IOSR Journal of Sports and Physical Education (IOSR-JSPE)
e-ISSN: 2347-6737, p-ISSN: 2347-6745, Volume 7, Issue 4, (Jul. – Aug. 2020), PP 06-11
www.iosrjournals.org

A Study to Evaluate Effectiveness of Reaction Ball Training On Lower Limb Reaction Time and Agility in State Level Football Players

Rajguru Vijayendra[1], Maurya Neelam[2]
[1](Associate Professor, PES Modern College of Physiotherapy, India)
[2](Intern, MGM College of Physiotherapy, India)

Abstract: *In football, players get a split second through their quick reaction to either kick or defend the ball. So, reaction time is important aspect of football. Agility is important for competitive sports such as football. Our study aims to evaluate the effect of reaction ball training on lower limb reaction time and agility in state level football players. This experimental study was conducted on male football players practicing at state level in Navi Mumbai for duration of 6weeksA total of 46male football players were included in this study and were divided in two groups of 23 each. Lower limb reaction time was assessed using validated reaction time apparatus and agility was tested using T-test of agility. Both lower limb reaction time and agility were significantly improved (<.005) in reaction ball training group followed by conventional group after 6 weeks of training.*

Hence the above study showed that reaction ball training improved lower limb reaction time and agility in state level football players.

Date of Submission: 27-07-2020 Date of Acceptance: 11-08-2020

I. Introduction

Reaction time is the duration between application of stimulus to the onset of response.[1] Psychologists have named three basic kinds of reaction time experiments (Luce, 1986; Welford, 1980) -simple reaction time experiment where there is one stimulus and one response, recognition reaction time experiment where there are some stimuli that should be responded and not other stimulus, Choice reaction time experiment where there are multiple stimulus and multiple response.[2]In sports and games, in which movements of a participant are conditioned by signals, by movements of opponents, or by motion of the ball, reaction time is of great importance.[3] Each athlete can learn to improve reaction time as athletes who have the fastest reactions have more thinking time to perform their specific sports skills and achieve wining performance activity. There will always be individual differences, but each athlete can learn to improve reaction time. It is even more valuable if players practice to improve reaction time in the context of game situations.[9]At present, there is no consensus among the sports science community for a clear definition of agility [4].Agility is the defined as "a rapid whole body movement with change of velocity or direction in response to as stimulus".[4] Agility is defined as the ability to change direction rapidly, without losing balance, using a combination of strength, power, and neuromuscular coordination. ".[4]Agility skill is classified as simple when there is planned movement and planned environment, temporal when there is planned movement and unplanned environment, spatial when there is unplanned movement and planned environment, universal when there is unplanned movement and unplanned environment.[7] A football player changes direction every 2–4 seconds [5] and makes 1,200–1,400 changes [6] of direction during a game. In a game situation, the changes of directions may be initiated to either pursue or evade an opponent or react to the moving ball. Therefore, it has been recognized that the response to a stimulus is a component of agility performance.[7]In competitive sports, particularly in sports that use a ball, the ability to rapidly process various types of changing information and to quickly react to different stimuli is extremely important for athletes.[8]

II. Material And Methods

This experimental study was carried out on male football players playing at state level in Navi Mumbai.

A total 46 adult subjects age between 18-23 years were for in this study.

Study Design: experimental study
Study Location: Navi Mumbai
Study Duration: six weeks.

Sample size: 46.
Inclusion criteria:
1. Male football players.
2. Age 18-23 years.
3. Football players practicing for a minimum of 3 years.
4. Football players who have participated at state level.

Exclusion criteria:
1. Any neurological or cardiovascular conditions
2. Any lower limb injuries or trauma such as fractures, sprains or lower back pain in the last 6 months.

Procedure methodology
After written informed consent was obtained, Right and left lower limb reaction time was taken using validated body reaction time apparatus which when provides a visual stimuli , player responded by clicking on the bar below the particular light. This was done for three readings for right and left lower limb. The mean of three readings was calculated and noted as a subject`s reaction time.
Agility was tested using T-test of each player. The TT was administered using the protocol outlined by Semenick.[10] The subject started the test with both of his feet behind starting point 1 and after the sound signal. First, he sprinted 9.14 m forward to point 2 and touched the cone. Then, he shuffled 4.57 m to the left and touched cone 3. After that, he shuffled 9.14 m to the right and touched cone 4 and then 4.57 m to the left, back to point 2. Then, the player backpedals passing the finish line at point 1. [11]
Participants were divided into two groups of 23 each .

