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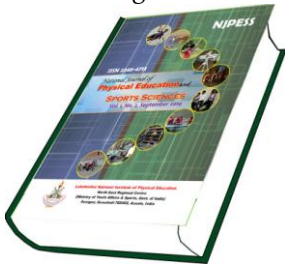### (NJPESS-2018)

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Editorial

Epicenter Voyage of a Myth Institute-Lakshmibai National Institute of Physical Education North East Regional Center

Lakshmibai National Institute of Physical Education, NERCis amongst the most admired centers of world-class education to foster academic excellence, physical fitness and research in sports committed to helping scholars, researchers and sports scientist leap into the 21st century. The present endeavor is a tribute to the holy symbol of Lakshmibai National Institute of Physical Education, NERC as the same was long precious aspiration. The journal shall symbolically signify the essence of quality research thereby appropriate in the ambition of the institute. The journal shall offer a much desired platform to publish quality research being undertaken in the whole world on the area in question. The journal shall bring the academicians and researchers from all over the globe to share their accumulated experiences and perceptions in order to realize new scientific and original innovation focused on aspects of the sports sciences and sports performance.

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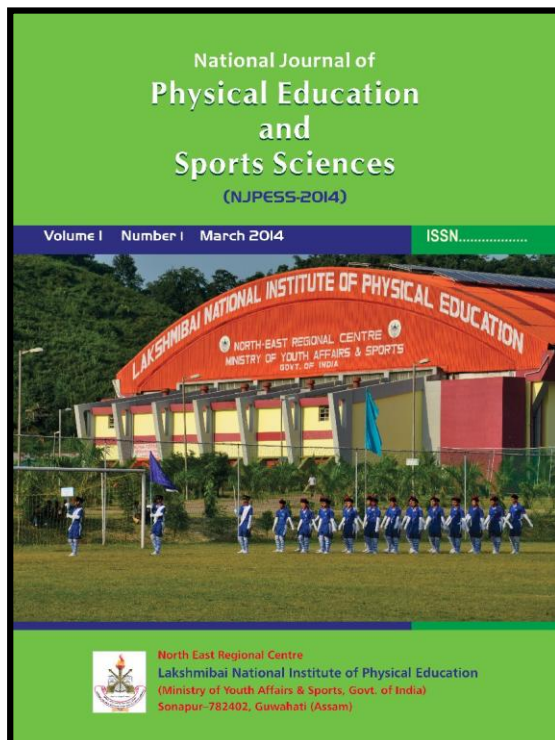
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Scientific Editors

Contents

Efficacy of Sand Plyometric Training on the Performance OF Kicking and Throw-in Distance of Footballers

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ABSTRACT

The present study was conducted to determine the effects of sand plyometric training on the performance of kicking and throw-in distance of footballers. The subjects for the study were selected on the basis of random group design. Thirty (N=30) male students were selected as subject for the present study from Lakshmibai National Institute of physical education, NERC, Guwahati (Assam), INDIA. All the subjects ranged between the chronological age of 17-22 years. The selected subjects were further divided into two groups. Experimental treatment was then assigned to group "A" while group "B" acts as control. The kicking and throw-in of football was used to measure the horizontal distance of kicking and throw-in. The subjects were subjected to the 6-week of sand plyometric training programme. The difference in the mean of each group for selected variable was tested for the significance of difference by "t" test. The level of significance was set at 0.05. The results have shown the significant improvement in kicking, since cal. t (=2.181) > tab t.05 (14) (= 2.145). The treatment of six week plyometric training programme also shown significant improvement in case of throw-in since cal. t (=4.582) > tab t.05 (14) (= 2.145). The results have shown the significant improvement in kicking and throw-in distance of footballers.

Keywords: *Plyometric Training, Kicking, Throw-in, Footballers*

INTRODUCTION

Plyometric is a method of developing explosive power. Previously referred to as jumping training the term plyometric first appeared in literature in the late 1960. Yuri verkhoshensky the father of plyometric. He was the discovered for Russian high jumpers and triple jumpers. Plyometric as a term was formed from the Greek root pleythein which loosely translated means to increase. An American coach by the name of Fred Wilt is believed to be the first person to use the term Plyometrics to describe the jump training that some U.S coaches were implementing with their athletes. The plyometric term was coined by an American track and field coach in 1975 Fred Wilt his thinking was to combine two Latin words 'Pilo' and 'Metric' which again loosely translated means more to measure. Plyometric training by definition refers to the specialized method of conditioning designed to enable a muscle to reach maximal force in the shortest possible time. Characterized by quick, powerful, explosive type movements, plyometric training is often a staple of sport-specific strength and conditioning programs. The movements traditionally employed in a plyometric training program will involve a pre-stretch and stretch-shortening cycle. Over time, a plyometric training program with result in increased force production due to mechanical factors such as increased stored elastic energy and neurophysiologic factors such as changes in the muscle's force/velocity characteristics. The true purpose of plyometric training is to decrease the ground contact time of an athlete while sprinting, jumping, or kicking. Ground contact time can simply be seen as the phase of time that elapses while the eccentric contraction (stretch) of a muscle group is reversed and the concentric contraction contract of that group begins. Before ever starting a plyometric program, you must assess your previous training experience, age, physical maturity and conditioning, flexibility and strength.

METHODS

Subjects

The subjects for the present study were selected on the basis of random group design. Forty (N=4 0) male students were selected as subject for the present study from Lakshmibai National Institute of physical education, NERC, Guwahati (Assam), INDIA. All the subjects ranged between the chronological age of 17-22 years. The selected subjects were further divided into two groups. Experimental treatment was then assigned to group "A" and group "B" acts as control. Kicking and throwing of football was used to measure kicking and throwing distance of footballers. The data were collected twice on each selected variables i.e., once before the programme and secondly at the end of six week programme.

KICKING FOOTBALL FOR DISTANCE

Objective

The kicking distance measure the explosive power of leg of footballers.

Required Resources

Football field, football, whistle, measuring tape

Test Procedure

The subjects stand behind restraining line into the ground. Three chances were given to the subjects but the best one is counted. One by one the subjects came and kicked the ball behind the restraining line. The distance of kicking of football was measure from restraining line to nearest dropping point of the football. Data of kicking distance was collected through this test. The distance is measure in meters of kicking.

THROW-IN FOOTBALL FOR DISTANCE

Objective

The throw-in distance measures the explosive shoulder strength of footballers.

Required Resources

Football field, football, whistle, measuring tape

Test Procedure

The subjects stand behind restraining line into the ground. Three chances were given to the subjects but the best one is counted. One by one the subjects came and throw in the ball behind the restraining line. The distance of throw-in of football was measure from restraining line to nearest dropping point. While throw-in the legs remains contact with the ground. Data of kicking distance was collected through this test. The distance is measure in meters of throw-in.

Six Week Training Programme

Plyometric training has been traditionally been used as an effective way to develop both explosive strength and maximum strength simultaneously. In the present study the following type of design were used for the six week of plyometric training programme:

*Upper body #Lower body

Table 1: Experimental Group Kicking

t-Test: Paired Two Sample for Means		
	Pre Test	Post Test
Mean	30.81	31.645
Variance	1.508316	2.526026
Observations	20	20
Pearson Correlation	0.282877	
Hypothesized Mean Difference	0	
Df	19	
t Stat	-2.18155	
P(T<=t) one-tail	0.020954	
t Critical one-tail	1.729133	
P(T<=t) two-tail	0.041909	
t Critical two-tail	2.093024	

*Significant at 0.05 level of Confidence.

"t".05 (14) = 2.145

Table 2: Control Group Kicking

t-Test: Paired Two Sample for Means		
	Pre Test	Post Test
Mean	31.94	32.509
Variance	3.374632	5.088452
Observations	20	20
Pearson Correlation	0.716833	
Hypothesized Mean Difference	0	
Df	19	
t Stat	-1.60229	
P(T<=t) one-tail	0.062793	
t Critical one-tail	1.729133	
P(T<=t) two-tail	0.125586	
t Critical two-tail	2.093024	

*Significant at 0.05 level of Confidence.

"t".05 (14) = 2.145

The finding shows that the mean of kicking distance of pretest of experimental group and posttest of experimental group was 30.81 and 3.64 respectively,

whereas the mean of kicking distance of pretest of and posttest of control group was 31.94 and 32.50. The "t" value in case of experimental group was 2.181 and for control group it was 1.602. Since cal. t (=2.181) › tab t.05 (14) (=2.145), Ho (null hypothesis) is rejected at.05 level of significance. Thus it may be concluded that six week of sand plyometric training programme showed significant improvement in kicking distance. As per the study the above remark can be given at 95% confidence. The graphical representation of responses has been exhibited in figure-1. So the hypothesis "There was significant effect of plyometric training on the performance of kicking distance of footballers" is accepted. It seems that the six weeks plyometric training method has significant impact on the kicking distance of football players.
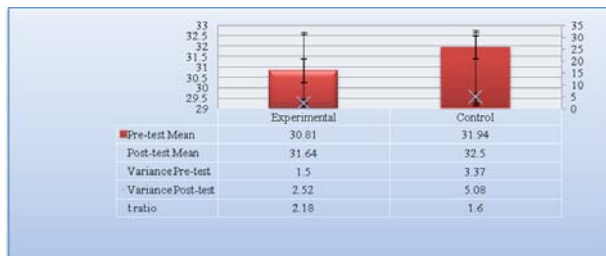
Fig. 1: Mean, Variance of Kicking Distance of Experimental and Control Group

Table 3: Experimental Group of Throw-in

t-Test: Paired Two Sample for Means		
	Pre Test	Post Test
Mean	5.175	5.595
Variance	0.577763	0.521553
Observations	20	20
Pearson Correlation	0.848287	
Hypothesized Mean Difference	0	
Df	19	
t Stat	-4.58258	
P(T<=t) one-tail	0.000102	
t Critical one-tail	1.729133	
P(T<=t) two-tail	0.000203	
t Critical two-tail	2.093024	

*Significant at 0.05 level of confidence.

"t".05 (14) = 2.145

Table 4: Control Group of Throw–In

t-Test: Paired Two Sample for Means		
	Pre Test	Post Test
Mean	5.27	5.355
Variance	0.372737	0.4405
Observations	20	20
Pearson Correlation	0.95897	

Hypothesized Mean Difference	0	
Df	19	
t Stat	-2.00128	
P(T<=t) one-tail	0.029927	
t Critical one-tail	1.729133	
P(T<=t) two-tail	0.059853	
t Critical two-tail	2.093024	

*Significant at 0.05 level of confidence.

"t".05 (14) = 2.145

The finding shows that the mean of throw-in of pretest of experimental group and posttest of experimental group was 5.17 and 5.59 respectively, whereas the mean of throw-in of pretest and posttest of control group was 5.27 and 5.35. The "t" value in case of experimental group was 4.582 and for control group it was 2.001. Since cal. t (=4.582) › tab t.05 (14) (=2.001), Ho (null hypothesis) is rejected at.05 level of significance. Thus it may be concluded that six week of plyometric training programme showed significant improvement in throw-in. As per the study the above remark can be given at 95% confidence. The graphical representation of responses has been exhibited in figure-2. So the hypothesis "There was significant effect of plyometric training on the performance of throwing distance footballers" is accepted. It seems that the six weeks plyometric training method has significant impact on the throwing distance of football players. So there is no increase in the performance of throwing distance of football players.
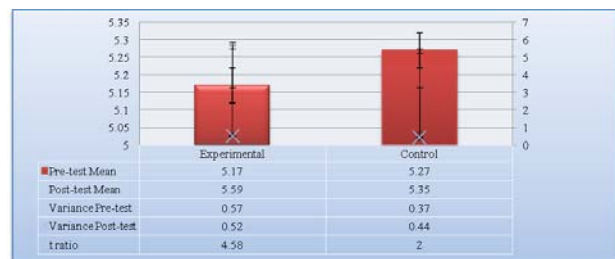
Fig. 2: Mean, Variance Test of Throw–in Distance of Experimental and Control Group

REFERENCES

Noble C. (1992) "Relative effect of isokinetic and plyometric training on vertical jumping performance", Journal of Strength Conditioning Research, Vol. 6(1), 36–41.

Mike (1992) "The effect of six weeks squat, plyometric, squat-plyometric training on power production" Journal of Strength and Conditioning Research, Vol. 6(1) 36–41.

Murphy A.J. (2003) "Plyometric training improves distance running performance" Europe Journal of Applied Physiology, Vol. 89(1) 1–7.

Jacob C. (2006) "Effect of four week training program on measurement of power in male collegiate hockey players" Journal of Strength and Conditioning Research, Vol. 1(2) 44–62.

Christos Kotzamanidis (2006)"Effect of plyometric training on running performance and vertical jump in prepubutal boys" Journal Of Strength Conditioning Research, Vol. 20(2) 441–445.

T. Bury (2006) "Benefit of strength and plyometric training on athletic performance in preadolescent soccer player" British Journal of Sports Medicine, Vol. 23(4) 365–371.

Rahman Rhimi (2006) "Evaluation of plyometric, weight training and their combination on angular velocity" Physical Education and Sport, Vol. 4(1) 1–8

Markovic G. (2007) "Does plyometric training improves vertical jump height" British Journal of Sports Medicine, Vol. 41(16) 349–355.

