



EFFICTIVENESS OF UPPER EXTREMITY PROPRIOCEPTIVE TRAINING EXERCISES ON REACTION TIME IN BATSMEN: AN EXPERIMENTAL STUDY

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Abstract

Objectives: To find effectiveness of proprioceptive training exercises in upper extremity on reaction time in batsmen by using ruler drop test after 3 weeks

Methods: Experimental study was performed from Oct 22 to April 22. A convenient sampling technique was applied to select 38 participants.

Results: There were significant effect of upper extremity proprioceptive training exercises on reaction time in batsmen seen ($p < 0.0001$)

Conclusion: According to results it can be concluded that proprioceptive exercise training for upper extremity shows significantly beneficial in improving reaction time in batsmen.

Keywords: Batsmen, Reaction time, proprioceptive exercises, ruler drop test

I INTRODUCTION

Cricket is a sport that requires quick reaction time and precise movement. Particularly with batsmen who's task is hitting the ball thrown by opposing team bowlers. A batsmen reaction time that are crucial that determine their success in the game .Therefore, various training methods have been employed to enhance their reaction time. Upper extremity proprioceptive training is one of the training that enhance an individual's awareness in their body position and movement which can improve their ability to react quickly and accurately to external stimuli.

Batting in cricket is known to be intricate combination of mental , perceptual and technical skill[1] The fastest bowler often bowl at around 150Km/hr. This would give batsmen less than 0.424 seconds to react [3] Different types of shots a batsmen can play –Block, cut, sweep, drive, edge pull [13] for example taking sweep and drive short in sweep short batsmen has to move bat in horizontal direction and for drive short batsmen has to move bat in vertical direction thus batsmen has to move the bat in different directions to hit the shot and make the run.

Proprioception is subsystem of the somatosensory system which also includes touch, and temperature sense from the skin and musculoskeletal structures.[18] Proprioception is body's sense of position and motion , which includes body segment static position, displacement ,velocity ,acceleration ,and muscular sense of force and effort .[4] Proprioceptors are sensory endings that derive various stimuli in response to mechanical deformation. This stimuli are converted into electrical impulses and sent to brain where they are transformed into relative position and movement parameters.[18] It is an important sensory function for all normal mobility actions including administering Dynamic balance and the skill of moving in the right manner[7]

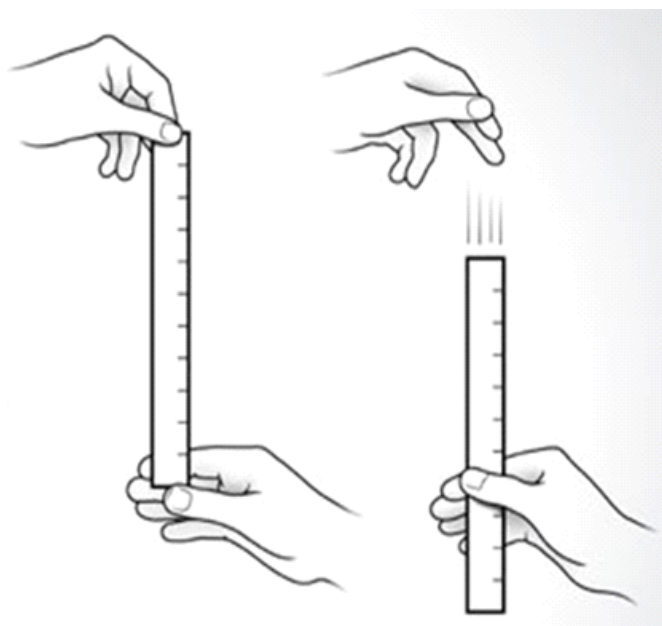
As the proprioception gets affected, the performance of the player during sports gets affected. Reaction Time (RT) is defined as time between the application of stimulus and the body's response to stimulus. Reaction time can be divided into 3 types:

- 1) Simple reaction time (1 stimulus - 1 response)
- 2) Choice reaction time (multiple stimuli - multiple response)
- 3) Recognition reaction time (multiple stimuli - only one will get response)

