



INFLUENCE OF ECCENTRIC TRAINING ON NON DOMINANT HAMSTRING STRENGTH IN SPRINTERS

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ABSTRACT

Study focuses on muscle imbalance of non - dominant hamstring with dominant hamstring muscle of lower limb, which is one of the pre- disposing factor for injury. Moreover the injury is likely to occur in the eccentric phase ,the strength imbalance can also hinder the performance. Thereby aim of study is to determine the influence of eccentric training on Non – Dominant Hamstring Strength in Sprinters .for this a pilot study is been conducted using hoping test to find out the non- dominant leg, after differentiate the non dominant hamstring where given eccentric strengthening for the period of six weeks. Pre and post strength assessment carried out with 1 RM test. Speed test where assessed using 30 meters sprint test Result; shows significant strength and speed of the sprinters. Conclusion: the study concluded that strength training initiate greater strength in non dominant hamstring, which indirectly improve the performance of sprinters.

KEYWORDS: ECCENTRIC, NON-DOMINANT , 1RM, SPEED TEST



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INTRODUCTION

For sprinters the quadriceps and hamstring are the important muscle one. The hamstring muscle are known as a sprinters muscle. But most of sprinters get an injury in hamstring muscle. The etiological factors for this injury are many, like lack of flexibility, physiological shortening due to fatigue, inadequate strength, inadequate endurance, contra lateral hamstring imbalance, insufficient warm up, poor running style, dysenergetic contraction of hamstring and inadequate Rehabilitation. DR.C. David Reid The study mainly focuses on muscle imbalance. The imbalance is mainly due to the weakness of the hamstring muscle. This occurs when player are carrying out eccentric contraction during rapid knee extension and also during increase in stride length , In this case hamstring muscle which have less strength are prone for injury. This imbalance can exist between quadriceps and hamstring unilaterally or bilateral imbalance of hamstring muscle between dominant and non-dominant side. More than 10 percent of bilateral imbalance predispose towards strain and also it will affect the performance of sprinters. This is stated by George blog19. And also in journal of sports science 200410. This imbalance may be corrected by strengthening exercise that and is superior in increasing strength compared to concentric training. This study I tried to test the effectiveness of eccentric training programme in improving non- dominant hamstring strength and speed of sprinters

MATERIALS AND METHODOLOGY

20 athlete (sprinters) were chosen with age group (21+-4 years, range from 17-25) and they were randomly divided into two groups. Group(1) was given the training and group (2) was used as control

CONTROL GROUP

The control group was not given this specific training but they were assessed pre and post ie.. 1 RM and speed test. Their routine programme were not interrupted.

Experimental Group Evaluation

This group was assessed for 1RM(repetition maximum) and speed (30m/s). 1 RM was assessed by giving a brief warming –up for 10 minutes and 2 minutes rest between each test in order to eliminate fatigue. After the completion of the test a cooling down for 10 minutes was given. Warm up phase include warm – up jogging . for 800 meters after free exercise. Specific warm up include hamstring curl without weights and stretching for hamstring. The test was done maximum 3 times in a day. If it was not able to be completed on that day, the test was completed on next day that is after 24 hours. The cool down phase include stretching and jogging for 2 rounds (800 Meters) . the 1 RM was assessed beginning and at the end of each week.

SPEED

The speed was assessed by using a stop watch as an evaluator tool. The athlete was asked to sprint 30 meters after short warm up and time was recorded The speed was assessed pre and post training.

TRAINING

Before training the general and specific warm up was done for 15 minutes. the training was given using hamstring curl , where player was asked to lift the weight with two leg and lower with non- dominant leg slowly controlling the gravity force. Training technique used was oxford protocol, Oxford Heavy – to – light System, with 3 sets of 10 repetitions, with 3 minutes rest is give between each set . for every week 5% Of 1RM was carried out every third week at third week at the end of session cool down for 15 minutes were done. Cool down phase comprise of walking, jogging, and flexibility exercise. This training was done thrice in a week.

RESULTS

1a INFERENCE

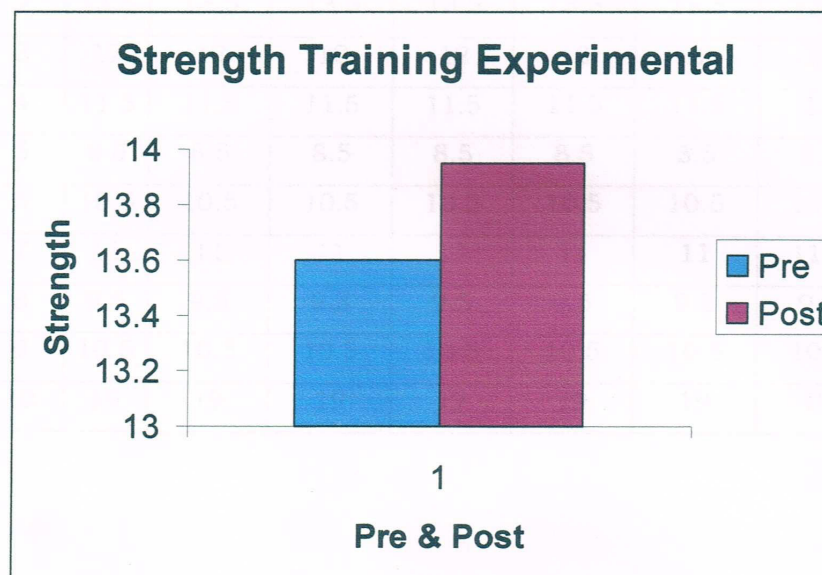
With a view to examine whether the exercise effectiveness increasing the strength of player. The data regarding strength for the pre- period and post –period for experimental group has been collected. Paired ‘t’ test has been carried out.

