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Effect of eight weeks proprioceptors training on agility of male Kho-Kho players

[*1] Ashutosh Pandey, [2] Dr. Reeta Venugopal
[1] Research scholar, School of studies in Physical education, Pt.Ravi Shankar Shukla University, Raipur, Chhattisgarh, India
[2] Professor, School of studies in Physical education, Pt.Ravi Shankar Shukla University, Raipur, Chhattisgarh, India

Abstract
Objective: The purpose of the study was to find out the effect of eight weeks proprioceptive training on agility of male kho-kho players.
Methodology: Fifty (25= experimental & 25= Control group) male national level kho-kho players were selected purposively as subject for the present study. The age of the subjects ranged between 14 to 18 years. Eight weeks proprioceptive training was considered as independent variable and Agility acts as dependent variable. The design of the study was repeated measure group design since the data were collected at different intervals. The test was conducted before the intervention program i.e. at baseline level, then after 4 weeks & finally after 8 weeks of intervention program. Agility of both the groups was measured by using Illinois agility test. In order to find out the effect of proprioceptive training on agility, Descriptive Statistic and Analysis of Covariance (ANCOVA) was used. Trend analysis was used to find out the trend of improvement. The level of significance was set at 0.05. The data was analyzed by statistical package of social science (SPSS).
Results & Conclusion of the study: The finding of the study showed that the Proprioceptive training improve performance of Illinois agility test of male kho-kho players. Statistically significant difference was found between experimental and control groups in pre, mid and post mean scores, experimental group showed higher scores at ($p < .05$) level.

Keywords: proprioceptive training, agility etc.

Introduction
Proprioception is a sensitivity mechanism present in mammals which coordinates with central nervous system through Mechanoreceptors present in the joint, muscles, & tendons as a result it signals the body how to react & with what amount of tension against a particular message. Proprioception is unconscious initially, but it can be enhanced via training. Proprioception is defined as the awareness of posture, movements & changes in equilibrium as well as the knowledge of position, weight & resistance to objects in relation to the body.
Ya-Wen-Liu, *et al*. (1997) defined proprioception as the conscious awareness of limb position & movement, and is a specialized variation of the sensory modality that encompasses the sensation of joint movement (kinesthesia) and joint position (joint position sense).
Sports training have been an integral part of sportsperson success, trends in this domain is continuously changing as per demand of excellence in sports competitions. Traditional sports training have been incorporated with various emerging advance scientific techniques that lead to enhance performance, in order to achieve peak & consistent performance, modern & innovative concept of sports training should be included in training programs.
Among all the new approaches in sports training one of the rapidly emerging approaches is Proprioceptors training; it has been widely used to increase performance level of sportsperson by elevating sportspersons fitness level.
India is renowned worldwide for its uniformity, culture, traditions and versatility. Physical exercise constituted an important part of Indian culture from ancient time,, there are various indigenous games which were integral part of the Indian culture like Kabbadi and Kho-Kho of which Kabaddi has been recognized at international level where as Kho-Kho is an indigenous sport which is originated from the villages of India not popularized internationally is appealing for its existence and exposure. The game requires well developed physical fitness components, energy, concentration, determination, hard work & skills to achieve top performance. Speed, agility, quickness, reaction time, strength, explosive strength, flexibility etc. are the physical fitness components that lead to top performance in Kho-Kho. Agility as the term indicates is the ability of the individual to respond towards a stimulus quickly & effectively. This game requires vigorous training, therefore the researcher thought of investigating the effectiveness of proprioceptors training on agility for kho-kho players.

Objective of the present Study
The purpose of the present study was to find out the effect of eight weeks Proprioceptive training on agility of male kho-kho players.

Methodology of the study
Selection of Subjects
For the purpose of present study national level male kho-kho players aged 14 to 18 years were selected as subjects. These subjects were divided in experimental group (N=25) and

Control group (N=25) respectively.

Selection of Variable
Eight weeks Proprioceptive training acts as an independent variable and agility acts as dependent variable for the present study.

Criterion Measures
Agility was measured as the minimum time in seconds required in completing Illinois agility test.

Proprioceptive Training
The Proprioceptive training program of 8 weeks, five days/week, once/day was developed for the present study. The total duration of each session was 45 minutes. Repetition exercise starts with 10 repetitions/day which was increased to 2-5 repetitions/day& for timed exercise start from 30 seconds hold which was increased by 10 seconds/day, until 30 repetitions and 60 seconds hold for each exercise were obtained till the last day of week. 10-15 minutes of warming up session was prepared before the commencement of training program, so that the body gets prepared for the training. The progression of training load (exercise) was according to the principles of training i.e. it was increased gradually in relation to the principle of load adaptation.