Fred B. (2007)"Effects of a short-term plyometric and resistance training program on fitness performance in boys age 12 to 15 years" Journal Of Sports Science and Medicine, Vol. 6 Page 519–525

Jacobson B.H. (2007) "Comparison of land and aquatic based plyometric training on vertical jump performance" Journal of Strength and Conditioning Research, Vol. 21(2) 568–571.

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Comparison of Indian Hockey Players
in Relation to Goal Orientation at Three Different Levels of Participation

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ABSTRACT

The objective of the study was to Comparison of Indian Hockey players in relation to Goal Orientation of Three Different Levels of Participation. A large number of subjects were selected for present study, but on the basics of their performance and skill, the study ends up with 180 subjects (90 State, 60 National and 30 International) Level Indian Hockey players. The purposive sampling technique was employed. Further the hockey players selected as subjects were from SAI Center, Amosi, Lucknow, Sports hostels K.D. Singh Babu Stadium, Lucknow, Guru Govind Singh sports college, Kursi Road Lucknow and also international players were selected from Indian Hockey team camp which was organized by Hockey India in Balawadi sports complex Pune in june 2010. The selection of subjects was based on the desired standard in terms of skill, technique and playing ability of the Indian hockey player at different level of participation. The age of the subjects ranged between 18 to 26 years.

*Discussion of Findings: Goal orientation is the desire to achieve personal goals in sport".
"Goal orientation is the desire to win inter personals competitive sporting events" A motivational construct referring to person definition of success. Those defining success as winning or defeating others, have an 'ego' goal orientation, whereas those viewing success as personal improvement and task mastering have a 'task or mastering' goal orientation. In present research work the statistical finding revealed that significant difference was found among international, national and state level hockey players in relation to goal orientation. Significant difference was found among international, national and state level hockey players in relation to ego orientation.*

Conclusion: Based on the findings and within the limitation of the study following conclusions were drawn. The significant difference was found in Goal Orientation (Task Orientation and Ego Orientation) of the different levels of participation of Indian Hockey players

Keywords: *Goal Orientation, Task Orientation, Ego Orientation*

INTRODUCTION

Today sports have become an inseparable phenomenon of our social life. It has made its own place at the apex of human civilization, because of its trial, competitive event and even improving nature. The acquisition of new knowledge for betterment of performance of human organism in relation to physical, motor and physiological qualities are in process of saturation. To strive for still better is a million dollar question to the experts on sports. In the process, they also explore the field of psychology and enlisted certain psychological parameter which does influence sports performance.

A sport is an activity in which millions of people throughout the world participate either actively or passively. Among the passive participation the role of media is tremendous. It is a Social phenomenon, which involves competition and cooperation. The desire to excel singularity of purpose, commitment, expectations of society etc. All influence their participation and performance. Sport is a psycho-social activity. It has both psychological and. Social dimensions, besides physical, physiological and technical aspects. In this modern era of competition, the psychological preparation of a team is as much important as teaching the different skills of a game on the scientific lines. The teams are prepared not

only to play the games, but to win the games. And for winning the games, it is not only the proficiency in the skills which bring victory, but more important is of the player with which they play and perform their best in the competition.

The craze for winning medals in the Olympics and other international competitions has catalyzed the sport scientists to take "interest in exploring all the aspects and possibilities which can contribute to enhance sports performance to undreamt heights." It has been established beyond doubt that human physiology is controlled by human psychology and that physiological preparation in sports inconsequential in the absence of study of human behavior as it related to competitive sport. The virgin realm of the mind has to be explored without which neither excellence nor perfection could be ensured.

Most of the coaches agree that the physical characteristics, skills and training of the players are extremely important, but they also indicate the good mental preparation for competition is a necessary component of success. In western countries like Brazil, Argentina, France, Germany etc. Much stress training is given for the mental preparation of their national football team. A coach has the job of helping the athletes to find out his specific talents and factors for their fullest potential. This includes developing not only the physical attributes but also his attitude, motives and psychological traits.

SELECTION OF SUBJECTS

A large number of subjects were selected for present study but on the basics of their performance and skill, the study ends up with 180 subjects (90 State, 60 National and 30 International) Level Indian Hockey players. The purposive sampling technique was employed. Further the hockey players selected as subjects were from SAI Center, Amosi, Lucknow, Sports hostels K.D. Singh Babu Stadium, Lucknow, Guru Govind Singh sports college, Kursi Road Lucknow and also international players were selected from Indian Hockey team camp which was organized by Hockey India in Balawadi sports complex Pune in june 2010. The selection of subjects was on based on the desired standard in terms of skill, technique and playing ability of the Indian hockey player at different level of participation. The age of the subjects ranged between 18 to 26 years.

INSTRUMENTATION

To measure the Goal Orientation of subjects the Task and Ego Orientation in Sport Questionnaires constructed by Joan L. Duda & John G. Nicholls, 1995 was administered.

Purpose

The purpose of the TEOSQ is to assess individual differences in goal perspectives in sport settings. It also assesses whether the individual is prone to being task or ego orientated in the sporting context (Chi & Duda, 1995; Li, Harmer, Chi & Vongjaturapat, 1996; Newton & Duda, 1993; White & Duda, 1994). This relates also to the extent that an individual defines success as mastery (task) or outperforming others (ego) (Duda, Olsen & Templin, 1991; Kim & Gill, 1997).

Scoring Pattern

The Task and Ego Orientation in Sport Questionnaire (TEOSQ) is a 13-item questionnaire. It has two subscales, one measuring task orientation and the other ego orientation, to measure individual differences. There are 7 task questions and 6 ego questions. Before completing the questionnaire, the participants are asked to think of a time when they felt most successful in their sport and answer the questions based on this. The answers are indicated on a 5 point Liker-type scale, where 1 = strongly agree and 5 = strongly disagree A mean score is then calculated for each participant and this is done by adding all the scores for all the task orientated questions and dividing by 7 and doing the same for the ego orientated questions but dividing by 6. This gives a mean score between 1 (low) and 5 (high).

STATISTICAL ANALYSIS

In order to compare the psychological characteristics at different level of Indian Hockey players in relation to Goal Orientation. ANOVA was applied and also scheffe's Post Hoc tests were used for significant F value and level of significance was set at 0.05 level.

ANALYSIS OF DATA AND RESULTS OF THE STUDY

The demographical information was obtained for all the players. The psychological variable ego orientation were collected on 180 male Hockey players of different levels i.e. 90 state, 60 national and 30 international level Hockey

players. Ages of the subjects were ranging between 18 to 26 years.

To compare the selected psychological variable among Hockey Players belonging to three levels of participation (International, National and State), one-way analysis of variance (ANOVA) was used. The level of significance was set at 0.05 level which was considered appropriate for the purpose of the study.

FINDINGS OF THE STUDY

The results are presented in tabular form. The comparison of Goal orientation(task and ego orientation) among three levels of participation i.e., state, national and international Indian hockey players respectively have been presented in Table 1 and 2.

Table 1: Analysis of Variance of Task Orientation of Three Different Levels of Participation of Indian Hockey Players

	Sum of Squares	Df	Mean Square	F
Between Groups	2.406	2	1.203	3.080*
Within Groups	69.122	177	.391	
Total	71.528	179		

*Significant at 0.05 level

$F_{.05}$ (2, 177) = 3.04

It appears from the Table 1 that there was a significant difference of Task Orientation among three different levels of Indian hockey players as calculated F value (3.080) was greater than the tabulated F-value (3.04) at 0.05 level of significance with 2,177 degree of freedom.

Since the F-value was found to be significant, the scheffe's Post hoc test was applied for further comparison.

Table 2: Pair Wise Comparison of Task Orientation Means of Different Level of Indian Hockey Players

Levels			Mean Difference	CD at 5% Level
State	National	International		
2.5444	2.6667		0.1223	0.257
2.5444		2.8667	0.3223*	0.325
	2.6667	2.8667	-0.2	0.3448

*Significant at 0.05 level

The Table 2 reveals that there was no significant difference between State level and National Level; National and international level of Indian Hockey players, on the

other hand there was significant difference between state and international level of Indian hockey players in relation to Task Orientation.
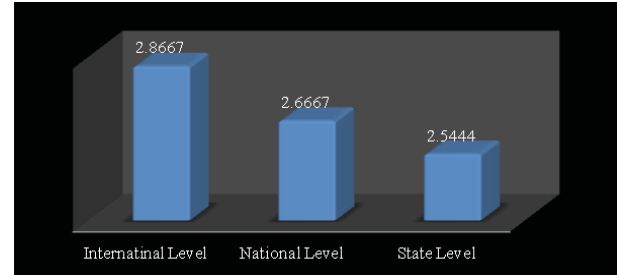
Fig. 1: Graphical Representation of Indian Hockey Players of Different Level in Relation to Task Orientation

Table 3: Analysis of Variance of Ego Orientation of Three Different Levels of Participation of Indian Hockey Players

	Sum of Squares	Df	Mean Square	F
Between Groups	5.028	2	2.514	5.620*
Within Groups	79.172	177	.447	
Total	84.200	179		

*Significant at 5% level

$F_{.05}$ (2, 177) = 3.04

It appears from the Table 3 that there was a significant difference of Ego Orientation among three different levels of Indian hockey players as calculated F-value (5.620) was greater than the tabulated F-value (3.04) at 0.05 level of significance with 2,177 degree of freedom.

Since the F-value was found to be significant, the scheffe's Post hoc test was applied for further comparison.

Table 4: Pair Wise Comparison of Ego Orientation Means of Different Level of Indian Hockey Players

Levels			Mean Difference	CD at 5% Level
State	National			
3.0556	2.9833		0.0723	0.2748
3.0556		3.4667	0.4111*	0.3475
	2.9833	3.4667	0.4834*	0.3686

*Significant at 5% level

The Table 4 reveals that there was no significant difference between State level and National Level of Indian Hockey players, on the other hand there was significant difference between state and international level; national and international level of Indian hockey players in relation to Ego Orientation.
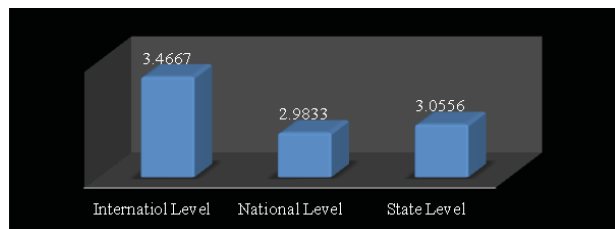
Fig. 2: Graphical Representation of Indian Hockey Players of Different Level in Relation to Ego Orientation

CONCLUSION

Based on the findings of the study following conclusions were drawn. The significant difference was found in Goal Orientation (Task Orientation and Ego Orientation) of the International level, National level and State level of participation of Indian Hockey players. The findings of these studies also reveal that the psychological factors are highly related with the performance of team sports players.

DISCUSSION OF FINDINGS

Goal orientation is the desire to achieve personals goals in sport". "Goal orientation is the desire to win inter personals competitive sporting events" A motivational construct referring to person definition of success. Those defining success as winning or defeating others, have an 'ego' goal orientation, where as those viewing success as personal improvement and task mastering have a 'task or mastering' goal orientation. In present research work the statistical finding revealed that significant difference was found among international, national and state level hockey players in relation to goal orientation, This might be due to that international player are more serious, alert and understand their opportunity to achieve their goal as they are goal oriented so they do mental preparation to achieve their goal. While national players have less experience about the task and state level players have both techniques as well as experience and are unable to focus completely on the task.

Significant difference was found among international, national and state level hockey players in relation to ego orientation, This might be due to that international players have more ego in relation to their position and level and getting social recognition and may be popularity is the reason to having more ego orientation while national and state level players have low level and always they try to achieve good level. Present study is also supported by the study conducted by Xiang P, & *et al.* (2007) and Hatzigeorgiadis A, & *et al.* (2002).

REFERENCES

Dictionary of Psychological Feste'n Sports and Exercise Science (Morgan Tgown West Verjeria: Fitness Information Technology Inc. 1990).

Balano Lee Anne, Field hockey (WA: W M.C. Brown Company Publishers, 1966).

Barrow M. Harold and Rosemary M.C. Gee, A Practical approach to Measurement in Physical Education, (Philadelphia, Lea & Febiger, 1979).

Butt Susan Dorsan, Psychology of Sport 2nd ed. (New York: Van Hostrand Reinhold Company, Inc. 1987).

Cox H. Richard, Sport Psychology Concepts and Applications (Dubuque, Iowa: Wrn. C. Brown Publishers, 1985).

Gill L. Dinel, Psychological Dynamics to Sports (Human Kinetics Publishers Inc., Champaign Illionibis, 1948).

Leith M. Larry., The Psychology of Coaching Team Sports (Toronto, Canada, Sports Books Publisher, 1949).

Silva M. John and Robert S. Weinberg, Psychological Foundations of Sport (Champaign, Illinois: human Kinetics Publishers, lnc., 1984).

Singh Agyajit, Sports Psychology: A study of Indian Sportsman (Delhi: Friends Publications, 1992).