N	10
d	— 0.4500
S	0.2838
T _{cal}	5.004
T _{0.05} at 9 d.f	2.262

Result

Since t_{cal} is greater t_{0.05} (table value). There is a significant difference in strength outcome average between pre- training and post- training. Hence training is effective for experimental group.

Strength Training Experimental



1b INFERENCE

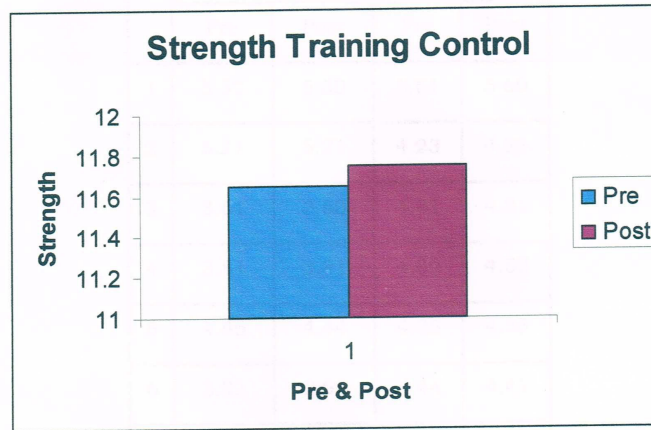
For the control group, no eccentric training exercise has been given . the values has been recorded and paired ‘t’ test has been carried out the result are given in

N	10
d	— 1.00 x 10 ⁻⁹
S	.2108
T _{cal}	1.500
T _{0.05} at 9 d.f	2.262

Result

Since t_{cal} is less than t_{0.05} (table value). There is no significant difference in strength outcome average between pre and post training control group

Strength Training Control



2a INFERENCE

With a view to examine whether the exercise effectiveness in increasing the speed of the player, the data regarding speed for the pre- period and post period for experimental group has been collected. Student 't' test for observation has been carried out

N	10
d	0.017
S	0.0216
T _{cal}	2.496
T _{0.05 at 9 d.f}	2.26

Result

Since t_{cal} is greater than 0.05 (table value). There is significant difference in speed outcome average between pre- training and post- training. Hence training is effective for experimental group.

2b INFERENCE

With a view to examine whether the exercise effectiveness in increasing the speed of the player, the data regarding speed for the pre- period and post period for control group has been collected. Student 't' test for observation has been carried out

N	10
d	0.008
S	0.012
T _{cal}	2.11
T _{0.05 at 9 d.f}	2.262

Result

Since t_{cal} is less than 0.05 (table value). There is no significant difference in speed outcome average between pre and post training control group

DISCUSSION

Early report suggests that the hamstring should be capable of producing 60 percent of the muscle strength generated by the quadriceps muscle groups. A 10 percent or greater strength deficit between the right and left hamstring muscle is thought to predispose

towards strain⁹. The hamstring shows greater importance in controlling running activities to stabilize knee during turning and more it works on eccentric part during rapid knee extension⁴. In the present study, there is significant improvement in strength development after

training. This is similar with previous studies by Dudley et al³ that the combined concentric and eccentric training significantly improve strength of leg compared concentric training only. Similar studies was conducted by Atha 5 1981, Clark 1913 where strength training has improved eccentric, concentric and isometric. Present study strength training was give based on oxford technique^{8,10}. After training there was 43.7% of improvement of strength. There could have been more improvement in strength, if the training continued for more than six week, moreover as per Johnson et al, in 1976, where he has demonstrated there will more strength when 10 RM is equal to 120 to 150% of 1RM. According to current 10 RM of Oxford technique is equal to 75% of 1RM. The result of present study shows eccentric training improves speed of sprinters which is similar to study is conducted by Bonde – Peterson et al.. increase in speed

performance due to activation of neural drive to a higher degree because of unilateral training, which was also observed by David Politt in August 2004¹⁵. For athlete the leg imbalance can be problematic, which not only reduce the performance but also prone for injury. Hence study should be carried out more than 12 weeks and follow up should maintained for one year in order to see the prevalence of injury.

CONCLUSION

From the result it may be observed that the training has been useful in increasing the strength of non dominant hamstring leg of individual. It may also be concluded that the training improves the speed and as it is not so for the control group. Hence training is effective in increasing speed of sprinters.

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