Group A: **Reaction ball Group:**
Total duration : 1 hour
Warm-up:5 minutes of jogging and static stretching for 5 minutes each to rule out any muscle asymmetry, lengthen and elongate the muscles and to avoid any discomfort while performing drills.
Dynamic stretching for 10 minutes which include walking lunges with rotation, heel ups, side toe taps, front toe taps, high knees, and Frankenstein walks[14]. Each reaction ball drill performed for 10minutes.

Reaction ball drills:
1)The Side Step: This exercise involves quick movement using side-to-side steps. The player catches the ball with a minimal amount of steps. Standing approximately 5 feet away from the wall, facing the wall & Bounce the ball off the wall and catch it using one or both hand then Slide toward the ball using side-to-side steps but Do not chase the ball.[12]

2)Ball Drops Drill : The player and coach stand 5 m away from each other. The coach has a reaction ball. The player assumes an athletic position. The coach holds the ball out to the side at shoulder height and then randomly drops it. As soon as the coach releases the ball, the athlete sprints toward it and catches it before it bounces twice. The player catches the ball in a good athletic stance. [13]

Conventional drills
Agility pole drill: player starts with sprinting from cone 1 and then shuffling to agility poles set at distance 0.5 m away from each other, poles being lined in three and two poles in a row and then sprints to cone 2. Distance between cones agility poles being 2 m.
Reactive sprint and pedal back: Two cones were placed 9 m apart. The athlete began by standing in an athletic position at cone 1. On the go signal, the athlete ran forward toward cone 2. When the coach says switch, the athlete immediately decelerates and changes directions, backpedaling to cone 1. [13]
Group B: **Conventional drill group**:
Total duration 40 minutes
Warm-up:5 minutes of jogging and static stretching for 5 minutes .
Dynamic stretching for 10 minutes which include walking lunges with rotation, heel ups, side toe taps, front toe taps, high knees, and Frankenstein walks.[14]
Conventional drill: Agility pole drill and reactive sprint and pedal back drill for 10 minutes each.
Players in both groups were assessed for reaction time and agility after 6weeks.

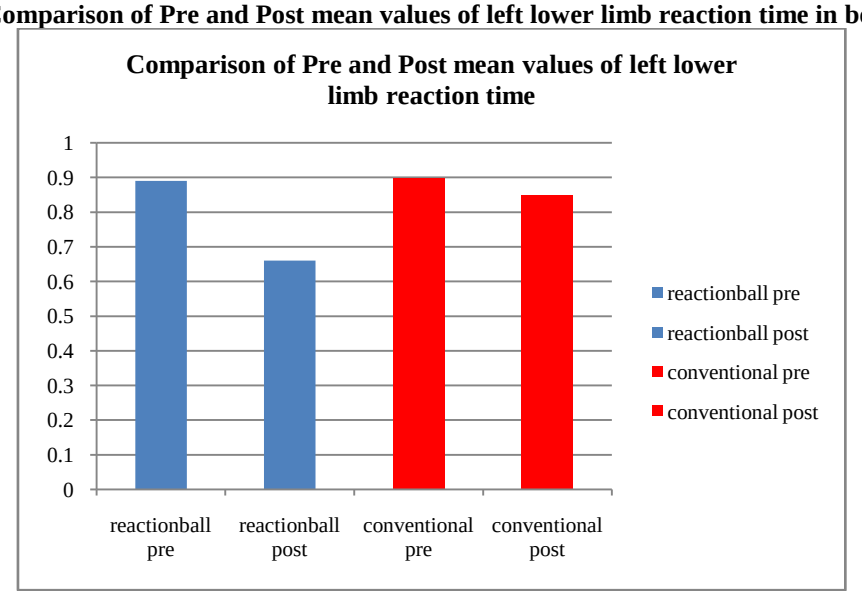
Statistical analysis
The results were calculated using SPSS software version 16.Normality was checked using the Shapiro-Wilk test.

Normality value for right reaction time, left reaction time, agility of reaction ball group was normally distributed data, paired t test was used for intra group comparison and unpaired t test for inter group comparison. Right reaction time and agility of conventional group was normally distributed data, paired t test was used for intra group comparison and unpaired t test for inter group comparison. Left reaction time of conventional group data was distribution free, Wilcoxon test was used for intra group comparison and Mann Whitney-U test for inter group comparison. The level $P < 0.05$ was considered as the cutoff value or significance.

III. Result

After six weeks of training, there was a significant difference in pre and post values of right lower limb reaction time, left lower limb reaction time groups and agility in both groups as $p<0.05$.