Factors affecting reaction time are age, gender, arousal, fatigue, distraction, stress, intelligence, left and right hand. [5] Reaction time in batting scenario the primary stimulus would be the bowler releasing the ball and it beginning to travel toward batsmen. After stimulus eye must detect this before relying the relevant information to the brain. The brain then proceed to interpret the information to see and formulate an appropriate response the brain relays the chosen bodily response to the motor cortex. The motor cortex relays the signal through spinal cord to the appropriate parts of body through which will cause them to move and enact the response the brain has specified [6]



Ruler drop test: Purpose is to measure reaction time, hand eye quickness and attentiveness. The subject to be tested stands/sit near the edge of table resting their elbow on the table so that their wrist extending over the side. Therapist/assessor holds the ruler vertically in the air between subject's thumb and index finger but not touching. Align zero mark with subject's fingers. Subject should indicate when ready and instruct to catch the ruler and release the ruler and let it drop. Subject must catch it as quickly as they see it fall.



II .NEED OF STUDY

- Cricket is one of the fastest ball game and is characterized by perceptual uncertainty and time pressure and hence players require short RT for success. RT can be improved by exercise but there is less evidence on the different type of exercise that can be used to improve RT in cricket.
- Proprioceptive training following lower extremity is commonly recommended but there is little information about Proprioceptive training following upper extremity especially in cricketers.
- There is little information on improving reaction time in batsmen.
- Lack of ligatures following on Proprioceptive exercises as a training program in cricketers.

III. AIM

To Study Effectiveness Of Upper Extremity Proprioceptive Training exercises On Reaction Time In Batsman

IV.OBJECTIVE

To find effectiveness of proprioceptive training exercises in upper extremity on reaction time in batsmen by using ruler drop test after 3 weeks

V. HYPOTHESIS

Null hypothesis [H0]: There will be no effect seen on upper extremity proprioceptive training on reaction time in batsmen after 3 weeks

Alternative hypothesis [H1]: There will be a significant Effect of upper extremity proprioceptive training on reaction time in batsmen after 3 weeks

VI. METHODOLOGY

Study design: Pre –post Experimental study

Sample size: 33

Sample method: Convenient

Study population: Children between age 12-16 who are going to cricket practice

Study setting: Cricket academy in and around Pune

Study duration: 6 months

Duration of intervention: 3 times a week for 3 weeks

VII.MATERIALS

Standard Ruler

Pen

Paper

Wobble board

Gym ball

VIII. Inclusion Criteria:

Age group 12 to 16 year Boys

No any case of visual and auditory impairment

MMT of upper limb grade 4 and above

Subjects those who are not using spectacles and lenses

Subjects who are going to cricket practices regularly since 6 months

IX.Exclusion Criteria:-

Recent fracture or injury to upper extremity since 6 months

Congenital deformity and disability

Specially able children with mental retardation, attention deficits

Female players

Those who are taking specific physical training other than cricket during test period.

Involved in other gym activities during test period

X.OUTCOME MEASURES

For measuring reaction time:

1.Ruler drop test

(Reliability- 0.74 according to intra class correlation coefficient)[10]

Reaction time was calculated using the

Formula:

$$t = \sqrt{2d/g}$$

t = reaction time (in seconds)

d = the distance at which the ruler was

Caught (in meters)

g = force of acceleration of gravity (9.8m/s²) [4]

XI. PROCEDURE

Study was begun with the presentation of synopsis to an ethical committee in PES MCOP

The subjects were selected from the various parts of the city on the basis of their inclusive and exclusive criteria. The subjects were explained about the Study before starting the procedure. Assent and consent form was taken from the parent and subjects who wish to participate in the study

Reaction time was tested by ruler drop test before start exercise program and noted the result

The subjects were underwent proprioceptive training for 3 times a week for 3 weeks.