Illinois agility test (Getchell 1979**)**

Objective
The purpose of the test is to assess agility of the subjects. It is applicable for both boys and girls.

Equipment Required
Flat surface, marking cones, stopwatch, measuring tape & Stopwatch etc.

Specification of the testing area
Four cones were placed at four corners of the ground to indicate the testing area with a dimension of 5 m x 10 m. Another four cones were placed in the centre of the marking area, which were 3.3 meters away from each other. Tester fixed a starting line, turning point and finish line respectively.

Test Administration
Subject is asked to lay on the starting line with his/her head touching the start line & their hands on the shoulder. On the signal "GO" the athletes quickly gets himself in to a position to complete the course in the direction indicated, without knocking the cones up to the finish line, two trails are given to the subject.

Scoring
The best score of the two trials is considered as the timing of the subject. The lesser the time taken by the subject more is his/her agility.

Fig 1: Administration of Illinois Agility Test

Statistical technique used for the analysis of data
In order to find out the effect of eight weeks Proprioceptive training on agility of male Kho-Kho players, Descriptive statistics, and analysis of covariance (ANCOVA) were used. Trend analysis was used to find out the trend of improvement. The level of significance was set at 0.05 the analysis of data was categorized into two sections i.e. Section A & Section.

Section: A
Findings related to Agility
Objective
The purpose of this section was to find out the effect of Proprioceptors training on Agility of male Kho-kho players.

Table 1: Descriptive Statistics for Illinois agility test of experimental and Control group of Male Kho-Kho players

Descriptive Statistics	Different Groups			
	Experimental group		Control group	
	Pre test	Post test	Pre test	Post test
Mean	17.61	16.97	17.47	17.74
Std. Error of Mean	0.13	0.12	0.14	0.10
Std. Deviation	0.65	0.60	0.73	0.52

Skewness	0.08	-0.33	0.38	0.71
Std. Error of Skewness	0.46	0.46	0.46	0.46
Kurtosis	0.30	-0.88	0.04	0.21
Std. Error of Kurtosis	0.902	0.902	0.902	0.902
Range	2.88	2.21	3.07	2
Minimum	16.27	15.78	16.11	17.02
Maximum	19.15	17.99	19.18	19.02
N	25	25	25	25

Table 1 shows the mean & standard deviation of experimental group (Pre-test & Post-test)are 17.61, 16.97, 0.13, 0.12 respectively. Similarly the mean and standard deviation for Control group (Pre-test & Post-test) are 17.47, 17.74, 0.14, and 0.10 respectively.

The above table indicates mean difference in pre-test, post test observations of experimental group and control group higher mean values in agility test in experimental group as compared to control group.

Table 2: Analysis of variance- Comparison of Means of Illinois agility test in Experimental group and Control group of male Kho-Kho players

Observations	Source of variance	Value of Sum of Squares	Value of degree of freedom	Value of Mean Square	Value of 'F'	Significance value
Pre-test	Between Groups	.230	1	.230	.475	.494
	Within Groups	23.219	48	.484		
Post-test	Between Groups	7.465	1	7.465	23.197	.000
	Within Groups	15.448	48	.322		
	Total	22.913	49			

Level of Significant was set at .05.

Table 2 clearly reveals that the obtained 'F' value for Pre test was .475 which was found to be insignificant at 0.05 level, since this value was found lower than the tabulated value 4.04 at 1,48 df. In relation to Post test, significant difference was found between experimental and control group since the obtained 'F' value was 23.197 which was found greater than the tabulated value 4.04 at 1,48 df.

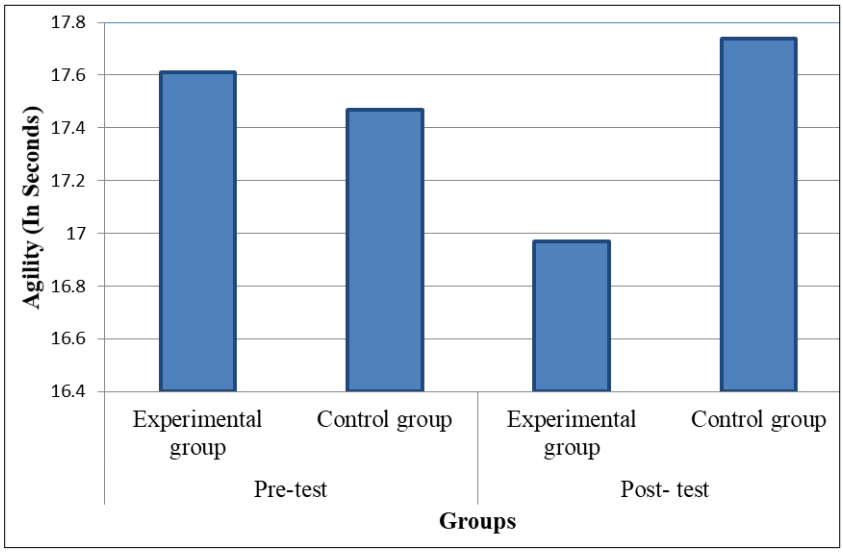

Fig 2: Comparison of Pre-test & Post-test mean scores on experimental and control groups in relation to Agility

