IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

EFFECTIVENESS OF PROPRIOCEPTIVE TRAINING ON EYE HAND COORDINATION AND FOOTWORK SKILLS IN AMATEUR BADMINTON PLAYERS

An Experimental Study

[1]Dr.Sanuja Kher,[2]Dr.Shweta Pachpute,

[1]BPTH, Late Shree Fakirbhai Pansare Education Foundation College of Physiotherapy, Nigdi, Pune, Maharashtra, India

[2]HOD and Professor of Musculoskeletal Physiotherapy Department, Late Shree Fakirbhai Pansare Education Foundation College of Physiotherapy, Nigdi, Pune, Maharashtra, India

Abstract: Badminton is an indoor game played across the net with a shuttlecock and a racket. It is considered one of the most popular racket sports among amateurs as well as professionals and serves to be a great recreational activity. The primary goal in badminton is to score points by hitting the shuttlecock (or birdie) over the net and into the opponent's side of the court. Badminton demands a high level of physical fitness, including speed, agility, and endurance. It also requires good hand-eye coordination, reflexes, proprioception and strategic thinking. In this study 30 Amateur Badminton players within the age group of 12-17 years were selected and were divided into control and experimental groups. The study aims to analyze the effect of proprioceptive training on eye hand coordination and footwork skills in amateur badminton players.

Aim: To study the effect of proprioceptive training on eye hand coordination and footwork skills in amateur badminton players.

Methodology: An Experimental study was done in which 30 Amateur Badminton players with the age group 12 to 17 years, having atleast 1 year of experience using purposive sampling were divided into group A (Experimental group) and group B (control group).Group A underwent proprioceptive training for 3 weeks on alternate days while the control group continued their training Both the groups were assessed for eye hand coordination and footwork skills. The test used for eye hand coordination was "Throw Overhead And Underarm Arrest Test" and footwork skills assessed by "Ya Lan Chiu Footwork Measurement". The pre and post results of eye hand coordination and footwork skills were recorded for both the groups. The data was collected, statistical analysis as done and resulted were tabulated.

Data Analysis and Result: The data was analyzed by parametric test. The normality of the distribution of data as assessed by Shapiro-wilk test. As the p value as <0.05 the data for both the group states to be normally distributed. According to the paired t test the p value for eye hand coordination is <0.05(p=0.0042)that interprets that there is a significant difference in the experimental group. According to paired t test the p value for footwork skills is<0.05(0.00014)that interprets that there is significant difference in experimental group. Unpaired t test for eye hand coordination depicts a p value 0.019 that interprets that

there is significant difference in experimental group of players than that of the control group. Unpaired t test for footwork skills depicts p value0.0001 that interprets that there is significant difference in experimental group of players than that of control group.

Conclusion: This study concludes that there is an effect of proprioceptive training on eye hand coordination and footwork skills in amateur badminton players of the experimental group.

***IndexTerm*–Badminton, Proprioceptive training, Eye hand coordination, Footwork skills.**

I. Introduction:

Badminton is a racket sport played by either two opposing players or two opposing pairs who take positions on opposite halves of a rectangular court that is divided by a net. Players score points by striking a shuttlecock with their racket so that it passes over the net and lands in their opponent's court. Seth [2011] defined that badminton play was characterized as short period, high intensity and short intervals.(1)

Badminton requires a constant analysis of the movements, forcing the player to react precisely and quickly and that is what demands that the player have good reaction ability and good eye hand coordination.(3)Badminton sport requires frequent jumps, quick changes of direction, rapid arm movements, rapid eye-hand coordination and adequate body position sense.(2)

Badminton, a sport that demands finesse, agility, and strategy, showcases an array of techniques essential for players to master. At its core, badminton relies on the precise execution of strokes, footwork, and tactics to outmaneuver opponents and secure victory.

Eye hand coordination is the coordinated control of eye movement with hand movement. It is processing of visual input to guide reaching along with use of proprioception of the hands to guide the eyes.In a badminton game, there are several technical exercises that the players must master, such as technique of holding the racket, technique of hitting the shuttlecock and the footwork technique.

A footwork skill is one of the determining indicators of the player's success in field."Blink it and you will miss it!" is the best way to describe the importance of a fast reaction in many sports. Footwork plays a pivotal role in badminton, as players must swiftly move across the court to position themselves optimally for each shot. Understanding and implementing these techniques not only enhance a player's performance but also contribute to the exhilarating and fast-paced nature of badminton matches to force and tension

Proprioception is the central nervous system process of determining the relative position of the body. Proprioception helps to adapt sudden changes in the environment such as those relating body position. Proprioceptive training is defined as "the series of exercises or situations that will produce a reaction in response to an external stimulant by the nervous system". (3)

II.METHODOLOGY:

The study was conducted on 30 Amateur Badminton players with atleast 1 year of experience, age 12 to 17 years old in Pune. . Ethical committee clearance was obtained. Written consent was taken from the subjects who fulfill the inclusion and exclusion criteria. Testing procedure was explained and demonstrated to the subjects.

