DOI: 10.53469/jerp.2025.07(01).16

Effects of Core Strength Training on Dynamic Balance and Agility in Recreational Soccer Players

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Abstract: ***Background: There are significant improvements in agility when an 4-weeks four days a week Core strength Exercise program is implemented to the football players' regular training program. The core strength exercise help to improve the dynamic balance and muscle coordination between lower and upper extremities, as well as reducing injury risk and muscle imbalances. Thus, the purpose of this study was to invigilate the effect of core strength exercise on dynamic balance and agility in football players Aim: Effectiveness of Core strength exercise on dynamic balance and agility in recreational football players Methods: The study included 30 recreational football players from SRM University who fulfilled the inclusion criteria. The 4 weeks of Core strength training were performed on agility sand dynamic balance by using Modified Agility T test and Dynamic Leap Balance Test (DLBT). Results: The Core Strengthening exercise resulted in significant gains in directions of DLBT and Modified T- test in recreational football players especially in experimental group as compared to control group. Conclusion: On the basis of the result and findings the researcher concluded that the four weeks of Core strength exercises program was effective in increasing in agility and dynamic balance in football players.***

Keywords: Football, Agility, Dynamic balance, Modified agility T test, Dynamic leap balance test

1. Introduction

Football is the world's most popular ball game with numbers of participants and spectators. Simple in its principal rules and essential equipment, the sport can be played almost anywhere, from official football playing fields (pitches) to gymnasiums, streets, school playgrounds, parks, or beaches. Football 's administering body, the Federation global de Football Association (FIFA), assessed that at the turn of the 21st century there were around 250 million football players and over 1.3 billion individuals "intrigued " in football; in 2010 a consolidated TV crowd of in excess of 26 billion watched football 'head competition, the quadrennial month-long world cup finals. Football as it is brought in North America, is the most well-known sport around the world. There are at present around 200 million players, 40 million of whom are female. (1)

Core stability is an essential part of practical development, fundamental in everyday living and athletic exercises and in assessment of functional movement. (2, 3)

Muscle strength, flexibility, endurance, coordination, balance and movement efficiency are essential components and integral parts of performance to achieve the functional movement in skill related to sports. (4, 5)

To accomplish ideal execution in beginner and elite athletics, it is vital that the body has adequate strength and durability. Core stability and balance are fundamentally significant for a wide range of sports and exercises. Although many games branches requires a decent balance, power age or body symmetry, they all rely upon core stability in three planes. (6)

As indicated by another review, it is accepted that the weakness or absence of coordination in core muscles upsets the exchange of energy, furthermore strain and abuse leads diminished viability of developments which additionally may lead to injuries.(7,8)

Core exercise stated as not only playing a key role in reducing back pain and rehabilitation of injuries but also avoiding and reduction of injuries in lower extremities as well. (9, 10)

Core muscles are important components in maximizing balance and athletic performance in lower extremity movements. While stabilize the trunk and spine during upper extremity movements such as jumping, running and throwing. (10, 11)

It is theorized that a strong Core region will ease the transfer of force from the lower body to the upper body while making the energy consumption in the body more efficient. (12)

Physiologically, it is accepted that Core strength stability phases of preparation give expansion in maximal strength and viable utilization of shoulder , arms and legs muscle , in light of havingmore tension on lower limit muscles of sprinters, it is critical to prepare Core muscle ,particularly

the pelvic and trunk.[12,13]

Agility, leg power, and leg speed are believed to be important physical component necessary for successful performance in many sports and recreational activities. [14]

For this reason, we have modified the classical T – Test for referees by addition side steps, quick turning and backward steps to test agility skills and their speed .[15]

The classical T – Test was used the imperial units (5 yards and 10 yards) to measure the distanceof the cones. We used the metric units (5 meters) [15]