Table 3: Adjusted post test Means of Illinois agility test for Experimental Group and Control Group of Male Kho-Kho players

Groups	Value of adjusted Mean	Value of Standard error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental group	16.93	.082	16.771	17.099
Control group	17.78	.082	17.622	17.950

Table: 3 shows the adjusted post-test mean and standard error for the data of Illinois agility test for experimental and Control groups during post testing. The table reveals that the differences in the scores were compensated in the post testing i.e. the effect of covariate was eliminated in comparing the effectiveness of the treatment groups during post-testing.

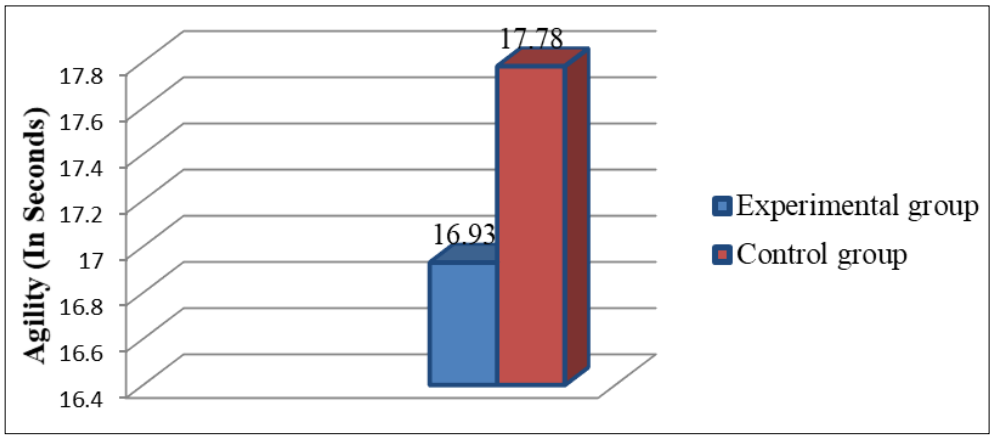

Fig 3: Comparison of Adjusted post-test means among experimental and control groups in relation to Speed

Table 4: Analysis of Covariance and Comparison of Adjusted Post Test Means of Illinois agility test in Experimental group and Control group of Kho-Kho male players.

	Sum of Squares	Degree of freeedom	Mean Square	F-Value	Level of Significance	Partial Eta Squared
Contrast	8.959	1	8.959	54.206	.000	.536
Error	7.768	47	.165			

*The level of Significance was set at 0.05.
F- Value required to be significant at 1, 47 df = 7.21

Table 4 revealed that the obtained 'F' value of 54.206 was found to be significant at 0.05 level, since this value was found higher than the tabulated value 7.21 at 1,47 df. The table also indicates significant difference between the adjusted post-test means of among experimental & control group. The value of partial Eta squared proves that 53.6% change in agility was due to the effectiveness of Proprioceptive training.

Section-B
Purpose
To find out the effect of Proprioceptive training on the trend (Linear and Quadratic Trend) on Agility.

Table 5: Result of trend analysis related to effect of Proprioceptors Training on Agility

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	45698.063	1	45698.063	41819.373	.000
Error	53.545	49	1.093		

Table 5 shows that the F-Value of 41819.373 was found significant at 0.05 level of significance. The table clearly indicates significant trend of improvement due to Proprioceptive training as far as agility was concerned.

Table 6: Result of Linear and Quadratic trend showing effect of Proprioceptors Training on agility

Source of variation	Experimental group	Value of Type III Sum of Squares	Value of Df	Mean Square value	Value of 'F'	Significance value
factor1	Linear	.837	1	.837	3.683	.061
	Quadratic	.001	1	.001	.028	.869
Error(factor1)	Linear	11.138	49	.227		
	Quadratic	2.208	49	.045		

Table 6, reveals that F-Value of 3.683 (in case of linear trend) was found insignificant at 0.05 level of significance in relation to the effect of proprioceptors training on agility. The table also shows F-Value of .028 was found insignificant (in case of quadratic trend) at 0.05 level of significance in relation to the effect of Proprioceptors training on agility.