Experimental group was given proprioceptive training for 3 weeks on alternate days for 30-40 minutes including warm up and cool down.Pre and Post test results were noted for both the groups.

Inclusion criteria:-

- Age 12 to 17 years
- Male and female
- Badminton players who have been practicing badminton atleast for 1 year

Exclusion criteria:-

- Any musculoskeletal injury
- Professional badminton players

Outcome measure:-

- Eye hand coordination assessed by Throw Overhead And Underarm Arrest Test [5]

(Reliability=0.875)

(Validity=0.718)

- Footwork skills assessed by Ya Lan Chiu Footwork Measurement [6]

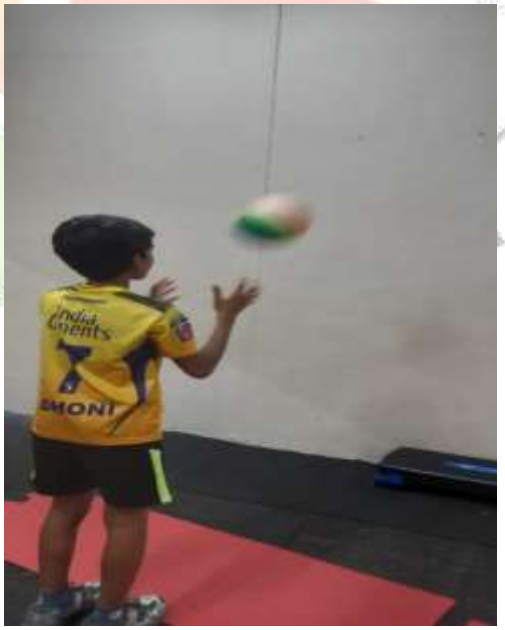
(ICC reliability= 0.910)

(Validity=0.730)

Eye hand coordination test:-

The "throws overhead and under arrest"test was used to assess the eye hand coordination. The player stood behind the line of 400 cm. After the 'yes 'signal the player would throw the ball to the wall as many as the player could till 60 seconds.

The ball was thrown overhead using both the hands and the player catches the ball by using both the hands as many times as possible which was parallel to the chest. The player should catch the ball within the circle diameter of 100 cm. The scores were counted and three sets performed. The set which had highest score among them was taken.



Footwork skill assessment:-

The side of the field was marked with a square shape that serves as a foothold for players. The size of the line for the front corner was 100 centimeters by 130 centimeters, and the size of the right and left side steps was 100 centimeters by 100 centimeters. The size of the back footing line was 100 centimeters by 115 centimeters, and the existing foothold was in the center of the field, measuring 115 cm by 115 cm.

The test was carried out for 30 seconds in the order that the testee stepped forward to the right, front left, middle right, middle left, then back right and back left. Scores were recorded when one of the testee's feet enters the line square, and does so using the correct technique.

Procedure:-

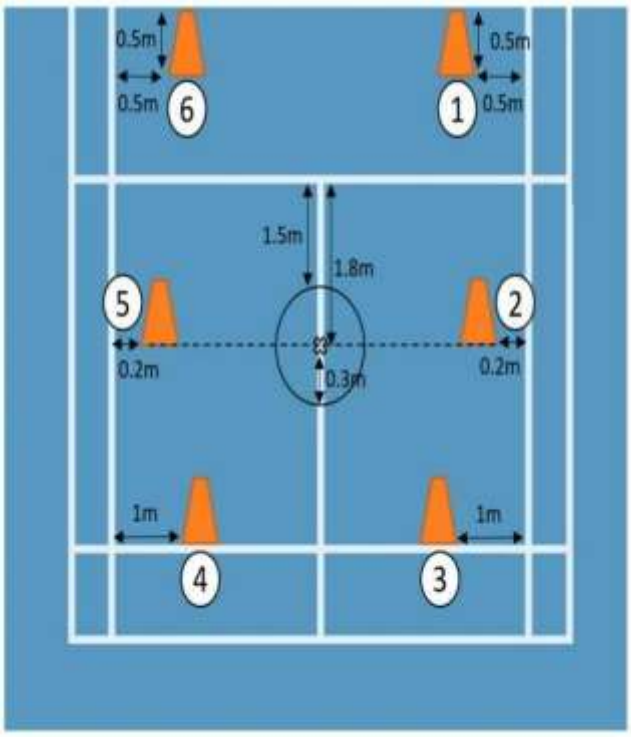
Players prepared in the middle of the field carrying rackets while waiting for the orders to start the test. Once the instructions were given, they move to the right front corner then the left front corner while throwing the racket forward.