(Repetition= week 1-7 rep , week 2-10 rep ,week 3-15 rep)

At the end of 3weeks the subject were reassessed using ruler drop test and the data was recorded again

Data analysis was done.

XII. EXERCISE PROTOCOL

Proprioception training :

Proprioception training exercises was given to an Experimental group. The following exercises were given as a part of upper extremity proprioceptive training.[9]







Exercise	Week 1	Week 2	Week 3
Rhythmic stabilization	1 min hold	1.5 min hold	2 min hold
Quadruped	1 min hold	1.5 min hold	2 min hold
Kneel push-up	30 sec hold	1 min hold	1.5 min hold
Prone on elbows	30 sec hold	1 min Hold	1.5 min hold
Push up	30 sec hold	1 min hold	1.5 min hold
Hands on wobble board		30 sec hold	1 min hold
Elbow on gym ball		30 sec hold	1 min hold
Hands on gym ball		30 sec hold	1 min hold

XIV. DATA ANALYSIS AND INTERPRITATION

The data collected was statistically analyzed using Microsoft excel sheet and Graphpad.com

Effectiveness of upper extremity proprioceptive training on reaction time in batsmen aged 12 to 16 years were analyzed using appropriate parametric test.

Paired t test were used to get difference between pre and post values

The various statistical measures such as Mean, standard deviation (SD) and test of significance where utilized to analyzed data

The results were concluded to be statistically significant if p value is less than 0.05.

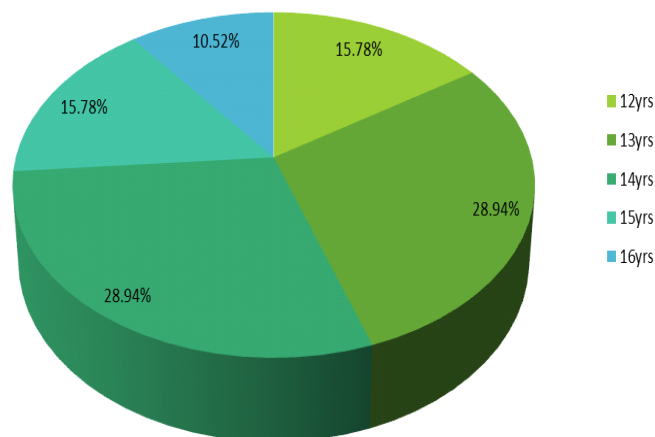
The data were represented in both tabular and graphical format