Xiang P., McBride R.E., Bruene A., Liu Y., "Achievement goal orientation patterns and fifth graders' motivation in physical education running programs," Pediatric Exercise Science. 2007 May; 19(2):179–91.

Hatzigeorgiadis A., Biddle S.J., "Cognitive interference during competition among volleyball players with different goal orientation profiles" Journal of Sports sciences. 2002 Sep; 20(9):707–15.

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Comparison of Selected Motor Variables between Batsmen and Medium Peace Bowlers in Cricket

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ABSTRACT

The objective of the study to compare of selected motor variables between batsmen and medium peace bowlers in cricket. Forty (40) university level male cricket players (20 medium peace bowler and 20 batsmen) of North Zone Intervarsity were selected for the purpose of this study. The selected subjects were from the age group of 21 to 25 years. Selected motor variables such as speed, explosive strength of leg, arm strength, shoulder and wrist elevation (flexibility), spinal flexibility, agility were taken as a criterion measures. The table value indicate that for all selected motor variables mean value of medium peace bowlers and batsmen were greater in explosive strength of leg, arm strength, spinal flexibility, agility and lower in speed, shoulder and wrist elevation (flexibility). The calculated t values were 3.02 for speed, 2.06 for explosive strength of leg, 2.11 for arm strength and 2.16 for agility were greater than table value (df = 48) 2.00 at 0.05 level of confidence. The calculated t value of 0.87 shoulder and wrist elevation (flexibility) and 0.39 for spinal flexibility were less than table value (df = 38) 2.00 at 0.05 level of confidence.

INTRODUCTION

Today, sports have become a part and parcel of our culture. It is being influenced and does influence all our social institutions including education, economics, art, politics, law, mass-communication and even international diplomacy. In fact, its scope is awesome.

Kapil Dev says, "Behind my world records a great hand of the physical fitness was there, without the fitness I could not achieve this tremendous success."

The physical fitness or condition is the sum total of five motor abilities namely strength, speed, endurance, flexibility & coordinative abilities. Therefore the sports performance in all sports depends to great extent on these abilities. To improve and maintain physical fitness is the most important aim of sports training.

Regular practice without (as per schedule), is always emphasized for the athletes because muscular contraction will increase through regular training and that may lead to increase in their flexibility and agility, training causes a reduction of fatty tissue with in the muscles and that will result in a greater efficiency and faster contraction. The more motor units are involved, the greater is the strength and the resistance can be overcome more quickly. On the other hand break of regular practice will have some adverse effect on the performance of athletes.

Regular physical exercise and participation in games and sports help to improve physical fitness, which includes strength, speed, agility flexibility and endurance. Exercise helps in controlling obesity, specially a few grams of fat from the wrong places such as in the walls of the coronary and other important arteries. It aids digestion by reducing nervous tension and has a favourable effect on the level of function. It also improves the function of the lungs. One can improve his agility and the activities.

An individual with high level of general motor ability possess the basic motor qualities necessary to achieve excellence in a number of activities may still be unable

to perform well in a particular sports unless he has develop a specific skill of that sports through long hour of practices, strength, speed, endurance agility reaction time and speed of movement are general component of performance in the field of sports and games. General motor ability assists a sportsman in learning the specific skills and form a solid base, over which he can develop excellence in the particular game he is involved.

METHODOLOGY

Forty (40) university level male cricket players (20 medium peace bowler and 20 batsmen) of North Zone Intervarsity were selected for the purpose of this study. The selected subjects were from the age group of 21 to 25 years.

CRITERION MEASURES

To compare the subjects (medium peace bowler and batsmen) of the study the selected variables such as speed, explosive strength of leg, arm strength, shoulder and wrist elevation (flexibility), spinal flexibility, agility were taken as a criterion measures.

STATISTICAL METHODS

For determining the significant comparison of Speed, Explosive Strength of Leg, Arm Strength, Shoulder and wrist Elevation (Flexibility), Spinal Flexibility, Agility of the medium peace bowler and batsmen, 't' test was employed. For testing the hypothesis of independent variables the level of significance was set at 0.05 level of confidence.

FINDINGS

In order to compare the selected motor variables i.e. speed, explosive strength of leg, arm strength, shoulder and wrist Elevation (flexibility), spinal flexibility, and agility of the medium peace bowler and batsmen are presented in Table 2.

Table 1: Administration of the Test and Collection of Data

Sr. No.	Variables	Test	Equipment Used	Measures in
1	Speed	50 Yard Das	Stop Watch	In 1/10 sec.
2	Leg Explosive Strength	Standing Broad Jump	Long Jump Pit, Measuring Tape	In Cm
3	Arm StrengthA	Pull –Ups & Dips	Horizontal bar and mat	$(\text{Pull Ups} + \text{Dips})\ (\frac{W}{10} + H - 60)$ Where: W=represent the weight in pounds. H-Height in inches.
4	Shoulder and Wrist Elevation (Flexibility)	Yard Stick		In Inches
5	Spinal Flexibility	Yard Stick		In Inches
6	Agility	4×10 Meter Shuttle Run	Stop Watch	In 1/10 sec.

Table 2: 't' Test for Testing Significance of Mean Difference between Medium Peace Bowler and Batsmen

Variables	Mean of Medium Pace Bowlers	Mean of Batsman	Mean Difference	Std. Error Difference	t-Ratio
Speed	5.34	6.12	-0.79	0.37	3.02*
Explosive Strength of Leg	163.56	153.32	10.24	6.23	2.06*
Arm Strength	794.42	645.67	148.78	65.13	2.11*
Shoulder and wrist Elevation (Flexibility)	23.44	25.92	-2.48	1.26	0.87
Spinal Flexibility	7.36	6.25	1.11	1.21	0.39
Agility	12.05	11.94	0.11	0.61	2.16*

*Significant at 0.05 level, t(38)₌ 2.02
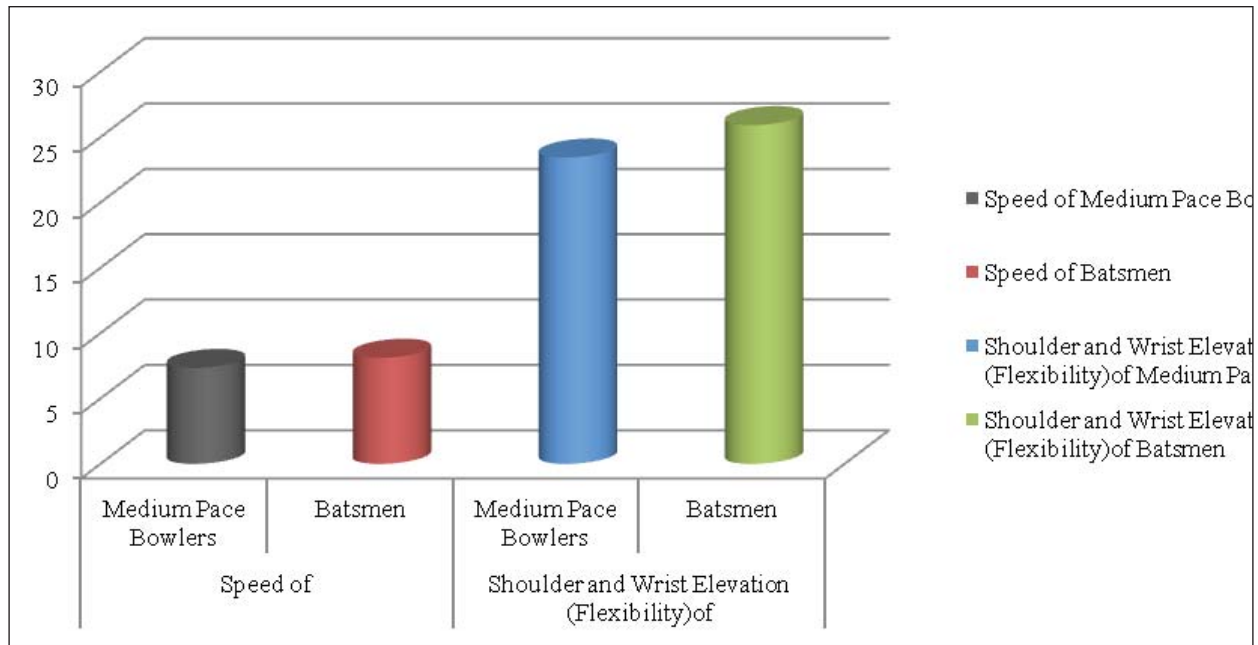
Fig. 1: Comparison of Arm Strength and Explosive Strength Mean between Medium Peace Bowlers and Batsmen
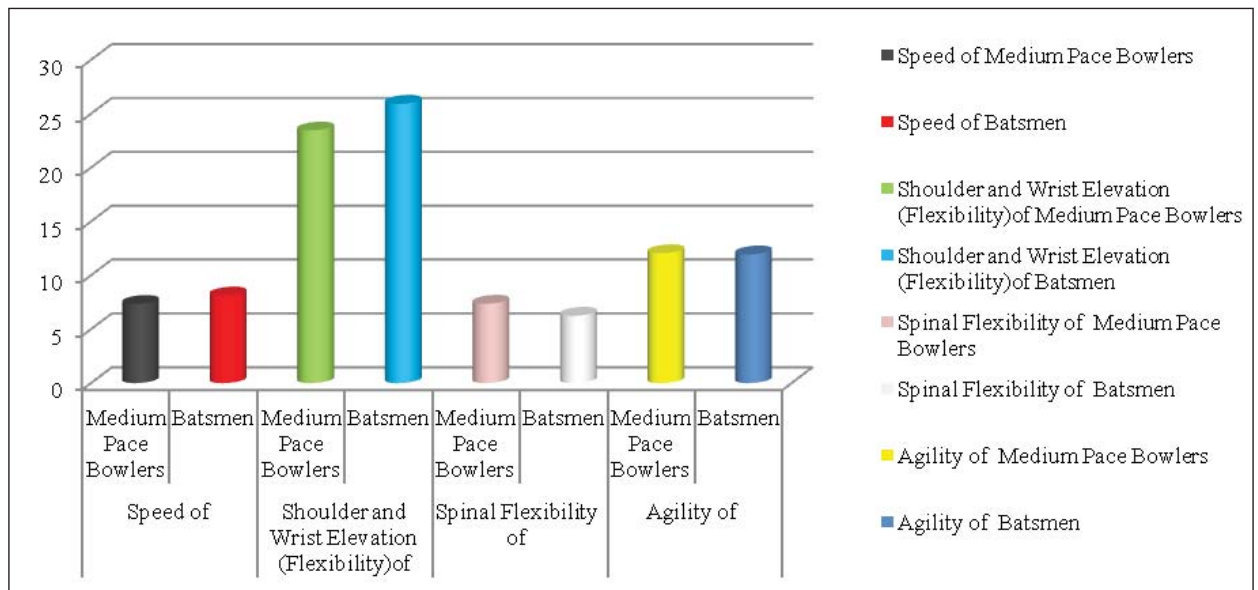
Fig. 2: Comparison of Speed, Shoulder and Wrist Elevation (Flexibility), Spinal Flexibility and Agility Mean between Medium Peace Bowlers and Batsmen

The Table 2 indicate that for all selected motor variables mean value of medium peace bowlers and batsmen were greater in explosive strength of leg, arm strength, spinal flexibility, agility and lower in speed, shoulder and wrist elevation (flexibility). The calculated t values were 3.02 for speed, 2.06 for explosive strength of leg, 2.11 for arm strength and 2.16 for agility were greater than table value (df = 38) 2.00 at 0.05 level of confidence. The calculated t value of 0.87 shoulder and wrist elevation (flexibility) and 0.39 for spinal flexibility were less than table value (df = 38) 2.00 at 0.05 level of confidence.

CONCLUSION

On the basis of above results following conclusions are drawn:

1. The medium pace bowlers have taller lower limbs so they have much speed than batsmen.

2. The medium peace bowlers have much explosive strength comparison to the batsmen.

3. The medium pace bowlers have more arm strength for which he deliver to fast bowl to the striker batsman.

4. Batsmen have more agile to compare a bowler because he do running between the wicket for the runs.

REFERENCES

Lay, Johan W., Kenyon, O'McPharsonand Gerald (1978). Sports and Social System. London: addition Wesley Publishing Company Inc.

Uppal, A.K. (1993). Physical Fitness & Health. Gwalior: Venus Publication,. pp. 27–29.

Bunn, John W. (1968). The Art of Officiating Sports (Englewood Cliff,. N.J.: Prentice Hall Inc.

Cheny Kay, M. (1966). A Comparison of Three Groups of Skilled Performers on a Battery of Selected Tests Balance. Complete Research in Health, Physical Education and Recreation.

Henery, F.M. and Whitley, J.D. (1960). Relationship of Individual Differences in Strength, Speed and Mass in Arm Movement. Research Quarterly 31, March.

Bratt, Janedle (1978). The Relationship of Arm and Wrist Strength to the Velocity of an Open Overhand Volleyball Serve. Complete Research in Health, Physical Education and Recreation.

Scoot J. Gulfoil (1978). The Relationship of Selected Flexibility and Strength Measures to Time in 100 Yards Crawl Stroke. Complete Research in Health, Physical Education and Recreation.