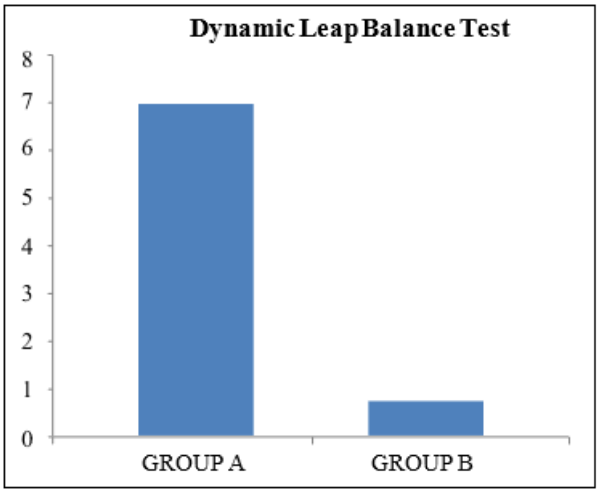
2. Procedure

The participants for the study was selected based on the inclusion criteria and the informed consent form was obtained from them. All related information from the subject is recorded including the demographic data and athlete's history. Assessment was done based on outcome measures'total number of participants for this study were 30 (n=30).30 recreational football players were chosen for this study (age between 19-23 years) and randomly assigned into experimental group (n=15) and control group (n=15). To improve the physical fitness of the football players, the subjects of Experimental Group was given 4-weeks of Core Strength exercises and the Control Group was kept under practices only without giving any specific training. This test item was administered on the subjects before administering the Core Strength exercises to obtain the data of pre-test and post-test score by using Dynamic leap balance test (DLBT) and Modified Agility T – Test. Before conducting the test the method of execution was clearly explained and practically demonstrated to the subjects. There were different stations with different activities in Core strength exercises. The group performed their respective Core strength exercises for the period of 4-weeks (28) days, for three (3) days in a week alternatively on Monday, Wednesday and Friday. The training program was consists of 10 minutes of warming up and cooling down exercises involving jogging, stretching and mobility exercises.

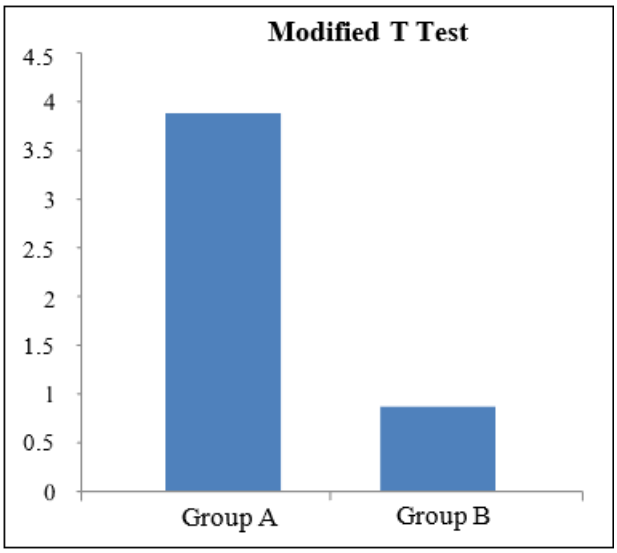
The Experimental group performed Core Strength exercises. The subjects performed differentexercises for 20 repetitions in each station with a 1 minute recovery time.

Exercises	Sets	Repetition	Rest (Min)
Plank	3	20	1
Bird Dog Position	3	20	1
Pelvic Bridging	3	20	1
Single Leg Pelvic Bridging	3	20	1
Crunch Cycle Exercise	3	20	1
Cross Crunch Exercise	3	20	1
Back Extension	3	20	1
V Up Exercise	3	20	1

Outcome Measure	Mean		Standard Deviation		T Value	P Value
	Group A	Group B	Group A	Group B		
DLBT	6.96	0.7266	2.336	2.496	7.06	.00001



Graph 1: Shows the mean difference between Group – A & Group – B for Dynamic LeapBalance test



Graph 2: Shows the mean difference between Group – A & Group – B for Modified T-test

Inter-group analysis (between groups): -
Comparing the effects of treatment on Group-A & B in terms of changes in Modified T –Test. The hypothesis is tested by unpaired sample t-test.

Table 2: Shows the mean difference between Group – A & Group – B for in ModifiedT –Test. test.