Continued to walk while swinging the racket to the right and then to left of the field. Then, rushed to the right and left back corners of the court while hitting overhead .Repeated the same for 30 seconds**.**

Scoring:-

For each rating indicator, the player got a value of 1 if he does it correctly and a value of 0 if he did not do it correctly. The final score was obtained from both elements, where the first element was the assessment of agility and speed of players stepping into the corner of the field with a time of 30 seconds.

At the same time, the second element was the attitude technique of implementation that the player does when doing the footwork test. The final score is the sum of the scores obtained in the first and second elements.



PROTOCOL:-

PROPRIOCEPTIVE TRAINING:-
(Experimental group)

Warm up:-

Neck ROM

Shoulder ROM

Elbow ROM

Wrist ROM

Trunk ROM

Hip ROM

Knee ROM

Ankle ROM

Week 1:-

Roll ball over wall (hand)-10secs

Roll ball over wall (leg)-10secs

Quadripod-10secs

Prone on elbows-10 secs

Kneelpushup-10secs

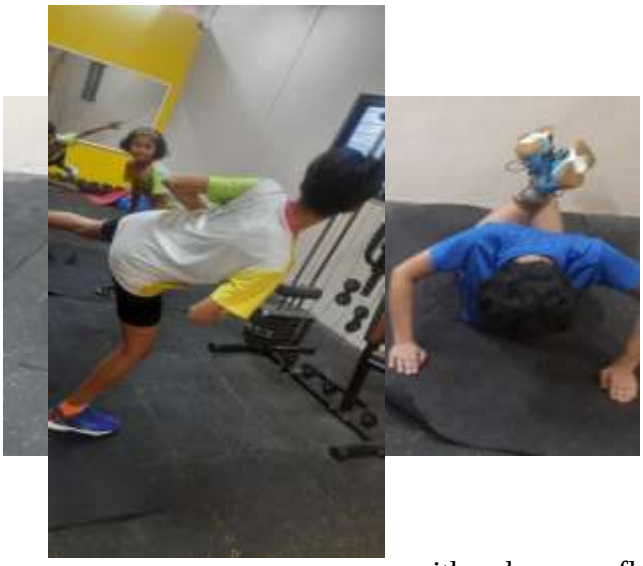
Bird dog pose-10secs

Wall squat-10secs

Lunges-10secs each leg

Heel toe stand-10secs

One leg stance-10secs

Week 2:-

One leg stance with knees flexed-10secs

One leg stance with knees flexed; catch and throw ball-10reps

One leg stance with hip-knee flexed; catch and throw ball-10reps

One leg stance kick in front (knee flex to ext)-10reps

One leg stance passing ball backwards-10reps

Alternating single leg deadlifts-10secs

Plank-10secs

Back kick hold-10secs

Crossover walk backward-10secs

Arms crossed and one leg stand with eyes closed-10secs



Week 3:-

Pushup-10secs

Unilateral squat-10 secs

Plank crossover-10secs

Stand with one leg crossing backwards and catch and throw ball-10secs

One leg on ball and side flexion-10secs

Toe weight bearing-10secs

Heel weightbearing-10secs

One leg stance and turn ball 360degrees-10reps

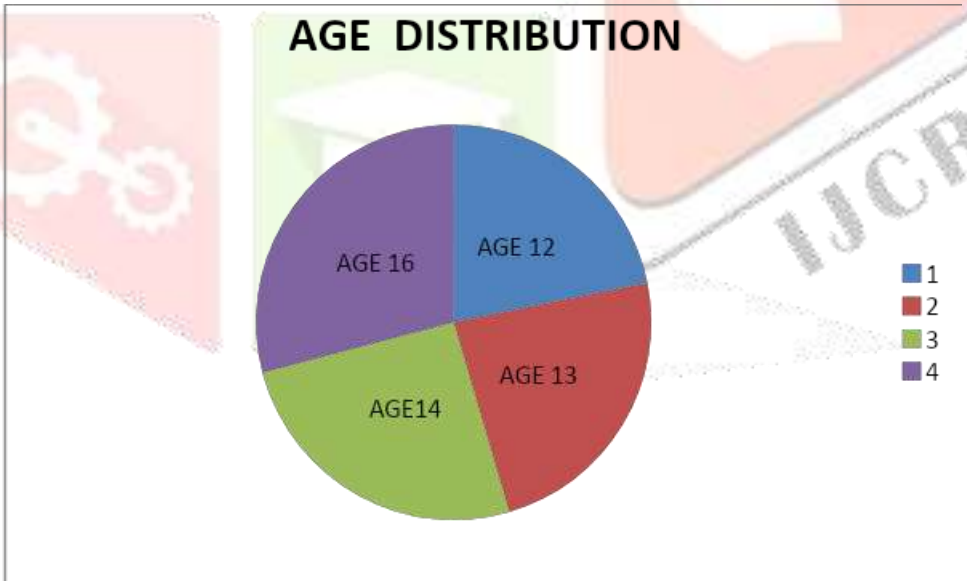
Donkey kick-10secs

One leg step up hold-10secs

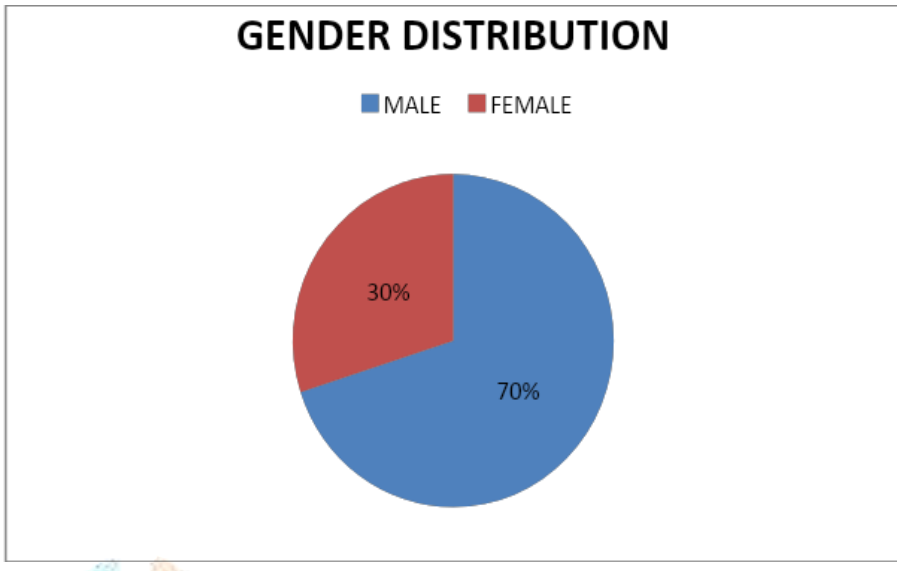


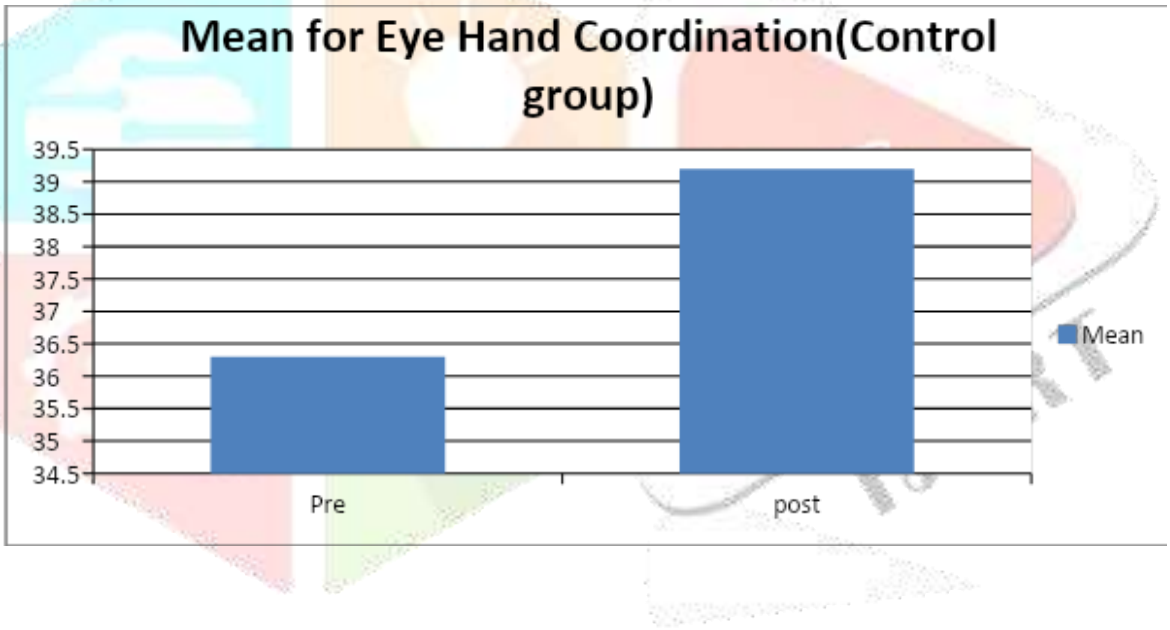
Statistical analysis and Result:

Age distribution:

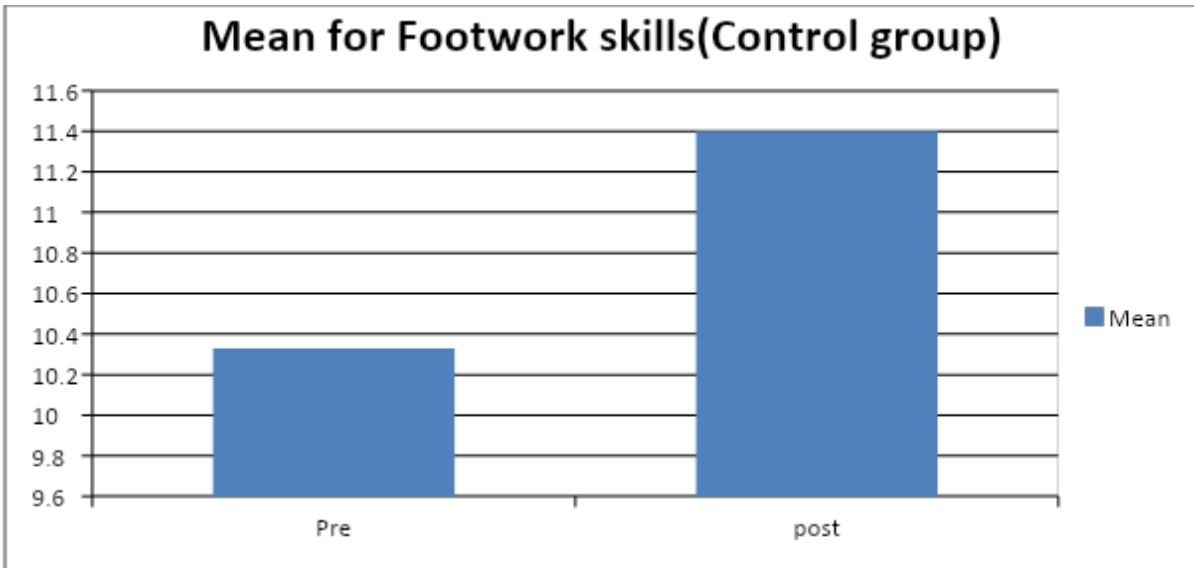


Gender distribution:

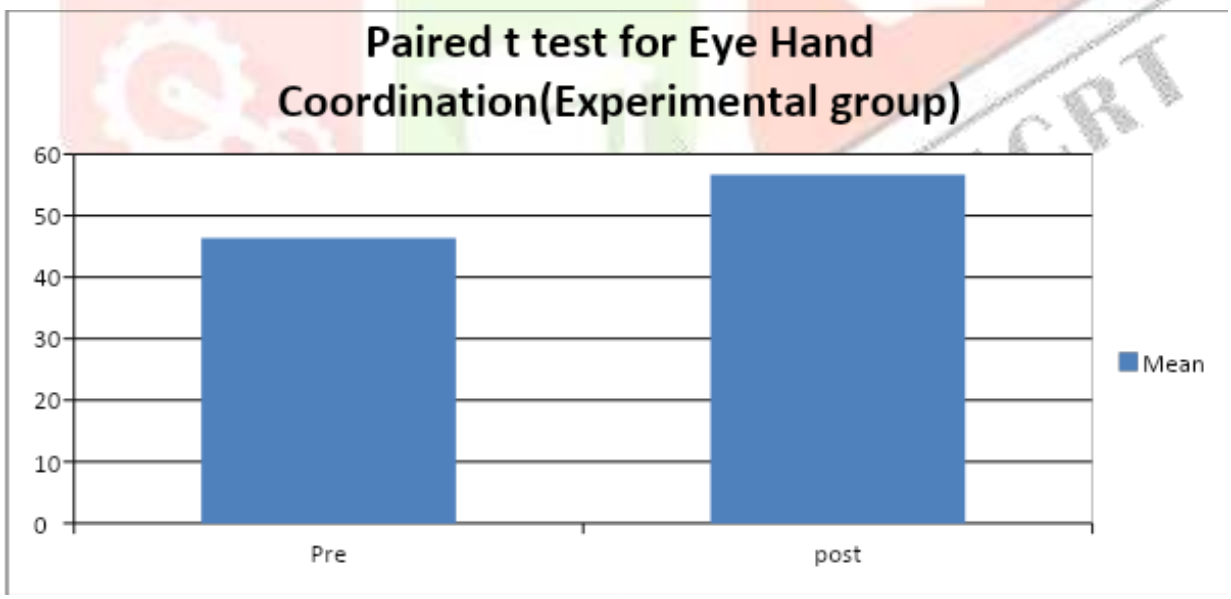




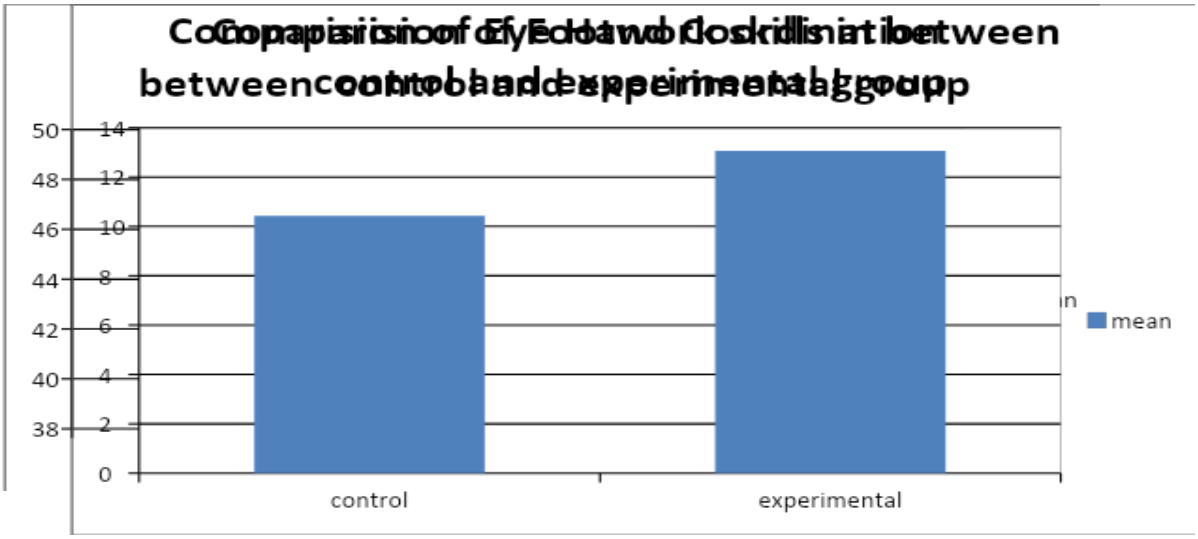
Paired t test for Footwork skills(Control Group)					
	Mean	SD	T value	P value	Result
Pre	10.33	1.234	5.171	0.00014	<0.005 Significant
Post	11.4	1.242	2.144		



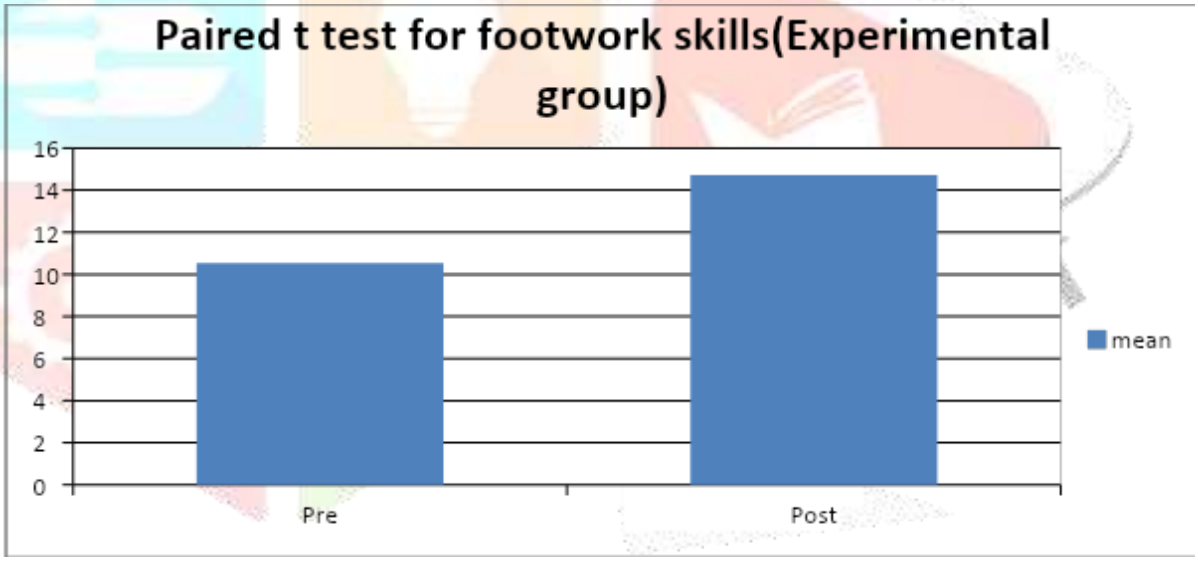
Paired t test for Eye Hand Coordination(Experimental group)					
	Mean	SD	T value	P value	Result
Pre	46.33	8.965	8.991	0.0041	<0.05 Significant
Post	56.66	7.997	2.144		