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Effect of Eight Weeks Training Programme on Leg Strength and Agility

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ABSTRACT

The purpose of the study was to find out the effect of eight weeks training programme on leg strength and agility among B.P.Ed students. To achieve the purpose, 20 male B.P.Ed. Students were randomly selected as subjects from Department of Physical Education, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) 2012–13. The age of the subjects were ranged from 20 to 27. The subjects were further classified randomly into two equal groups of 10 subjects each in which group–I underwent training proggrame for five days per week for eight weeks and group –II acted as a control group who were not undergo any special training programme. The leg strength and agility were selected as a criterion measures and were assessed before and after the training period. The collected data were statistically analysed by using Analysis of Covariance (ANCOVA). The leg strength was measured by using leg dynamometer (in kg.) and agility (in sec.) was measured by administering the shuttle run test. From the results of the study, it was found that there was a significant improvement on the leg strength and agility for experimental group when compared with the control group.

Keywords: *Strength, Agility, etc*

INTRODUCTION

The main physical qualities considered relevant to achieve success are Strength, Endurance, Speed, Agility and Flexibility. For the Physical system of the body to be fit, they must function well enough to support the specific activity, that the individual is performing (Morehouse and Miller, 1976).In sports the word "Training " is generally understood to be a synonym of doing physical exercises. In a narrow sense, training is doing physical exercises for the improvement of performance.

Strength is a conditional ability i.e., it depends largely on the energy liberation processes in the muscles. Strength and Strength training , therefore, assume high importance for achieving good performance in all sports. Zimmermann (1989) has rightly pointed out the positive effects of strength training on muscles, bones, joints, heart, circulatory system, metabolism and nervous system.

Agility is generally defined as the ability to change the direction quickly and effectively while moving as nearly as possible at full speed. It is depended primarily on strength, reaction time, speed of movement and specific muscle co-ordination.

The purpose of the study was to investigate the Effect of eight weeks training programme on leg strength and agility among B.P.Ed. Students. It was hypothesized that there would have been a significant effect of eight weeks training programme on leg strength and agility.

MATERIALS AND METHODS

Selection of Subjects

Twenty male students studying in B.P.Ed. course from the Department of Physical education and Sports, Guru Ghasidas Vishwavidyalaya Bilaspur (C.G.) during the academic year 2012–13 were selected to participate in the study. Their age ranged from 20 to 27 years. Further these subjects were divided randomly into two groups of ten (10) subjects each. Group-A considered as experimental group who underwent training programme and Group-B considered as control group that did not undergo any special training programme.

Criterion Measures

On the basis of the available literature, feasibility , availability of instruments, equipments to the present

study, the following criterion measures were selected: (1) Leg strength (2) Agility.

Training Programme

The subjects were training five times per week. The training programme was periodized for intensity and volume of training by using progressive load method and varied rest periods. Also none of the subjects were performing any high intensity training workouts or any other strenuous activity outside of their experimental training programme apart from their day to day activities.

Analysis

The data were collected on leg strength (in Kilograms) and agility (in Seconds) by using leg dynamometer and shuttle run at before and after the eight weeks of training as pre test and post test. Analysis of covariance (ANACOVA) was applied to find out significant difference if any between the two groups.

RESULT AND DISCUSSION OF FINDINGS

The Analysis of covariance (ANACOVA) for Leg Strength and Agility for experimental group and control group are presented in Table 1.

Table 1: Analysis of Covariance for Leg Strength

Groups	Experimental Group	Control Group	'F' Ratio
Pre-test mean + S.D.	54.56 + 1.27	54.72 + 1.39	0.249
Post-test mean + S.D.	58.63 +1.38	54.65 + 1.47	19.25*
Adjusted Post-test mean + S.D.	58.74	54.53	36.32*

*Significant at 0.05 level of significance.

Table 2: Analysis of Covariance for Agility

Groups	Experimental Group	Control Group	'F' Ratio
Pre-test mean + S.D.	11.23 + 0.027	11.36 + 0.011	0.52
Post-test mean + S.D.	11.46 +0.020	11.40 + 0.094	5.69*
Adjusted Post-test mean + S.D.	11.38	11.87	6.04*

*Significant at 0.05 level of significance.

Table value for df (1, 18) = 4.41 and for df (1, 17) = 4.45 at 0.05 level

Results of ANACOVA are presented on Table 1 and Table 2 for leg strength and agility respectively. From the Table 1 and Table 2, it can be seen that 'F' values of 19.25 and 5.69 for the post tests shows a significant difference between experimental group and control group on leg strength and agility respectively.

Thus the significant 'F' value indicates that the training have a positive influence on the leg strength and Agility. The graphical representation of data has been presented in Fig. 1 and Fig. 2.
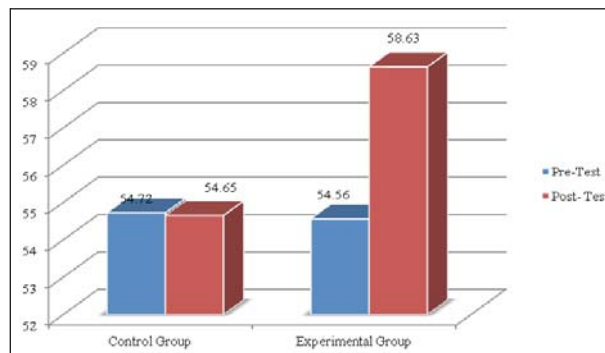
Fig. 1: Comparison of Pre-test Means and Post-test Means of Control Group and Experimental Group in Relation to Leg Strength
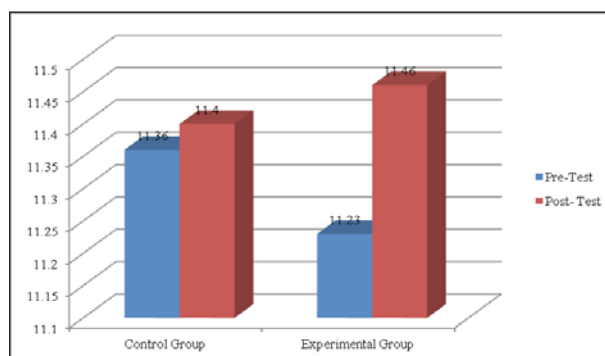
Fig. 2: Comparison of Pre-test Means and Post-test Means of Control Group and Experimental Group in Relation to Agility

DISCUSSION OF HYPOTHESIS

The findings of the present study have strongly indicates that eight weeks training programmes have significant effect on selected variables i.e. Leg strength and Agility. Hence the hypothesis earlier set that Eight weeks training programme would have been significant effect on Leg strength and Agility in light of the same the hypothesis is accepted.

CONCLUSION

On the basis of the findings and within the limitations of the study the following conclusions were drawn: The

training programme proved to be superior to control group in bringing the change in leg strength and agility. Significant difference was found between adjusted post test means of explosive strength and agility by keeping post test as covariate.

REFERENCES

Brown Lee E., Ferringo Vance A., and Santana Jaun Carlos, "Training for Speed, Agility and Quickness" (U.S.A. 2000), p.2.

Jennet Clair W., "An investigation of tests of Agility". Completed Research in Health, Physical Education and Recreation, 2 (1960): 44.

C.E. Kalf and D.D. Aruheim, Modern Principles of Athletic Training, (St. Louis: The C.V. Mosby Publishers, 1963), p.93.

Singh Hardayal, "Science of Sports Training" (New Delhi; D.V.S. Publications, 1993), p.175.

Edward L. Fox, *et al.* Physiological Basis of Physical Education and Athletics, (Iowa: Brown Publishers, 1989, p.416.

Dick, N.F. Sports Training Principles, London: Lepus Books, 1978.

Garrett, H.E. Statistics in Psychology and Education. Bombay: Vakils and Simons Pvt. Ltd., 19173.

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Peer Reviewed Research Article

Comparative Effect of Short Term Unilateral and Bilateral Leg Resistance Training on Maximum Strength of Legs

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ABSTRACT

Research is the gateway to new discoveries. Discoveries such as new technologies to improve the speed, strength, novel training programs to enhance the performance or creative initiative that evaluate children's enjoyment in sport. Research provides us all with the chance to learn more and acquire new knowledge to help ourselves and others.

With the continual growth of sport from with a participatory and academic study point of view, there is little doubt that to be able to appreciate the complex web of connections researching in sport offers, a plethora of information the informs understanding and builds knowledge must be sought. Whether examining the way the human body responds to physical work in order to develop new strategies to improve athletic performance, evaluating the role sport plays in bringing communications together, or describing how sport has given many people hope and belief following times of personal suffering.

Engaging the physical activity, games, sport and outdoor recreation contributes to a sense of community and social connectedness. These are vital components of improved wellbeing. Student's involvement in physical activity can take many forms, ranging from individual, non-competitive activity through to competitive team games. Emphasis is placed on combining motor skills and technical knowledge to improve individual and team performance.

INTRODUCTION

Football is world's most popular form of sport, being played in every nation without exception. The most widespread code is association football or soccer.

In recent years there has been a remarkable expansion of sports science. The subject area is recognized both as an academic discipline and a valid area of professional practice. Sport science as well respected within it's parent disciplines, for example biomechanics, biochemical, physiology, sociology and so on. A new maturity became apparent as the sports science were increasingly applied to address problems in particular sports rather than to sports in general.

It has taken some years for the knowledge accumulating within sports science to be translated in to a form usable by practitioners. Efforts have been made to compile scientific knowledge and expertise and make them more widely available to football world. The aim of the thesis is but one step in that direction.

PHYSICAL DEMANDS OF SOCCER

Soccer players need a high level of fitness to cope with the physical demands of a game and to allow for their technical skills to be utilized throughout a match. Therefore fitness training is an important part of the overall training program.

Fitness refers to a range of individual characteristics and in a game like soccer is a composite of many attributes and competencies. In consequence, fitness for soccer is said to be multivariate and also specific to the sport.

Strength Training and Soccer

Many activities in soccer are forceful and explosive i.e. tackling, jumping, kicking, turning and changing pace. The power output during such activities is related to the strength of the muscles involved in the movements. Thus, it is beneficial for a soccer player to have a high level of muscular strength, which can be obtained by strength training.

Strength training is of importance also in preventing injuries as well as reoccurrence of injuries.

Unilateral or partial unilateral supported exercise (USE) such as lungs, step-ups and unilateral squats are implemented in resistance training programs as assistance exercise and generally receive less emphasis than core exercise. Although USE is typically integrated in to most training programs, the emphasis of utilization varies, in part, because of the lack of scientific data to determine the potential for these exercise to improve strengthened power.

The exercise are typically used as a variation of bilateral supported exercise (BSE) such as the bilateral squat. The bilateral squat is typically implemented at the beginning of the resistance training program to develop a foundation of strength for untrained subject before USE. However, many skills that relay on fundamental lower body movements (running, throwing, hitting, kicking, vertical and horizontal leaps and changing running direction) are performed entirely of predominantly in a unilateral weight-bearing phase. Research data are needed to determine if USE could be incorporated early in a resistance training program to significantly improve strength and explosive power. Bilateral supported exercises have been extensively investigated to determine the effects of lower-body training on improved strength and power.

Statement of the Problem

The purpose of the study was to know the comparative effect of short term unilateral and bilateral leg resistance training on maximum strength of legs.

Delimitation

1. The study was delimited to 20 female soccer players of Lakshmibai National Institute of Physical Institution Gwalior.

2. The age group of female soccer player's is 19+years.

3. The study was restricted to 8 weeks of unilateral and bilateral training program only.

4. The study was further delimited to unilateral and bilateral maximum strength of leg which was as follows:

- Squat
- Leg press
- Leg extension
- Leg raise

1. The duration of the study was further delimited to the female soccer players of Lakshmibai National Institute of Physical Institution Gwalior.

Limitation

The effects of uncontrollable factors like climate conditions, dietary habits, facilities, trainings and emotional conditions etc. at the time of testing might influence the result of study.

Hypothesis

Based on literature gone through and similar findings available the following hypotheses were formulated.

It is hypothesized that there would be a significant difference between multilateral and bilateral leg resistance training on maximum strength of legs.

Definition and Explanation the Terms

- *Strength:* It is the ability to exert a force against a resistance.
- *Leg Strength:* It is the capacity of the individual's leg muscle to exert muscular force. The force is revealed by individual ability to push an object.
- *Maximum Strength:* The Maximum strength is defined as the maximum weight that can be lifted by the leg muscles in one extension.
- *Resistance Training:* It is referred as the leg extension resistance training exercise with 15 repetition maximum.
- *Unilateral Exercise:* It is referred to those exercise in which one side of the body is used at a time.
- *Bilateral Exercise:* It is referred to those exercise in which both side of the body is used.

SIGNIFICANCE OF THE STUDY

- The study may help to find out the comparative effects of short term unilateral and bilateral leg resistance training on maximum strength of legs.

- The study will be helpful for the coaches to improve new training plans over the old traditional plans.

- The study will be helpful for the players to have a better training plan for the quick improvement of the strength of the legs.