Outcome Measure	Mean		Standard Deviation		T Value	P Value
	Group A	Group B	Group A	Group B		
Modified T – Test	3.873	0.866	1.747	0.743	6.131	.00001

Table 1 describing and comparing the effects of treatment on Group-A & B in terms of changes in Dynamic Leap Balance Test. It shows the mean difference between Group – A (6.96) & Group – B (.72) for Dynamic Leap Balance test.

Table 2 describing and Table 3.2 Comparing the effects of treatment on Group-A & B in terms of changes in Modified

T –Test. Shows the mean difference between Group – A (3.873) & Group – B (.866) for in Modified T

The statistical analysis with spearman's correlation coefficient 'ρ' shows correlation for Balance and agility with Dynamic leap Balance test and Modified T-test Table.

The results of the present study show statistically and clinically significant correlation for the recreational football players which have a relationship between Balance and Agility.

TABLE 1 Shows the T value and p value between Groups – A & Group – B for Dynamic LeapBalance test. The t-value is 7.06076. The p-value is < .00001. The result is significant at $p < .05$.

TABLE 2 shows the mean difference between Groups – A & Group – B for in Modified T test. The t-value is -6.13109. The p-value is < .00001. The result is significant at $p < .05$

3. Discussion

In this study, the effects of 4-week Core strength exercises on Dynamic balance and Agility performance were investigated. When the results were examined, a statistically significant improvement was observed in the experimental groups in terms of Dynamic Balance and agility performance. In addition, when the difference between the groups was compared, it was found that there was a statistically significant difference in the Dynamic balance and Agility tests after 4 weeks in the Experimental group.

The analysis revealed that both groups improved statistically during the study period but the experimental group showed a greater statistical improvement when compared with the control group, which emphasizes the fact that core muscular training improves these specific skills in the footballers. **W. Ben Kibler** core stability creates several advantages for integration of proximal and distal segment in generating and controlling forces to maximize athletic function. The larger bulkier muscles in the central core create a rigid cylinder and large moments of inertia against body perturbation while still allowing a stable base for a distal mobility. [(16)]

Despite dynamic balance is dependent from different factors (e.g., range of motion, sex, movement abilities, strength and proprioception) it would be expectable to observe some sensitivity of the test to different competitive levels, but hypothesizing a favorable tendency for professional players. However, in the current study, it was found that semi-professional players had significant better scores in both dominant and non-dominant legs. [(17)]

Thus, the results reject the null hypothesis and accept the alternate hypothesis showing correlation between the variables used. Furthermore, research must focus on the correlation withlarge sample size of competitive recreational football population from different cities in and around Tamilnadu as well as in other cities around India.

Future research may extend this work by analyzing more physical parameters that are involved in.

We consider that the above-mentioned studies can provide further insight in assessing and adapting the training programed.

4. Conclusion

The present study concludes that there is a significant correlation between the core strengthening exercises with Dynamic balance and Agility among the recreational football players.

As a result, it can be seen that 4 weeks of Core Strengthening Exercises s in recreational footballplayers has a positive effect on the Dynamic balance and Agility.

Performance improvement in Agility and Dynamic balance requires various training methods working together and does not rely only on the Core training.

5. Limitations

- Small sample size
- Study was performed with only recreational healthy players.
- The exercises were prescribed only on alternatives days.
- Lack of previous research studies on the topic

Recommendations

- Can be done with a large sample size.
- Performance improvement in agility requires various training methods working together and does not rely only on the core training.
- Core muscle exercises should be included in the training program in addition to lower extremity muscles for improving static and dynamic postural control.
- Core strength exercises performed in conjunction with plyometric exercises, are recommended to improve sports performance .Several studies evaluated the effect of Core strength exercises on sports performance. Most of them are purposes from a length of 4 to 12 weeks; 8-week programs are the average length
- These findings provide a basis for further research to train and evaluate the specific role of Core strength exercises in performance.

Source of Financial Support in the Form of Grants: Nil

Registration Number in Case of Clinical Trials: NA

Author's Contribution:
- **Study Conception and Design:** Sonam Nidhi, Jawahar V
- **Data Collection:** Jawahar V
- **Analysis and Interpretation of Results:** Sonam Nidhi, Jawahar V
- **Manuscript Preparation:** Sonam Nidhi, Jawahar V

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