Paired t test for Eye Hand Coordination(Control Group)					
	Mean	SD	T value	P value	Result
Pre	36.3	7.925	3.417	0.0041	<0.005 Significant
Post	39.2	6.826	2.144		



Paired t test for Footwork Skills(Experimental group)					
	Mean	SD	T value	P value	Result
Pre	10.53	1.245	2.948	0.0041	<0.05 Significant
Post	14.73	1.099	2.144		



Unpaired t test for Eye Hand Coordination(Control and Experimental group)					
	Mean	SEM	T value	P value	Result
Pre	41.33	6.600±2.752	2.398	0.019	<0.05 Significant
post	47.93				

Unpaired t test for Footwork Skills(Control and Experimental group)					
	Mean	SEM	T value	P value	Result
Pre	10.43	2.633+0.43	6.042	<0.0001	<0.05 Highly Significant
post	13.07				

RESULT:-In this study,30 players participated among which 21 were male and 9 were female. After conducting the study the experimental group of players shoe improvement in eye hand coordination and footwork skills.The normality of the distribution of data as assessed by Shapiro-wilk test. As the p value as <0.05 the data for both the group states to be normally distributed.

According to the paired t test the p value for eye hand coordination is <0.05(p=0.0042) that interprets that there is a significant difference in the experimental group. According to paired t test the p value for footwork skills is <0.05(0.00014) that interprets that there is significant difference in experimental group.

Unpaired t test for eye hand coordination depicts a p value 0.019 that interprets that there is significant difference in experimental group of players than that of the control group. Unpaired t test for footwork skills depicts p value 0.0001 that interprets that there is significant difference in experimental group of players than that of control group

IV.DISCUSSION:

This study aimed to study the effect of proprioceptive exercises on eye hand coordination and footwork skills in amateur badminton players .The result of this study showed significant improvement in players of experimental group for eye hand coordination and footwork skills than the control group. The proprioceptors that are located all over the body provide signals that help to improve the player's body position sense and maintain body position. Proprioception enables us to judge limb movements and positions, force and heaviness, stiffness and viscosity. The purpose of the proprioceptive training is to increase the complex activity of the neuromuscular system .Information is transferred from the peripheral receptors via the afferent and efferent of the neural system during the static and dynamic activities. .The eye hand coordination is important in individual sport as well as team sports in which the motor hand skills are used . Winter et al (2022) claimed that the motor reaction depends on the visual information, and with the eye and hand spatial and temporal connection hypothesis.[7]Thus the eye hand coordination can be improved through multisensory integration of proprioception and visual inputs.

Footwork skills are an important aspect for improving performance in any sport. Sensitivity is one of the important sports qualities of human body, it is not only related to physical qualities but also to the nerves types. in his study stated that there is an connection between ankle proprioception and motor control on footwork. Novrizal (2017) stated that skill acquisition requires us to interact effectively with the environment, detect information and respond effectively.[8]

Proprioceptive training tends to improve the sensorimotor function, balance and agility and thus tend to improve footwork skill acquisition. Han et al found that high ranked athletes had superior ankle proprioception and argued that superior proprioceptive ability enables athletes to perform secondary sports related tasks.[9]Pablo(2017) stated that persistent risk factors for injuries are reduced lower limb strength, prproprioception and muscle imbalances**.[10]**In addition many researchers investigated the positive effects of balance and proprioceptive training on injury reduction in players. Thus, proprioceptive training should be included in improving footwork skills and performance of badminton players.