- The result of the study will help the coaches enhancing the performance of the players

SELECTION OF SUBJECTS

For the purpose of the study, 20 physically active female soccer players from soccer match practice group of Lakshmibai National University of Physical Education, Gwalior was voluntarily selected to participate in this study. Participants were not involved in any resistance training program, however they had participated only in there regular activity training program. The subjects were instructed to keep the same level of physical activities throughout the study. A verbal consent was taken from the department and all the benefits and the risk factors of the training factors were told to the subjects prior the start of the activity.

Selection of Variables

The selected variables for the study were:

- Dependent Variable.
    1. Maximum strength of leg strength.
- Independent Variable.
    1. Unilateral and bilateral exercise.

COLLECTION OF DATA

The pre data was collected after two trial repetition and then the pre data were taken. The maximum strength was measured with the recommended by the Brown and Weir (28). After 28 week of training again post data were taken after two trail repetition.

ADMINISTRATION OF TEST

There were two groups, one is Experimental Group 1 (unilateral group) and the other is Experimental Group 2 (bilateral group) on whom a systematic progressive program of weight training for both groups. Unilateral group was administered perform the exercise with one leg, where as bilateral group perform the exercise with both legs.

MAXIMUM STRENGTH OF LEGS 1 RM TEST

The procedures performed to determine knee extension 1 RM followed the recommendations described by Brown and Weir (28). In short, subjects performed a complete repetition starting the movement with 90^0 of knee flexion, extended the knee up to 180^0, and then returning the initial position. The amount of weight used in the first repetition was defined as 40 % of weight lifted in the familiarization sessions. Then, trials with a three-minute interval between trials. There was a 5% increment in the load between trials to nearest 2.5 kg. Single legs alternately and then both legs were tested and the greatest weight lifted was considered as 1 RM.

TRAINING PROGRAM

The experimental group 1 (universal resistance training group) and experimental group 2 (bilateral resistance training group) was performing resistance training exercise. The group 1 (universal resistance training group) trained with an exercise load corresponding to 15 RM and group 2 (bilateral resistance training group) was trained with a load of 15 RM. Training was performed for 8 weeks, three times a week on alternate days (Monday, Wednesday and Friday for unilateral group and Tuesday, Thursday and Saturday for bilateral group). Maximum strength of legs 1 RM will be evaluated pre and post training. If she could complete all sets with the determined number of repetitions plus two training load will be maintained in next training session. However if she was not able to perform the determined number of repetitions minus 2, the training load was decreased. The duration of both the concentric and the eccentric phases was 4 seconds (2 s for concentric and 2 s for eccentric actions).

The research scholar went through the available literature pertaining to the training of female soccer players using weight training and also after having a discussion with the experts of Lakshmibai National University of Physical Education, Gwalior the following exercise was chosen.

Table 1: Training Program/ Training Schedule (Unilateral/ Bilateral Group)

Name of Exercise	Weight in Kg.	Repetition	Sets	Rest Period (in Secs.)
Squat	10	25	25x3	45
Leg press	15	30	30x3	30
Leg Extension	10	30	30x3	30
Leg Raise	10	30	30x3	30

Table 2: Increasing the Load as Per Week for the Both Group

Repetition	Weight Category
1st time (1 week to 4 week)	5 kg
2nd time (5 week to 6 week)	5 kg
3rdtime (7 week to 8 week)	10 kg

STATISTICAL ANALYSIS

SPSS version 17.1 is used to run all data analysis. Groups means and Standard Deviations for maximum leg strength (IRM) are reported for unilateral and bilateral training groups. ANCOVA was used to analyze the relationship of training between the two group interactions and is reported at a level of p <.05.

ANALYSIS OF DATA AND RESULT OF STUDY

Statistical Analysis of Data

The statistical analysis of data collected on leg strength variables of twenty subjects belonging to two different groups (experimental group 1 and experimental group 2) have been presented.

The data was examined by applying statistical technique (ANCOVA) and the level of significance was set at 0.05 level of confidence.

Level of Significance

The level of significance chosen to ascertain the difference in the initial and final means obtained by `ANCOVA' test was set at 0.05, which was considered adequate for this study.

FINDINGS

Table 1: Descriptive Statistics

Groups	Mean	Std. Deviation	N
Experimental Group 1	22.3000	1.45458	20
Experimental Group 2	19.7100	1.10829	20
Total	21.0050	1.83008	40

Table 1 shows the descriptive statistics that is mean and standard deviation of post test of groups which shows that the mean of the Experimental Group 1 is grater than the Experimental Group 2.
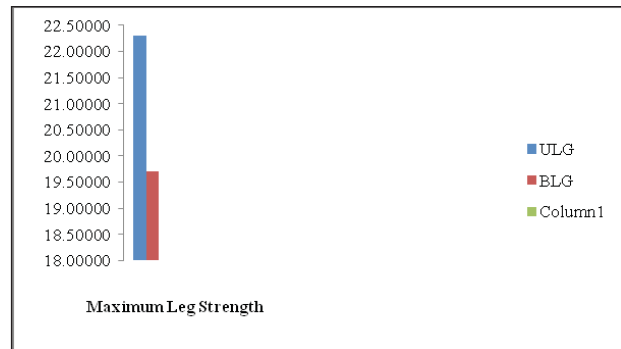

Fig. 1: Graphical Representation of Means of Maximum Leg Strength of Unilateral Group and Bilateral Group

Table 2: Adjusted Mean

Groups	Mean	Std Error	95 % Confidence Interval	
Experimental Group 1	21.838a	150	21.533	22.142
Experimental Group 2	20.172a	150	19.868	20.477

a, covariates appearing in the model are evaluated at the following values: pre = 17.8000

Adjusted means for data on muscular leg strength of different groups during post test shown in Table 2.

Table 3: Tests Between–subjects Effect

Source	Type 1 Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	115.283a	2	57.641	139.065	.000
Intercept	17648.401	1	17648.401	42578.401	.000
Pre	91.721	1	91.721	221.284	.000
Groups	23.562	1	23.562	56.846	.000
Error	15.336	37	.414		
Total	17779.020	40			
Corrected Total	130.619	39			

R Squared =.883 (Adjusted R Squared =.876)

Since, the analysis of covariance for muscular leg strength scores had a significant difference among the two experimental groups, therefore post hoc comparison LSD test was applied and it presented in Table 3.

Table 4: Pair Wise Comparison

(I) Groups	(J) Groups	Mean Difference (I-J)	P-value
Group 1	Group 2	1.666 *	.000
Group 2	Group 1	-1.666 *	.000

Based on estimated marginal means

*. The mean difference is significant at the.05 level.

b. Adjustment for multiple comparisons : Least Significant Difference.

Table 4 Indicates that there is significant difference between Experimental Group 1 and Experimental Group 1 of Maximum strength because p-value is 0.00 which is less than 0.05. There is significant difference between Experimental Group 1 and Experimental Group 2.

DISCUSSION OF FINDINGS

From the findings, it is clearly indicated that there was significant effect of training on the maximum leg strength of the leg extensors. The reason for having the significant effect on the physical variables of the experimental group was that the program was designed in such a way that probably motivated the individuals of the experimental group to do their best.

In case of maximum leg strength of the leg extensors a significant improvement was found. The present study supports the study conducted by Wyland, T.P. and Reyes, G.F. "Cisco" (2013) studied the Implications of Universal Training on Performance on both male and female subjects. The study was further supported by Hakkinen *et al* (1996) studied the neuromuscular adoptions during bilateral versus unilateral strength training in middle edged and elderly men and women also brings similar results. The study was further supported by Vandervoort and Antony A (1980) studied the motor unit activation in unilateral and bilateral muscle contraction in men.

It was found that there was a significant difference found in unilateral and bilateral training. The reason could be attributed to the fact that the sample size was small.

DISCUSSION OF HYPOTHESIS

On the basis of the result of the study, the hypothesis was accepted at 0.05 level of significance in Maximum Strength of the Leg extensors because significant differences were found there.

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Impact of Pranayamas on Stress of Males School Going Student

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ABSTRACT

The aim of this study was to observe the impact of Pranayamas on stress of subjects with the age range 14 to 15 years. For this 30 male subjects were drawn from Beliatore high school, Beliatore, Dist: Bankura (W.B)by using simple random sampling. Pre post data were collected before and after intervention of Pranayama for 45 days using stress inventory for school students (SISS) by Seema Rani and Dr. Basant Bahadur Singh. Since calculated value of t (= 6.57) is greater than tabulated t0.05 (29) (= 2.045). It is concluded that Pranayama plays positive and significant role to decrease stress level of the subjects.

Keywords: *Pranayama, Stress*

INTRODUCTION

तस्मिन्सति भवासप्रवासयोर्गतिविच्छेदः प्राणायामः

tasmin-satisvasa-prasvasa-yor-gati-vicchedahprana-yamah,

—*Patanjali Yoga Sutra II:49*

tasmin- in that.

sati- while being.

svasa- inhalation.

prasvasa-exhalation.

yoh (→ r)- 6th, possessive case suffix-dual of the two.

gati- motion, here rhythmic regular movement.

viccheda(h)- cut, interruption, break, (is).

pranayama (h)- pranayama(is).

Two Sanskrit words are combined in the word 'Pranayama' Prana and Ayama. 'Prana' means life force i.e Breath. 'Ayama' means development or control. Therefore Pranayama is the control of breath. Breath is the life force that sustains life. Nobody can survive more than a few minutes without air. When the breath stops, life ends. In simple terms pranayama may be called the control of the breath. Its essence lies in the modification of our normal process of breathing. The practice of Pranayama and

Meditation, and must be achieved before union can take place with the higher reality. The application is pranama is considered beneficial for health and cure of certain disease for stress management and for improving general efficiency of individual is different fields. pranayama is also a spiritual pursuit for many seekers of truth. In the modern world, western countries like America use pranayama as a tool for mental, physical and spiritual up liftmen.

Objectives

This study has aimed to study the impact of Pranayamas on stress level of the male subjects,

Hypothesis

Practice of Pranayamascauses significant decrease in stress level of the all subjects.

METHODOLOGY

Sampling

This study was conducted in 30 samples from Beliatore High School, Beliatore, Dist: Bankura (W.B).Samples were selected by applying the simple random sampling using lottery method. 30 were males of age range 14–15yrs.

Research design: pre-post single group

Symbolically, A Q$_1$ X Q$_2$

Where,

A= single group

Q = pre- test

X= Pranayama(45 min. for each morning and evening per day)

Q2= Post-test

PROCEDURES

Using stress inventory for school students (SISS) by Seema Rani and Dr. Basant Bahadur Singh Firstly, by using SISS questioner of each subject was measured and post measurement of SISS questioner for the same subjects were taken after allowing practice of Nadisodhan Pranayama for 45 days. During the practice, each subject was allowed for inhalation (Puraka), retention (kumbhaka) and exhalation (Recaka) in equal

ratio, thrice through left nostril and the same through right nostril and then inhalation through both nostrils and the exhalation through mouth which is supposed to be one round. Same procedure was suggested with different deep feelings in Puraka, Kumbhaka and Recaka steps. The reference of this technique can be obtained from Super Science of Gayatriwriten by PanditSriram Sharma Acaaya, founder of all worlds GayatriPariwara.

INTERPRETATION OF FINDINGS

The following interpretation can be made on the basis of the results shown in the above output.

The values of the mean, standard deviation and standard error of the mean for the data on Haemoglobin in the pre and post testing are shown in the Table 1. These values can be used for further analysis.

It can be seen from Table 2 that the value of t statistic is 6.57. This t value is significant as the p value is 0.000which is less than 0.05.

RESULTS & DISCUSSION

Table 1: Paired Sample Statistics

		Mean	N	S.D.	S.E(Mean)
Pair 1	Pre Stress.	103.06	30	18.12	3.30
	Post Stress.	94.53	30	15.48	2.82

Table 2: Paired T-Test Table

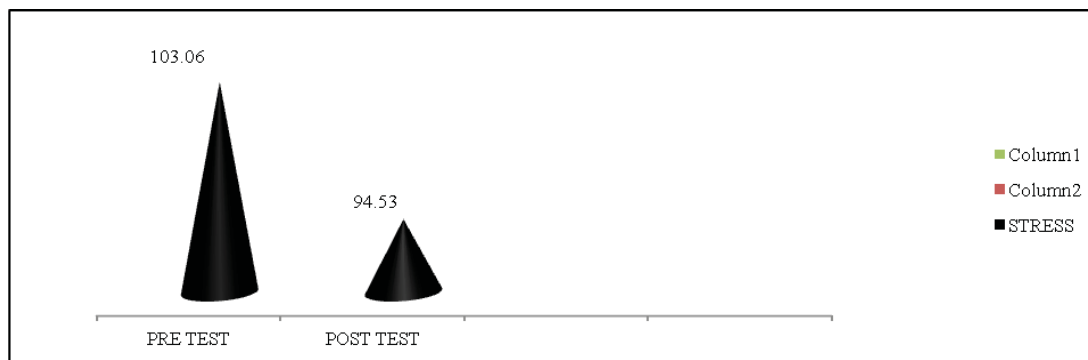|	Paired Differences					t	df	Sig. (2-Tailed)
	Mean	S.D.	SE (Mean)	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pre- Stress. Post- Stress.	8.53	7.10	1.29	5.87	11.18	6.57	29	0.000

Fig. 1: Graph for Total Subjects (Mean)

For one-tail test, the value of tabulated t at 0.05 level of significance and 29 (N-1 = 29) dfwhich is 2.045. Since calculated value oft (= 6.57) is greater than tabulated $t_{0.05}$ (29) (= 2.045), Hypothesis may be accepted and it may be concluded that Practice of Pranayama causes significant decrease in the stresslevel of the all subjects.