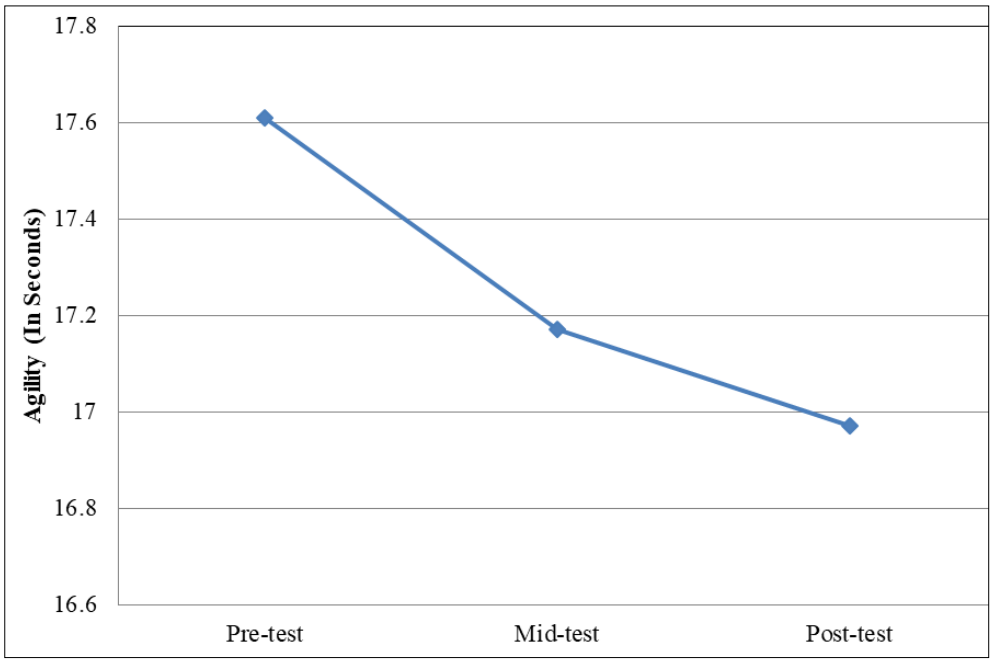

Fig 4: Trend (Linear & Quadratic) of agility in experimental group

Figure: 4 shows the graphical representation of improvement in agility performance due to Proprioceptive training. The graph shows positive improvement in agility performance since the timing decreases gradually.

Discussion and conclusion

The finding of the present study suggested that the participation in proprioceptive training leads to the improvement in agility. Agility requires quick and faster movement against particular stimulus which is facilitated by the proprioceptors. Proprioceptors located in the muscles (muscles spindle) and joints (Golgi tendon organ) receive extra information regarding movement of body in particular direction and directs the body to move quickly and rapidly, thus training of these organ by mean of Proprioceptive training ultimately results in agility improvement.

The result of the present study is supported by various studies done previously. Ganesh (2012) [4] in a study suggested that participation in proprioceptive training leads to significant improvement in agility performance and skill oriented performance in hockey players. The result of the present study is further supported by the study conducted by Miller *et al*. (2006) [2].

Gaurav *et al*. (2013) [1] conducted a study on basketball players aged 14-20 years. subjects for the study were categorized into group A (n=15) & group B (15), group A underwent wobble board proprioceptive training program whereas group B participated in multi-station proprioceptive training, they reported significant improvement in agility & vertical jump performances in group- A which supported the use of conventional proprioceptive training in performance enhancement.

Simek Salaj, Milanovic & Jukic (2007) [3] demonstrated a positive improvement after proprioceptive training program on double leg vertical jump explosive strength and agility of healthy students aged 19 ± 1.2 years**.** Subjects were divided into experimental (n=37) and control (38) groups respectively. Experimental group underwent 10 weeks Propriceptive training with a frequency of 60 minutes 3 times a week. The training programme was a combination of one-leg and double-leg static and dynamic balance exercises. Progression of load was done accordingly. The control group continued to carry out their daily activities during the experiment. The explosive jumping strength and agility were estimated by nine tests at the beginning and at the end of the experiment. The result of the study revealed significant improvement in explosive strength and agility, which supports the existence of present study. In the light of above studies, it is clear that participation in proprioceptive training leads to the improvement in physical fitness components as a result the performance of players also improves.

Conclusion

The result of the present study reported that participation in the Proprioceptive training program, improved agility in experimental group.

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