Pedro harry et.al (2022)stated that the exercises performed with complexity or on unstable surface induce a higher stimulation and recruitment of mechanoreceptors which increase proprioceptive

feedback.[11]Hubscher M et al (2010)stated in an stud that proprioceptive exercises 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 change in direction.[12]The study by Gruber and Gollhofer (2004) said that the addition of proprioceptive exercises to the players training has led to major improvements in the training programs, as reflected in improvements in subjects' reaction times and specific muscle strength, as well as greater stability and injury prevention.[13]

Proprioception tends to improve the joint stability and improve the sense of joint awareness. Proprioceptive training thus helps to develop the sensorimotor activity and help in improving the players performance .It tends to develop sensitivity of the body in acquiring different and complex patterns of movements. This eventually helps to react to the stimulus in an faster and efficient way and help a player to react efficiently. Therefore, It concludes that the study is effective in improving eye hand coordination and footwork skills in badminton players.

V.CONCLUSION:

This study concludes that there is an effect of proprioceptive training on eye hand coordination and footwork skills in amateur badminton players of the experimental group.

Therefore, proprioceptive training should be included as a training program for improving badminton players performance.

VI. LIMITATION OF THE STUDY:

The training provided for the experimental group was given on alternate days .Therefore, the days without the training were not personally monitored.

VII.FUTURE SCOPE OF STUDY:

The study can be undertaken for longer duration of weeks so that long term effects of the proprioceptive exercises can be measured. This study can be used to check for the effectiveness of training on players performance in the game.

The study can be conducted on other games to study the effect of training on their field of game. The study can be undertaken to study the effect of proprioceptive exercises on other components like agility, balance etc.

IX.ACKNOWLEDGEMENT:

I express my deep sense of gratitude to my project guide Dr. Shweta Pachpute, professor and HOD of Musculoskeletal Physiotherapy department at LSFPEF's College of Physiotherapy, for her guidance, precious time and contributions made during the course of the study. I express my sincere thanks to the badminton academy and all the subjects who participated and gave their full cooperation for the study.

X.REFERENCES:

1. Seth B.Determination factors of badminton game performance .In.J.Phys.Edu.Sports health 2016,3,20-22.

2.Raana A ,Shahnaz Shahrjerdi, Masod Golpaigany and Mohsen Kazemi .Effect of a six-week plyometric training on dynamic balance and knee proprioception in female badminton players,2019,144-153.

3.Halil Ibrahim Ceylan and Ozcan Saygin. Examining the effects of proprioceptive training on coincidence anticipation timing ,reaction time and Hand eye coordination,2015,20(3),437-445.

4.Mehmet Fatih Yuksel and GulsenTosun Tunc. Examining the reaction time of international level badminton players under 15,2018,6,20.

5. Roma Irawan,Heru Syarli Lesmana.Validity and reliability testing on eye hand coordination basketball players "overhead and under arms throw" ,Vol 464,2019.

6. Jia Han,Gordon Waddington,Roger Adams,Judith Anson and Yu Liu.Assessing proprioception:A critical review of methods' sports Health Sci,2016 Mar,5(1):80-90.

7. Winter, Leoni et al. "The Effectiveness of Proprioceptive Training for Improving Motor Performance and Motor Dysfunction: A Systematic Review." Frontiers in rehabilitation sciences vol. 3. 8 Apr. 2022

8. Prakash jha et al .Proprioception: An evidence based narrative review, Sports med,2017

9. Jia Han, Gordon Waddington,Roger Adams,Judith Anson and Yu Liu.Assessing proprioception:A critical review of methods .J sports Health Science,2016 Mar,5(1):80-90.

10. Read, Paul & Jiménez, Pablo & Oliver, Jon & Lloyd, Rhodri. . Injury prevention in male youth soccer: Current practices and perceptions of practitioners working at elite English academies. Journal of Sports Sciences.2017, 36, 1-9

11. Pedro Harry-Leite,Manuael Paquete et al ".Acute impact of proprioceptive exercise on proprioception and balance in atheletes",2022,12(2),830.

12. Hubscher M, Zech A et al.Neuromuscular training for sports injury prevention: A systematic review. Medicine and science in sports exercise, 2010,42 (3),413-42.

13. Markus Gruber et al".Impact of sensorimotor training on the rate and force development and neural activation",2004

14. Michael Phomsoupha etal, 2015.The science of Badminton: Game characteristic, anthropometry, physiology, visual fitness and biomechanics. Sports Med 45,473-495(2015).