XV.GRAPHICAL REPRESENTATION

1.Graphical representation of age group distribution

AGE	NUMBER
12yrs	15.78%
13yrs	28.94%
14yrs	28.94%
15yrs	15.78%
16yrs	10.52%

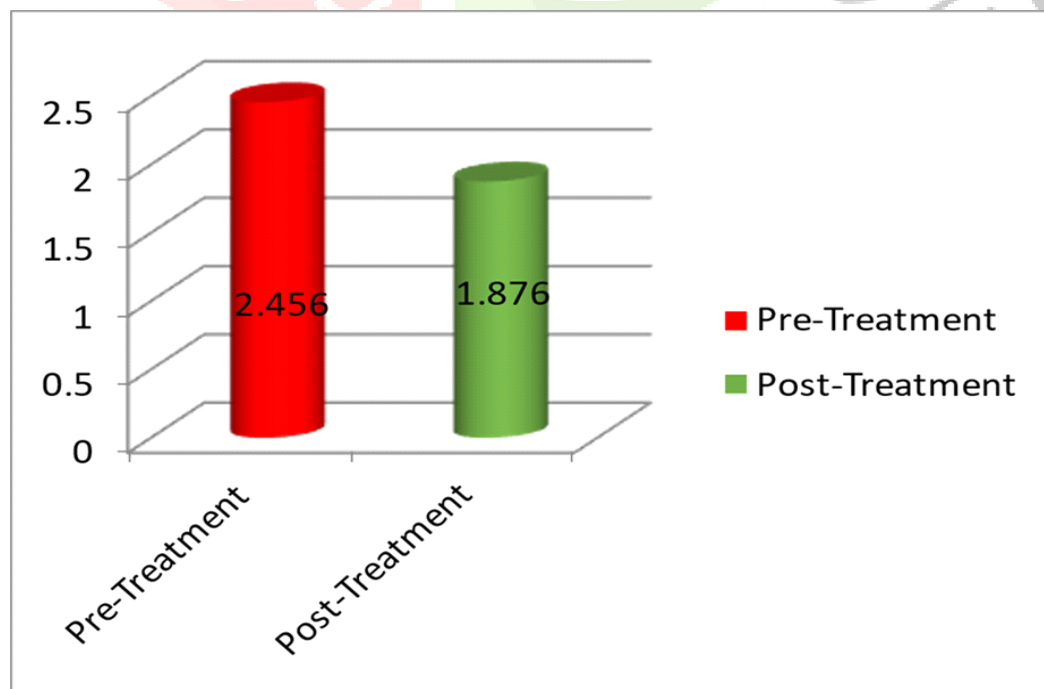
Age group distribution



2.Tabular representation of pre and post treatment

PARAMETRS	PRE TEST		POST TEST		T VALUE	P VALUE	RESULT
Ruler Drop Test	MEAN	SD	MEAN	SD	4.759	<0.0001	EXTREMELLY SIGNIFICANT
	2.456	+0.9417	1.876	+0.8762			

3.Graphical representation of pre and post treatment



XVI.DISCUSSION

The objective of this study was to find effectiveness of reaction time in batsmen by upper extremity proprioceptive training exercises between the age 12 to 16 yrs. Total 38 participants were trained for 3 weeks to find the effectiveness of upper extremity proprioceptive training on reaction time.

Proprioceptive training is a type of training that focuses on enhancing an individual's awareness of their body position and movements. This type of training has been shown to be effective in improving reaction time in a variety of sports.[4]

A study was done by Chitralli Bokil on effectiveness of upper extremity proprioceptive training on reaction time in table tennis players. This shows that upper extremity proprioceptive training along with conventional training is extremely significant to improve reaction time in table tennis players.[4]

Another study was done by Rami Kassem on the effect of proprioceptive training on reaction time. A randomized control trial that concludes that proprioceptive training may have a positive influence on reaction time.[15]

In batting, reaction time is a critical factor that can determine the success or failure of a shot. Research shows that upper extremity proprioceptive training can improve the reaction time of batsmen by enhancing their ability to anticipate the ball's trajectory and position, which can lead to more successful shots and improved performance. A study was done by Leon Gomes on the proprioceptive training in preparation of handball players, showing a significant effect on improving performance.

The ruler drop test is simple to conduct and requires minimal equipment, which makes it a popular method for measuring reaction time. This test involves dropping a ruler and measuring the time it takes for the person to catch it.

According to the results of the present study, it is showing that the pre and post assessment of reaction time after proprioceptive training exercises found that the P value is less than 0.0001, which is considered extremely significant. The pre-treatment mean was 2.45 with SD 0.9417, while the post-treatment mean was 1.876 with SD 0.8762. The T value was 4.759. Proprioceptive exercises are activities that challenge and improve sense of position, movement, and orientation in space, typically through movement that requires balance, coordination, and body awareness.

Improved proprioception can help to reduce the risk of injury by improving balance and stability, as well as enhancing the body's ability to react quickly and appropriately to sudden movements or changes in direction.[17]

XVII. CONCLUSION

According to the results, it can be concluded that proprioceptive exercise training for upper extremity shows significantly beneficial in improving reaction time in batsmen.

XVIII.LIMITATION

Female batsmen were not included.

Lack of long-term follow-up.

XIX.FUTURE SCOPE

Research can be done on a study of any significant variations in reaction time between males and females.

Research can be done to compare the effectiveness of proprioceptive training on improving reaction time in fast bowlers and batsmen.

Study can be done to compare the effectiveness of proprioceptive training on reaction time in right-handed batsmen and left-handed batsmen.

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