DISCUSSION

The effectiveness of Pranayama programme may be due to the reason that Pranayama programme decrease the level of stressof individuals, as by practicing the Pranayama the arousal level of the individual is regulated which in return help us to decrease the stress level. Therefore, proposed hypothesis has been accepted in case of stress.

CONCLUSION

Pranayama decrease the Stress level of school going student.

REFERENCES

Asha, C.B. (2003) Creativity, intelligence, academic stress and mental health. Journal of Community Guidance and Research, Vol.20 (1), 41–47'.

Bisht, A.R. (1980) Interactive effect of school climate and need for academic achievement on the Academic stress of students. Education, Almora Constituent College, Kumon University.

Bisht, A.R. (1987) Bisht battery of stress scales. National Psychological Corporation Agra.

Chauhan S.S (1978) Advanced Educational Psychology, Vikash Publication Pvt. Ltd.

Dewan (2003) Journal of Educational Research and Extension. Vol. 41(3), July-Sep. (2004)

Flocco, D. C. (2005) School schedules and how they impact student perceptions of stress. Unpublished doctoral thesis, Dissertation Abstracts International, June Vol. 65 (12), 4411.

Graver et al (1988) Role of Yoga in the treatment of Psychoneurosis, PGI Psychiatry, 29 253–258.

Kochar H.C. (1972) Yoga practice as a variable in neuroticism, anxiety and hostility, Yoga Mimansa, 15, 37–46.

Kochar H.C. (1976)Influence of Yogic Practices on mental Fatigue. Yoga-Mimansa Vol. 28 (2), 3.

Kochar, H.C. (1976–77) Effect of yogic practices on immediate memory, Yoga Mimansa 18, 57–61.

Kumari, Santosh et al (2005) Impact of Yogic Shatkriyas and Pranayamas on stress of senior secondary student, Yoga Mimansa, Vol. 37, No. 1 & 2., 23–30.

Mangal, S.K. (2002) Advance Educational Psychology, Prentice Hall of India Private Lim. Pratap, V. (1971) Investigation on Tratka, collected papers on yoga, Lonavala, Kaivalyadhama, 16.

Tirth, Omanand (1960) PatanjalYogParadeep, Geeta Press Gorkhpur. Sahu R.J. & Bhole M.V. (1983) Effect of three week Yogic training programme on psychomotor performance, Yoga Mimansa, 22, 59–62.
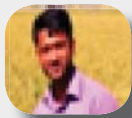
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Peer Reviewed Research Article

Effect of Yogic Training on Flexibility of Female D.I.T.E. Students

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ABSTRACT

Being flexible significantly reduces the chance of injury and chronic back pain. The purpose of the study was to see the effect of Yogic training on flexibility of female D.I.T.E. students. So forty (40) female D.I.T.E. students of Radha Krishna Institute Vikaspuri, New Delhi was randomly selected as subjects and further twenty (20) students were randomly selected for Control Group and remaining 20 students were selected for Experimental Group. The age of the subjects ranged between 18 to 20 years. Flexibility was selected as variable and Sit and reach test was used as criterion measure for flexibility. Pre-test data were collected from both the group before giving 45 days of yogic training programme and also Post-test data were collected from both the group at the end of 45 days of yogic training programme. Mean, Standard Deviation and ANCOVA were used as statistical techniques for the present study. Result revealed that the 45 days of Yoga training had significantly improved the flexibility of female D.I.T.E. students of Radha Krishna Institute Vikaspuri, New Delhi.

Keywords: *Flexibility, D.I.T.E. Students, Suryanamaskar, Asanas, Pranayama, and Yoga Nindra*

INTRODUCTION

Flexibility is needed to perform everyday activities with relative ease. Flexibility tends to deteriorate with age, often due to a sedentary lifestyle. Without adequate flexibility, daily activities become more difficult to perform. Over time, we create body movements and posture habits that can lead to reduced mobility of joints and compromised body positions. Staying active and stretching regularly help prevent this loss of mobility, which ensures independence as we age. Being flexible significantly reduces the chance of injury and chronic back pain.Yoga has been considered to be improving one's flexibility. The various different yoga positions work on all the different joints found in the human body. These also include those joints that are not really targeted in other forms of exercise. Benefits of yoga include increasing one's lubrication of the tendons, joints and ligaments.

It is important to include flexibility training as part of our regular fitness routines. Improved flexibility may enhance performance in aerobic training and muscular conditioning as well as in sport. There is scientific evidence that the incidence of injury decreases when people include flexibility training in their routines due to the enhanced ability to move unimpeded through a wider range of motion. The only exception to this would be when there is an excessive or unstable range of motion, which may increase the likelihood of injury. When used appropriately, flexibility training allows us to become more in tune with our body. It is a form of active relaxation that can improve both mental and physical recovery. So considering the importance of Flexibility I have tried to see the effect of 45 days of Yogic training programme on female students of Radha Krishna Institute D.I.T.E. Vikaspuri, New Delhi.

METHODOLODY

For the purpose of the study forty (40) female D.I.T.E. students of Radha Krishna Institute of Vikaspuri, New Delhi was randomly selected as subjects and further twenty (20) students were randomly selected for Control Group and remaining 20 students were selected for Experimental Group. The age of the subjects ranged between 18 to 20 years. Flexibility was selected as variable and Sit and reach test was used as criterion measure for flexibility. Pre-test data were collected from both the group before giving 45 days of yogic training programme and also Post-test data were collected from both the group at the end of 45 days of yogic training programme.

Mean Standard Deviation and ANCOVA were used as statistical techniques for the present study.

TRAINING PROTOCOL

The training programme was divided into four parts, Suryanamaskar Part, Asanas Part, Pranayamas Part, and Yoga Nindra Part. The training programme lasted for 45 days every day in the evening for 40 minutes from 4:00pm to 4:40pm and 5 (five) days a week, Monday to Friday. Saturday and Sunday were observed as rest Day.

Surya Namaskar

At the beginning of the training Suryanamskar was made to perform for 8 minutes continuously.

Asanas

After performing the Suryanamaskar, following asanas were made to perform for 21 minutes:

1. Sarvangasana.
2. Halasana.
3. Bhujangasana.
4. Dhanurasana.
5. Pashimottanana.
6. Ardhamatsyendrasana.
7. Vajrasana.
8. Tadaasana.

Pranayamas

After performing Asanas following pranayamas were made to perform for 6 (Six) minutes:

1. Anulom-Viloma.
2. Suryabhedhana.
3. Chandrabhedana.

Yoga Nindra

Finally last 5(five) minutes were given for yoga Nindra.

RESULTS

The data pertinent to flexibility of pre-test and post-test of forty (40) female students of Radha Krishna Institute D.I.T.E. Vikaspuri, New Delhi were computed with the help of computer Software called IBM SPSS Statistics-21 and presented from table No. 1 to Table No. 4.

Table 1: Descriptive Statistics of Flexibility on Pre-test and Post-test Data

Group	N	Pre-test		Post-test	
		Mean	SD	Mean	SD
Control	20	-2.970	5.9203	-3.020	5.9336
Experimental	20	-1.595	2.7790	3.400	2.3261

The Table 1 shows the Mean, Standard Deviation Score of Pre-test and Post-test data of Control and Experimental Group. For the Pre-test data the mean of Experimental Group is greater than the mean of Control Group as the mean score is -1.595 and -2.970 respectively. Again the variability score of Experimental Group was also better than the Control Group as the Standard Deviation is 2.7790 and 5.9203respectively.

Further for the Post-test data, the mean of Experimental Group is greater than the mean of Control Group, as the mean score is 3.400 and -3.020 respectively. Again the variability score of Experimental Group was also better than the Control Group as the Standard Deviation is 2.3261 and 5.9336.

Table 2: Adjusted Mean of Post-test Data

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Control	-2.375a	.279	-2.941	-1.810
Experimental	2.755a	.279	2.190	3.321

a Covariates appearing in the model are evaluated at the following values: Pre =-2.283.

The Table 2 shows the adjusted mean of Post-test data of Control and Experimental Group. The Adjusted mean of Post-test data of Control and Experimental Group after covariate of Pre-test data are -2.375 and 2.755 respectively.

ANCOVA was computed in the Table 3 to see the effect of 45 days of Yogic training on Control Group and Experimental Group of Pre-test data and Post-test data.

Table 3: ANCOVA (Tests of Between-Subjects Effects on Post-test Data)

Source	Type I Sum of Squares	df	Mean Square	F	Sig.
Pre-test	869.663	1	869.663	564.355	.000
Group	257.237	1	257.237	166.930	.000
Error	57.016	37	1.541		
Total	1185.360	40			
Corrected Total	1183.916	39			

a R Squared =.952 (Adjusted R Squared =.949)

In the above Table 3 when tested between Pre-test data of Control Group and Experimental Group, Significant difference was found as the p-value is 0.000 which is less than 0.05, level of confidence.

Further when tested between the Groups (i.e. Control and Experimental) of Post-test data after covariate of Pre-test data and Adjusted Mean of Post-test Data significant difference was found as the p-value is 0.000 which is less than 0.05, level of confidence.

Table 4: Pair Wise Comparison of Post Adjusted Means on Flexibility

(I) Group	(J) Group	Mean Difference (I-J)	Sig.b
Control	Experimental	-5.131*	0.000
Experimental	Control	5.131*	0.000

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Pair Wise Multiple comparison Post Adjusted Means of Flexibility were done between Control Group and Experimental Group on Table 4. The Post Adjusted mean difference between Control Group and Experimental Group is -5.131 and the Post Adjusted mean difference between Experimental Group and Control Group is 5.131. Thus from the above Table 2 of Adjusted Mean of Post-test Data it is evident that Experimental Group on Post-test data had greater flexibility.

DISCUSSION OF FINDINGS

In the present study we have given 45 days of Yogic training to forty (40) female D.I.T.E. students of Radha Krishna Institute of Vikaspuri, New Delhi, to see whether it can improve flexibility or not. The result of the ANCOVA revealed that the 45 days of Yogic training had improved the flexibility of female D.I.T.E. students of Radha Krishna Institute of Vikaspuri, New Delhi. Thus our findings of the present study supported the previous findings of Armstrong, W. Jeffrey & Smedley, June M. Scott (2003); Bal, B.S. & Kaur, P.J (2009); Kawade, R. C. (2011) and Kumar, Surender (2013).

Armstrong, W. Jeffrey & Smedley, June M. Scott (2003) studied on "Effects of a home-based yoga exercise program on flexibility in older women" and their result also revealed significant improvement of flexibility for older women. Again Bal, B.S. & Kaur, P.J (2009) studied on "Effects of selected asanas in hatha yoga on agility and flexibility level" and subjects were taken from D.A.V. Institute of Engineering and Technology, Jalandhar (Punjab), INDIA. Their result also revealed significant improvement in Flexibility and Agility as well. Kawade, R. C. (2011) studied on "Yoga Improves Flexibility" and her subjects were school girls of Navi Mumbai. Her result was also effective in improving Flexibility of the school girls of Navi Mumbai. Kumar Surender (2013) also studied on "effect of yogic training programme on physical fitness of boys of rural high school in district kaithal" and result of the study revealed that yogic training programmed have positive effect on physical fitness components of rural high school boys i.e. speed, strength, agility, endurance and flexibility. Thus it is evident that from the above studies regular training of Yoga can improve flexibility and it is recommended to all ages of people to regularly participate in the yoga activities to keep themselves fit and flexible, so that one can do his/her task efficiently.

REFERENCES

Armstrong, W. Jeffrey & Smedley, June, M. Scott(2003). Effects of a home-based yoga exercise program on flexibility in older women. *Clinical Kinesiology: Journal of the American Kinesiotherapy Association*, Vol: 57, No.1, Spring, p.1(6) ISSN: 0896-9620

Bal, B.S. & Kaur, P.J (2009). Effects of selected asanas in hatha yoga on agility and flexibility level. *Journal of Sport and Health Research.* 1(2):75–87.