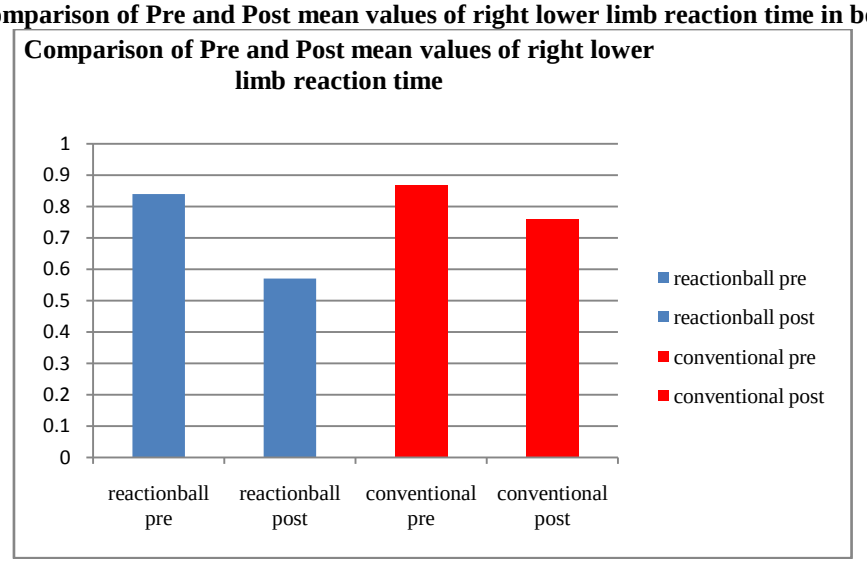
Table 1: Comparison of Pre and Post mean values of left lower limb reaction time in both groups



LEFT REACTION TIME	INTERVENTION		CONVENTIONAL	
	PRE	POST	PRE	POST
MEAN	0.89±0.66	0.66±0.82	0.90±0.07	0.85±0.08
P-VALUE	0.00*		0.00#	

* As calculated by paired t test
# As calculated by Wilcoxon test

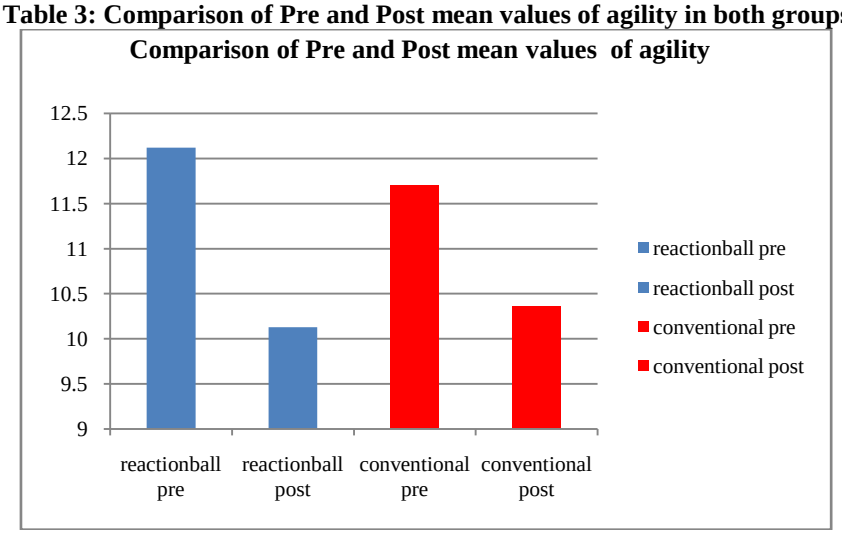
Table2: Comparison of Pre and Post mean values of right lower limb reaction time in both groups



RIGHT REACTION TIME	INTERVENTION		CONVENTIONAL	
	PRE	POST	PRE	POST
MEAN	0.84±0.80	0.57±0.72	0.87±0.09	0.76±0.09
P-VALUE	0.00*		0.00#	

