the terminal stages of hip flexion and knee extension once the terminal stage of the forward swing phase was complete. The hamstrings concentrically contract to extend the hip and flex the knee. The hamstrings play the role of hip extensors during the stance phase of running and sprinting4.

Hamstring strength plays an important role in sprint gait cycle in football players. Football players need to develop the muscle power output during intermittent and sprint exercises are also applicable to football and other sports associated with high intensity intermittent sprinting1, 2.

The purpose of the study is to examine the effect of concentric and eccentric (isotonic) hamstring strengthening exercise in improving anaerobic strength among football players5, 6, and 9.

It is difficult to measure the rates at which muscles produce and transfer energy internally. Only the external manifestations of the energy are capable of measurement6.

Anaerobic power test are available to test the maximal activation of ATP-CP system. These tests provide easier evaluation for intermediate energy system10.

Isotonic resistance exercise is a dynamic form of exercise carried out against constant or variable load it can be performed either concentrically or eccentrically. In this study concentric and eccentric strength training is given.

40 Yard dash test is used or evaluating anaerobic strength in this study11.

All the subjects filled out a participation health status questionnaire to determine eligibility18.

This study is focused on improving anaerobic strength of football players through concentric and eccentric hamstring strength training. The objective of the study is to compare the effect of concentric versus eccentric hamstring strength training in improving anaerobic strength among recreational football players.

2. Methodology
All thirty recreational football players of age 18-30 were selected and randomly allotted for group –concentric and eccentric hamstring strength training group.

All subjects asked to fill out a participation health status questionnaire to determine the eligibility. History of previous No hamstring injuries, no performance enhancing drugs and no weight training for the lower extremity for the past 6 months were included. Previous injuries to hamstring or knee are excluded for this study.

The subjects are explained about the mode, effect and use of exercise. An informed consent is obtained from all the eligible subjects.

Subjects of both concentric and eccentric group evaluated with pretest anaerobic strength using 40 yard dash test. This test involves running a single maximum sprint over a distance of 40 yards on the flat surface.

2.1 Procedure
The subjects were explained about the safety and simplicity of the procedure (Training Program).

2.1.1 40 Yards dash test –pretest
The athlete’s stretches and warm-up. After warm-up the athletes were put into standard staring position with a foot behind the starting line, with no rocking movements and had a dash run up to 40 yards.

Both the groups were evaluated prior and after. The trial was conducted in the same set up. The best time was taken.

2.1.2 Concentric and eccentric hamstring strength training:
The hamstring strength training was given in hamstring isotonic curl machine.

After pre test session the subjects were assigned to the concen-
The collected data were tabulated and analysed using descriptive statistics to access all the parameters. Mean and standard deviation was used to find out significant changes between pre and post test by paired t test.

3.1 Significance of difference between pre-test and post-test score of Concentric Group: No of subjects 15

The interference shows significant difference between pre-test and post-test score of the concentric group.

<table>
<thead>
<tr>
<th>Group A (Concentric)</th>
<th>Mean (Secnds)</th>
<th>Standard Deviation</th>
<th>Mean Difference</th>
<th>T value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>6.370</td>
<td>0.385</td>
<td>0.128</td>
<td>4.29</td>
<td>.0007</td>
</tr>
<tr>
<td>Post-test</td>
<td>6.242</td>
<td>0.372</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table No-1

3.2 Significance of difference between Concentric Group A and Eccentric Group B:

Calculated t’ value is 3.99 for 28 degree of freedom (n1+n2-2=18) at 5% level of significance.

The inference shows significant difference between pre-test scores of both groups since the calculated t’ value.

The interference shows significant difference between pre-test and post-test score of group – B since the calculated t’ value is greater than the tabulated t’ value.

<table>
<thead>
<tr>
<th>Group B (Eccentric)</th>
<th>Mean (Secnds)</th>
<th>Standard Deviation</th>
<th>Mean Difference</th>
<th>T value</th>
<th>P value</th>
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</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>6.587</td>
<td>0.429</td>
<td>0.408</td>
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<td>.0001</td>
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<tr>
<td>Post-test</td>
<td>6.179</td>
<td>0.515</td>
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</tr>
</tbody>
</table>

Table No-2

4. Conclusion

Statistical analysis was done by paired t’ test and independent t’ test which showed significant difference in pre and post test score in eccentric anaerobic strength when compared to concentric anaerobic strength .

Hence stating that eccentric hamstring training is effective in improving anaerobic strength among football players.

5. Discussion

The results of this study indicate that there is statically significant improvement in anaerobic capacity when the athletes are trained using eccentric exercise.

Exercises featuring heavy eccentric load can actually support a greater weight and muscles are approximately 10% stronger during eccentric contractions than during concentric contractions.

Physiology of eccentric contraction supports the results. The muscles can supports greater weight and approximately 10% stronger than concentric activity comparing the muscle gains in concentric and eccentric hamstring strength training.

Thus eccentric hamstring strength training has greater advantage in improving anaerobic capacity and there by influencing proper sprint gait cycle and thereby improving performance in football players.
REFERENCE

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