Kawade, R.C. (2011). Yoga Improves Flexibility. *Variorum, Multi-Disciplinary E-Research Journal*; Vol. 01, Issue-3

Kumar Surender(2013). Effect of Yogic Training Programme on Physical Fitness of Boys of Rural High School in District Kaithal. *Research Expo International Multidisciplinary Research Journal.* Volume-III, Issue – II; ISSN: 2250 – 1630

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Kinematic Analysis of Baseball Passing in Basketball

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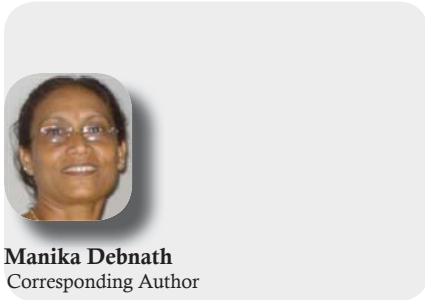
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ABSTRACT

The aim of our study was to assess the relationship of selected kinematic variables with the performance of baseball pass in basketball. Twenty male basketball players who participated in North Zone Inter University Basketball Championship 2010-11 held at C.S.J.M. University, Kanpur (Uttar Pradesh), India, volunteered to participate in this study. The performances of the subjects were assessed by three judges. Judges gave marks according their subjective observation from five point scale. The videos as obtained by the use of digital videography were analyzed (the best trial) by Silicon coach pro 7 software were represented by the angles at selected joints as Ankle joint, Knee joint, Hip joint, Shoulder joint, Elbow joint, Wrist joint, height of center of gravity. The data was analyzed by use of person's product moment correlation, Multiple Correlation and regression equation. The statistical findings shows that there is significant relationship of knee, hip and elbow joint in moment execution phase in baseball pass in basketball. Pattern and principles of movement during the preparation and execution phase of baseball pass in basketball signifies the contribution of three joints (shoulder, knee and hip) for the best execution of baseball pass.

INTRODUCTION

Basketball is one of the most popular sports in the world, participants of all ages have discovered basketball to be fun, competitive, educational, recreational, and fitness oriented. Individual skills, such as shooting, passing, dribbling and rebounding along with offensive and defensive team work, are prerequisite for successful participation in the sport. [20]

The game requires various techniques which include shooting, dribbling, passing, rebounding and defense. Most schools in America, Asia and other parts of European countries adopted basketball in the Physical Education Curriculum basically because the game promotes fitness as well as develop their social awareness such as teamwork, camaraderie and sportsmanship.

Proof of the popularity of the game was the establishment of long-time college basketball game, the National Collegiate Athletic Association (NCAA) in United States of America and other top collegiate basketball league all over the world which produced Olympic and professional players.

Passing is a method of moving the ball between players.

Passes are accompanied by stepping the foot (left or right) forward to increase power and control. Follow-through is highly recommended to make sure to the accuracy of the pass. [6, 7]

Passing is the quickest way to move the basketball but is the least liked by many players, especially those just learning the game. Most players would rather dribble or shoot the ball than give it up but eventually they learn that by passing the ball to others when they are open then teammates will pass the ball to them when they are open good passing relies only partly on good technique and more so on good vision and awareness of where players are in open spaces. This is why at lower standards, where players are not well spaced apart and moving to open spaces, there are many more turnovers from poor passes, even though the technique of the pass may be correct. In addition correct skills in catching can make a poorly executed pass be successful. [1, 15, 21]

Because basketball is a movement game it is important that player be taught to pass and move to a new position (not pass and stand still) and always expect a return pass, therefore maintaining vision on the ball is most important (a player should never pass and turn his back

to the ball). From the beginning all drills should include passing and movement and vision on the ball as well as using each hand. [17]

The baseball passes-is used to make a long pass down court, usually on a fast break, and requires both distance and accuracy. Similar to the Skip Pass this pass requires arm strength and body size and is not recommended for young children and beginners. Players, at all ages and levels, must understand their passing range (like in shooting range) as trying to pass out of range leads to poor execution and accuracy.

The baseball pass, as the name implies, involves the same techniques as the overhead throw that is commonly used in baseball. The baseball pass is the long distance pass and is usually thrown a distance of at least half the court. This pass is often used when passing to teammate down the court for a quick two points, when making a outlet pass to start a fast break or when inbounding the ball.

As with all passes, an effective baseball pass requires that the player first be in a well balanced athletic stance, with the feet shoulder-width apart and the knees bent. The head should be positioned over the support base, slightly behind the knee and over the waist, with the back straight. When preparing to execute the baseball pass, the player should bring the ball up to the ear with the passing hand positioned behind the ball. The arm of the passing hand should be held at a 45 degree angle with the upper arm parallel to the floor so that the player can throw the quick, hard and straight pass. The player should keep the non passing hand in front of the ball until the pass is released.

When using the baseball pass, the player begins in a balanced stance but most pivot on the passing-side foot. The player shifts his weight from the middle of the stance to the passing-side foot and then to the front foot as the player steps toward the target and passes the ball. The player steps toward the direction of intended pass with the foot opposite the throwing arm. On the follow through, the player's legs, back and arms should extend forward in the direction of the target, and after the ball is released, the palm of the passing hand should face the ground and the fingers should be pointed towards the target. [18, 3, 25]

The over arm throwing pattern is performed in various sports activities as football, baseball, javelin, handball

and basketball. A lot of studies analyzed baseball pitching, hand ball throwing and shoulder pass in netball [12, 13, 2, 10, 22, 9, 8, 19, 16, 14, 7]. On the contrary, the kinematic analysis of baseball pass in basketball is not well documented, that's why we do not have a study about global description of baseball passing in basketball. So, the aim of our study was to assess the relationship of selected kinematic variables with the performance of baseball pass in basketball.

MATERIALS & METHODS

Participants

Twenty male basketball players who participated in North Zone Inter University Basketball Championship 2010–11 held at C.S.J.M. University, Kanpur (Uttar Pradesh), India, volunteered to participate in this study. The age of the participants were ranging from 18 to 28 years (25 years old in mean). Their mean height was 1.82 ± 0.07m and their mean mass 72.5 ± 5.5 kg. All the participants were right handed.

Criterion Measure

The scores of the subjects in baseball pass were used as the criterion variable in the study. The performances of the subjects were assessed by three judges. Judges gave marks according their subjective observation from five point scale.

Testing Protocol

Prior to collecting data, participants were informed of the protocol of the study and signed a consent form. Silicon coach pro 7 software was used in the collection of kinematical data. A Casio Exilim F-1 Low Speed Camera, which was positioned at 7.90m from the subject at height of 1.50m from the subject on an extension of free throw line. Camera was also set for capturing 300 fps. The subjects were made to take three Shots only. The angular kinematical variables of the body were calculated at moment preparation and moment execution phase.

The videos as obtained by the use of digital videography were analyzed (the best trial) by Silicon coach pro 7 software were represented by the angles at selected joints as Ankle joint, Knee joint, Hip joint, Shoulder joint, Elbow joint, Wrist joint, height of center of gravity.
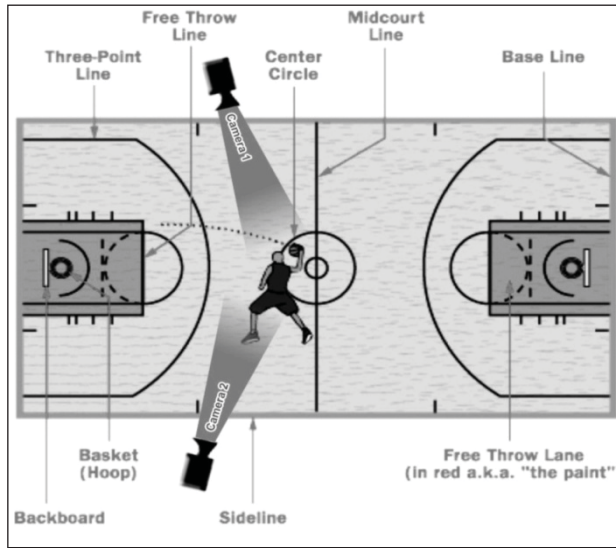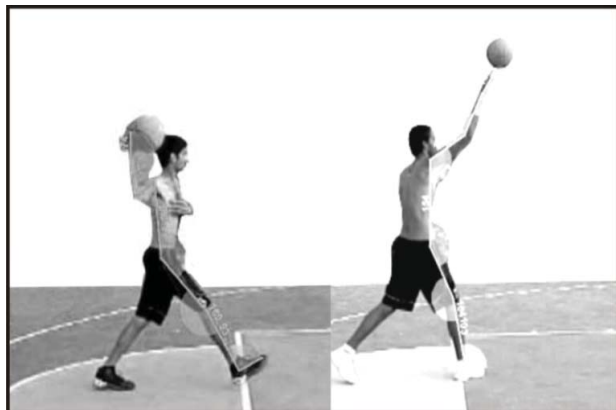
Fig. 1: Positioning of the Camera

Fig. 2: Moment Preparation and Moment Execution Phase

STATISTICAL ANALYSIS

The data was analyzed by use of person's product moment correlation, Multiple Correlation and regression equation. The level of significance chosen to test the hypothesis was 0.05. [5, 4, 24]

RESULTS

Figure 3 reveals the descriptive analysis of moment preparation phase in baseball pass in basketball. In this the angles of the different joints showed the value of mean, standard deviation, range, maximum and minimum value respectively.
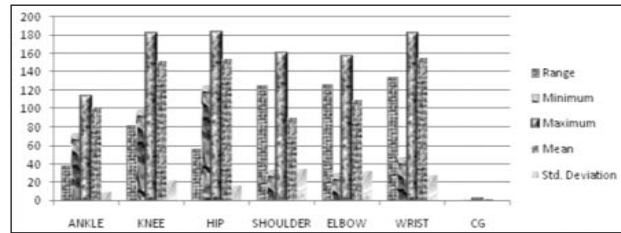

Fig. 3: Descriptive Analysis of Baseball Pass at Preparation Phase in Basketball

Table 1: Correlation between Dependent Variable (Baseball Pass Performance) and Independent Variables (Selected Angular Kinematic Variable) at Moment Preparation Phase

Independent Variables	Correlation Coefficient
Ankle joint (Right)	0.115
Knee joint (Right)	0.489*
Hip joint (Right)	0.335
Shoulder joint (Right)	0.032
Elbow joint (Right)	-0.029
Wrist joint (Right)	0.015

* Significant at .05 level, r.05 (18) =.444

Table 1 clearly indicates that there exists a significant relationship between *Baseball pass performance and Knee (Right)* as the correlation coefficient values were found higher than the tabulated value. at .05 level of significance.

MULTIPLE RÉGRESSION ANALYSES

$Y = 6.691 + .041X_1$

Where,

Y = Estimation of Baseball pass Performance at moment preparation phase

X_1 = Knee (right)

The relationships of selected angular kinematic variables at moment preparation phase with the performance of subjects in Baseball pass is presented in Fig. 4.
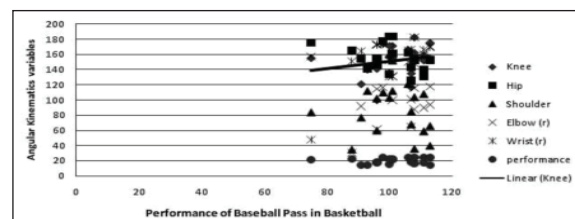

Fig. 4: Correlation between Dependent Variable (Baseball Pass Performance) and Independent Variables (Selected and Angular Kinematic Variable) at Moment Preparation Phase

**Table 2: Correlation between Dependent Variable
(Baseball Pass Performance) and Independent Variables
(Selected Linear Kinematic Variable) at Moment
Preparation Phase**

Independent Variables	Correlation Coefficient
1. Height of Centre of gravity	-0.398

r.05 (18) =.444

Table 2 clearly indicates that there exists an insignificant relationship between *Baseball Pass performance and height of centre of gravity* as the correlation coefficient values were found lower than the tabulated value. At 0.05 level of significance.

Since no significance relationship was found between baseball pass performance and linear kinematic variables at moment preparation phase and there multiple correlation and regression equation were not formulated.

Figure 5 reveals the descriptive analysis of moment execution phase of baseball pass in basketball. In this the angles of the different joints showed the value of mean, standard deviation, range, maximum and minimum value respectively.
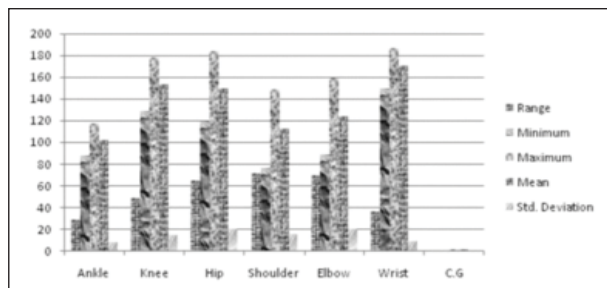

**Fig. 5: Descriptive Analysis of Baseball Pass at
Execution Phase in Basketball**

**Table 3: Correlation between Dependent Variable
(Baseball Pass Performance) and Independent Variables
(Selected Angular Kinematic Variable)
at Moment Execution**

Independent Variables	Correlation Coefficient
Ankle joint (Right)	0.188
Knee joint (Right)	0.486*
Hip joint (Right)	0.597*
Shoulder joint (Right)	-0.450*
Elbow joint (Right)	-0.226
Wrist joint (Right)	-0.389

*Significant at.05 level, r.05 (18) =.444

Table 3 clearly indicates that there exists a significant relationship between Baseball pass performance and

Knee (Right), Hip (Right) & Elbow (Right) as the correlation coefficient values were found higher than the tabulated value. At 0.05 level of significance.