* As calculated by paired t test
# As calculated by paired test

Table 3: Comparison of Pre and Post mean values of agility in both groups

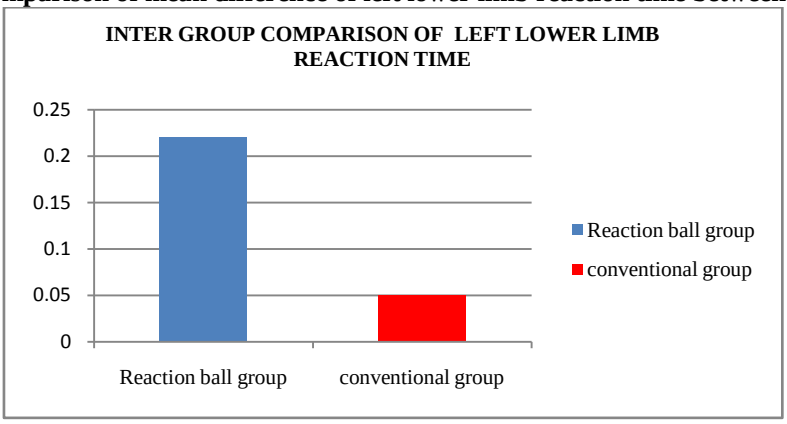


AGILITY	INTERVENTION		CONVENTIONAL	
	PRE	POST	PRE	POST
MEAN	12.12±1.17	10.13±0.61	11.7±0.84	10.36±0.73
P-VALUE	0.00*		0.00#	

* As calculated by paired t test
# As calculated by paired test

After six weeks of training, there was a significant change in left lower limb reaction time, right lower limb reaction time and agility with p=0.00,p=0.00,p=0.10 respectively.

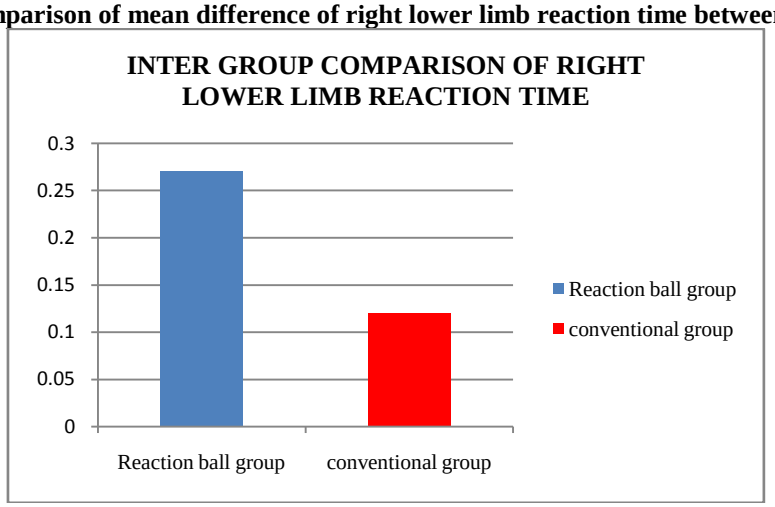
Table 4: Comparison of mean difference of left lower limb reaction time between two groups



LEFT REACTION TIME		
group	mean	p value
Reaction ball group	0.22±0.12	0.00*
conventional group	0.05±0.03	

*As calculated by Mann Witney U Test
Inference There was a significant decrease in left lower limb reaction time in reaction ball group than conventional group with p<0.05

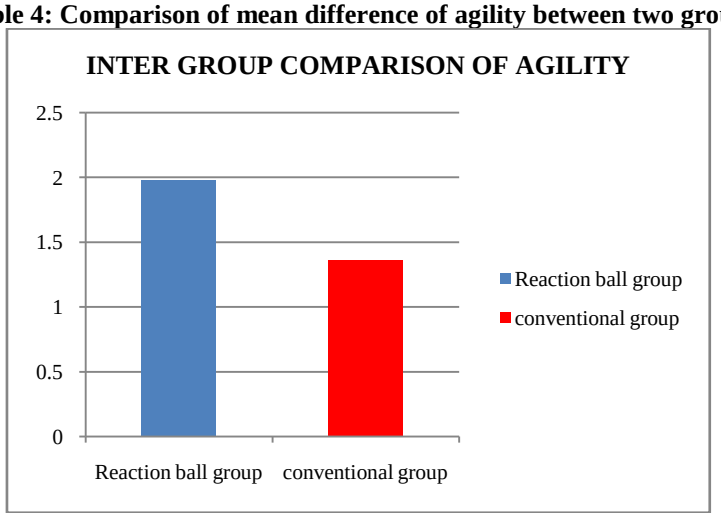
Table 4: Comparison of mean difference of right lower limb reaction time between two groups



RIGHT REACTION TIME		
group	mean	p value
Reaction ball group	0.27±0.10	0.00*
conventional group	0.12±0.06	

*As calculated by unpaired t test
Inference: There was a significant decrease in right lower limb reaction time in reaction ball group than conventional group with $p<0.05$

Table 4: Comparison of mean difference of agility between two groups



AGILITY		
group	mean	P value
Reaction ball group	1.98±0.91	0.10*
conventional group	1.36±0.63	

*As calculated by unpaired t test
Inference: There was a significant decrease in agility in reaction ball group than conventional group with $p<0.05$

IV. Discussion

The aim was to study effect of reaction ball training on lower limb reaction time and agility in state level football players. Evidence indicating that reaction ball training improves reaction time and agility in football players was given in this study.

The study revealed that reaction ball drills was superior mode of training than conventional drills in football players after 6 weeks of training. The study revealed that reaction ball drills improves reaction time , as the reaction ball drills work on the principles of 1)detection of cue, 2) decision making,3) anticipation about the bounce of ball ,4) intensity of stimulus,5) limited time available[15]. Exercise which works on these principles were proved to help in improvement of reaction time given by various studies carried out in various sports.

Reaction ball drills also improve agility in football players was found from this study. The improvement in agility in football players can be credible to improvement in:

A-cognitive aspects of decision making speed and accuracy of 1) anticipation,2)visual scanning 3)pattern recognition and B-physical aspects of 1) leg muscle qualities such as reactive strength,2)straight speed and

C-technical improvements such 1) feet placement, 2) adjustments of steps to accelerate, 3) body lean and posture[16].

Improvement in reaction time in conventional group is credible drills work on to the principles of 1)detection of cue,2) decision making,3) intensity of stimulus [15] .

Various studies have also concluded the positive effect of dynamic stretching on reaction time. Dynamic stretching involves controlled movement through the active range of motion (ROM) for a joint, and incorporates calisthenics movements (e.g. lunging) and running drills that include forward, lateral, and change-of-direction movements.[17]

V. Conclusion

The study concluded that reaction ball drill was more effective in improving lower limb reaction time and agility in state level football players.

References

[1]. Barry L. Johnson, Jack K. Nelson. — Practical measurement for evaluation in physical education. Surjeet Publication 3rd edition, 1988

[2]. Luce, R. D. 1986. Response Times: Their Role in Inferring Elementary Mental Organization. Oxford University Press, New York.

[3]. Gavkare A, Nanavare N. Auditory , visual and whole body reaction time in athletes. Indian Medical Gazette —June 2013 214-219

[4]. Sheppard JM,WB Young. Agility Literature Review: Classifications, Training and Testing. Journal of sports sciences. 2006 24(9):919-32

[5]. Verheijen R. Handbuch fur Fussballkondition. In: Sporis G, Jukic I, Milanovic L, and Vucetic V. Reliability and factorial validity of agility tests for soccer players. J Strength Cond Res 24(3): 679–686, 2010.

[6]. Bangsbo J. Time and motion characteristics of competition soccer. In: Science Football (vol 6). Reilly T and Korkusuz F, eds. London, UK: Routledge, 1992, pp. 34–40.

[7]. Chelladurai, P. Manifestations of agility. Canadian Association of Health, Physical Education and Recreation. 42:36-41, 1976.

[8]. shinji T, shinichi D, et al,agility Characteristics of Various Athletes Based on a Successive Choice-reaction Test. American Journal of Sports Science and Medicine. 2016; 4(4):98-102.

[9]. Thakur, Tara. A study on variation of Reaction time with respect to playing positions of Football players Journal of sports and physical education. Volume 3 2016.

[10]. Semenick, D. The T-test. National Strength and Conditioning Assoc Journal 1990 12: 36–37

[11]. Sporis, G, Jukic, I, Milanovic, L, and Vucetic, V. Reliability and factorial validity of agility tests for soccer players. J Strength Cond Res 2010 24(3): 679–686

[12]. B.Kannabiran, V.S.T.Saikumar A Study On The Effectiveness Of Reaction Ball Training For Novice Cricket Player To Improve Hand-Eye Coordination And Reaction Time.

[13]. *Developing agility and quickness* National strength and conditioning association ,human kinetics May 2017

[14]. Rajguru V,Kadiwala T,Comparission of effect of dynamic stretching versus exercise drill on reaction time in cricket players, International Journal of Sports Sciences and Fitness, Volume7(2) 2017

[15]. Mackenzie, B. (1998) *Reaction Time* https://www.brianmac.co.uk/reaction.html

[16]. Sheppard JM, Young WB. Agility Literature Review: Classifications, Training and Testing. Journal of Sports Science 2006; 24(9): 919-32

[17]. Behm and Chaouachi.A review of the acute effects of static and dynamic stretching on performance.2011. 111(11):2633-51

Rajguru Vijayendra, et. al. "A Study to Evaluate Effectiveness of Reaction Ball Training On Lower Limb Reaction Time and Agility In State Level Football Players." *IOSR Journal of Sports and Physical Education (IOSR-JSPE,)* 7(4) (2020): 06-11.