**Table 4: Joint (Right) Contribution of Independent
Variables (Selected Angular Kinematic Variable) in
Predicting Dependent Variable (Baseball Pass
Performance) at Moment Execution**

Criterion Variable	Independent Variables	Coefficient of Multiple Correlation
Baseball pass performance	Knee (right)	
	Hip (right)	0.666*
	Shoulder (right)	

* Significant at.05 level, R.05 (16) =.468

Table 4 indicates that significant relationship was found between criterion variable Baseball pass performance and independent variables {*Knee (right), Hip (right) & shoulder (right)*} as coefficient of multiple correlations was found significant which is higher than the tabulated value.

Multiple Régression Analysis

$Y = 5.358 - .041X_1 + .071X_2 + .057X_3$

Where,

Y = Estimation of Baseball pass Performance at moment Execution

X_1 = *Knee (right)*

X_2 = *Hip (right)*

X_3 = *Shoulder (right)*

The relationships of selected angular kinematic variables at moment execution with the performance of subjects in Baseball pass is presented in Fig. 6.
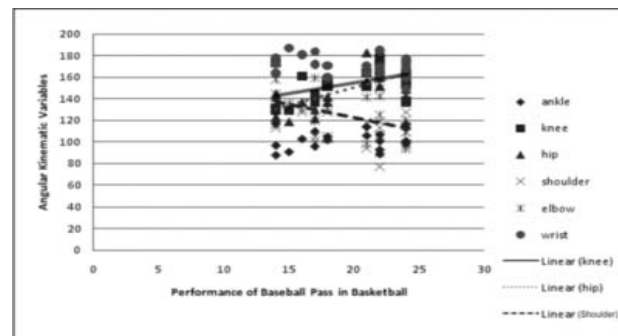

**Fig. 6: Correlation between Dependent Variable
(Baseball Pass Performance and Independent Variables)
(Selected Angular Kinematic Variable) at Moment Execution**

Table 5: Correlation between Dependent Variable (*Baseball Pass Performance*) and Independent Variables (*Selected Linear Kinematic Variable*) at Moment Execution

Independent Variables	Correlation Coefficient
1.Height of Centre of gravity	-0.418

r.05 (18) =.444

Table 5 clearly indicates that there exists an insignificant relationship between *Baseball Pass performance and height of centre of gravity* as the correlation coefficient values were found lower than the tabulated value. At 0.05 level of significance.

DISCUSSION

The statistical findings shows that there is significant relationship of knee, hip and elbow joint in moment execution phase in baseball pass in basketball.

Findings also supported the resulting regression equation, for positive contribution of knee joint, hip joint and elbow joint in execution of baseball pass in basketball (Baseball performance = 5.358 +.041X1 +.071X2 +.057X3).

This may be due to the fact that for executing the skill of baseball pass, we have to take the ball backward with elbow bent and body slightly twisted at the passing hand side, and the body will be half turned and for maintaining the balance the rear foot will come forward with knee slightly bent. All these movements are executed at three main joint i.e. knee joint, hip joint and elbow joint. The findings of the present study supported by the studies of Gretchen D Oliver, David W Keeley (2010) investigated that for several parameters, the actions at and about the shoulder are strongly related to the actions of the pelvis and torso throughout the pitching motion. [11]

The base ball pass in basketball consists of the following joint movements of the arms: the major Shoulder joint movement involves was horizontal flexion; inward rotation and flexion, at Shoulder Girdle abduction movement and at Elbow/ Forearm/ Wrist joint extension and pronation movement.

During the Baseball pass in basketball, the Two Feet's are remain in Contact with the Ground consists of the following joint movements of the legs: Front Leg movements at hip joint involves extension, inward rotation and adduction, at knee joint extension movement and at ankle joint planter flexion movement. As far as back leg movements were concern at hip joint major movement involves were extension, outward rotation and abduction, at knee joint extension movement and at ankle joint planter flexion movement. [23]

CONCLUSION

1. Arm patterns are defined by actions occurring at the shoulder joint. These arm patterns are the overhand, sidearm, underhand, backhand and pushing patterns. Baseball pass in basketball come under the overhand pattern and in present study also significant relationship of shoulder joint occur in moment execution phase of baseball pass in basketball.

2. The designation of the front or back leg is the leg that is closer to or further from the target, respectively. This designation is important since the individual has rotated the trunk away from the target in the preparatory phase as and then steps toward the target to begin the force production phase. In present study also knee joint found significant in moment preparation phase and knee as well as hip joint found significant in moment execution phase of baseball pass in basketball.

PRACTICAL APPLICATION

Pattern and principles of movement during the preparation and execution phase of baseball pass in basketball signifies the contribution of three joints (shoulder, knee and hip) for the best execution of baseball pass. These joints are very important for the execution of baseball pass because accurate baseball pass demands greater amount of force that is attain by the slight turning of upper body at hip joint and accuracy during the time of release for the proper pass and after the release optimum balance which is provided by the knees and the force on the ball is applied with the extension of arm at elbow and shoulder joint.

ACKNOWLEDGEMENT

REFERENCES

Adkins C., Bain S., Dreyer E., Starkey R., (2007). *Basketball Drills, Plays and Strategies: A Comprehensive Resource for Coaches*, Ohio: Better way Books

Atwater, A. (1979). Biomechanics of over arm throwing movements and of throwing injuries. *Exercise and Sports Science Reviews*, 7, 43–85.

Bunn, J.W., (1989). *Scientific Principles of Coaching. Englewoods Cliffs*, New Jersey: Prentice Hall Inc

Burns R.B., (2000). *Introduction to Research Methods*, New Delhi, Sage Publication

Clarke D.H. and Clarke H. H., (1970). *Research Process in Physical Education* Second Edition, New Jersey, Prentice Hall, Inc.

Cook, Ben. (2002). *Total Basketball Fitness. A 52-Week, Year-Round Training Program*, Monterey, CA: Coaches Choice.

Derbyshire D. (2007).Physical factors influencing the throwing action in netball and cricket players. Stellenbosch University.

Elliott, B., Grove, J., & Gibson, B. (1988). Timing of lower limb drive and throwing limb movement in baseball pitchers. *International Journal of Sport Biomechanics*, 4,59-67.

Feltner, M. & Dapena, J. (1986). Dynamics of the shoulder and elbows joints of the throwing arm during a baseball pitch. *International journal of sport biomechanics*, 2, 235-259.

Fleisig, G.S., Escamilla, R.F., Andrews, *JR*, Matsuo, T., Satterwhite, Y. & Barrentine, SW. (1996b). Kinematic and kinetic comparison between baseball pitching and football passing. *Journal of applied biomechanics*, 12, 207-224

Gretchen D Oliver, David W Keeley (2010) Pelvis and torso kinematics and their relationship to shoulder kinematics in high-school baseball pitchers, Journal of Strength & Conditioning Research,24(12):3241-3246

[Hall Susan J (1995) *Basic Biomechanics*, California state university, Northridge California

Hay, J.G. (1994). *The Biomechanics of Sports Techniques*. Prentice-Hall, Englewood Cliffs, N.J.: Prentice-Hall

Hetherington S., King S., Visentin D., and Bird M.L. (2009). A Kinematic and Kinetic Case Study of a Netball Shoulder Pass. *International Journal of Exercise Science, 2(4), 243-253*

Jain, N., (2003). *Play and Learn Basketball*, New Delhi: KSW.

Joris, H.J.J., Edwards van Muyen, A.J., van Ingen Schenau, G.J. & Kemper H.C.G. (1986). Force, velocity and energy flow during the overarm throw in female handball players. *Journal of biomechanics*, 18(6), 409-414.

Manwaring S. (2003). *How to Play Basketball for Beginner Coaches and Players*, NSW Australia, Fiba Oceania.

McGee K. (2007). *Coaching Basketball Technical and Tactical Skills*, US, Human Kinetics,

[Mero A. & Komi P.V. (1994). Body segments contributions to javelin throwing during final thrust phases. *Journal of applied biomechanics*, 10, 166-167.

Oliver J. (2004). *Basketball fundamentals*, US, Human Kinetics

Stimpson, P. (1986). *Basketball. The Skills of the Game*. London: The Crowood Press.

Stodden *O.F.*, Fleisig G.S., Mc Lean S.P., Lyman S.L. & Andrews J.R (2001). Relationship of pelvis and upper torso kinematics to pitched baseball velocity. *Journal of applied biomechanics*, 17, 164-172.

Ulibarri V. D.(2001). Patterns and Principles of Movement, KIN 330 Michigan State University

Verma J.P. (2000). *Sports Statistics*, Gwalior, Venus Publication

Wissel, Hal. (1994). *Basketball: Steps to Success*, US, Human Kinetics.

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Comparison of Netball Players of Different Levels on Selected Physiological Variables

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ABSTRACT

The purpose of this study is to compare the netball players of different level on selected physiological variables. Ninety male netball players from different universities those who participated in intercollegiate' and inter-varsity championship. Selected Physiological Variables were Resting Pulse Rate, Resting Blood Pressure, Vital Capacity and Resting Respiratory Rate. Mean and standard deviation of selected physiological variables were calculated and three different levels i.e. beginners, intermediate and advanced were compared by using analysis of variance. In order to test the hypothesis, level of significance was set at 0.05. It was concluded that variability does not exist among the netball players of different groups with respect to their Selected Physiological Variables i.e. Resting Pulse Rate, Resting Blood Pressure, Vital Capacity and Resting Respiratory Rate.

INTRODUCTION

Netball is a ball sport played by two teams of seven players. Its development, derived from early versions of netball, began in England in the 1890s. By 1960, international playing rules had been standardized for the game, and the International Federation of Netball and Women's Netball (later renamed the International Netball Federation (INF) was formed. As of 2011, the INF comprises more than 60 national teams organized into five global regions.

Games are played on a rectangular court with raised goal rings at each end. Each team attempts to score goals by passing a ball down the court and shooting it through its goal ring. Players are assigned specific positions, which define their roles within the team and restrict their movement to certain areas of the court. During general play, a player with the ball can hold onto it for only three seconds before shooting for a goal or passing to another player. The winning team is the one that scores the most goals. Netball games are 60 minutes long. Variations have been developed to increase the game's pace and appeal to a wider audience.

Netball is most popular in Commonwealth nations, specifically in schools, and is predominantly played by women. According to the INF, netball is played by more than 20 million people in more than 80 countries. Major transnational competitions take place, including the Netball Super league in Great Britain and the ANZ Championship in Australia and New Zealand. Three major competitions take place internationally: the quadrennial World Netball Championships, the Commonwealth Games, and the yearly World Netball Series. In 1995, netball became an International Olympic Committee recognized sport.

The physiological system of the body must function well enough to support the physical activity that a player is performing. Moreover, different activities make different demands with respect to circulatory, respiratory and other systems of the body. Physiological fitness is specific to activity and is highly adaptable to exercise. Each activity requires effective functioning of the system for the appropriate outcome.

After going through various literatures in the field of Physical Education and Sports, it is realized and understood that though there are various physical, physiological, psychological and bio mechanical factors which contributes a lot to performance of any sports. However physiological variables play an important role for the effective training and enhancement of performance. Therefore, there was an urge to undertake this research study with the purpose to compare the netball players of

different level i.e., beginners, intermediate and advanced on selected physiological variables namely Resting Pulse Rate, Resting Blood Pressure, Vital Capacity and Resting Respiratory Rate.

OBJECTIVES OF THE STUDY

The following were the objectives for the study:

1. To compare the netball players of different level in relation to Resting Pulse Rate.

2. To compare the netball players of different level in relation to Resting Blood Pressure.

3. To compare the netball players of different level in relation to Vital Capacity.

4. To compare the netball players of different level in relation to Resting Respiratory Rate.

METHODOLOGY

Subjects

Ninety male netball players consisting of 30 subjects in each group of different levels (beginners, intermediate and advanced) from different universities those who participated in intercollegiate' and inter-varsity championship were selected as subject for this study. Subjects were ranging from 18–25 of years age group.

Variables

Variables selected for this study were: Resting Pulse Rate, Resting Blood Pressure, Vital Capacity and Resting Respiratory Rate.

Criterion Measures

The data pertaining to Physiological variables were obtained by using the following criteria:

● Resting pulse rate was recorded while the subject was in sitting position and recorded in terms of numbers of pulse per minute.

● A sphygmomanometer (dial type) and a stethoscope were used to measure blood pressure (systolic and diastolic).

● Vital capacity was measured in liter by using spirometer.

● Resting respiratory rate was recorded while

the subject was in supine position which was recorded in term of the total number of inhalation and exhalation per minute.

ANALYSIS OF DATA AND RESULTS OF THE STUDY

Mean and standard deviation were computed in order to understand the physiological profiles of each group separately. One way analysis of variance was utilized to compare the different groups i.e., beginners, intermediate and advanced.

Table 1: Mean and Standard Deviation of Physiological Variables of Different Groups of Netball Players

Sr. No.	Variables	Beginners		Intermediate		Advanced	
		M	S.D.	M	S.D.	M	S.D.
1	Resting Pulse Rate	51.33	6.989	51.90	5.616	51.73	7.192
2	Resting (Sys) Blood Pressure	112.83	7.43	113.77	6.72	112.37	7.83
3	Resting (Dias) Blood Pressure	84	10.09	85.10	8.51	83.67	9.95
4	Vital Capacity	2.70	0.31	2.72	0.30	2.68	0.28
5	Resting Respiratory Rate	18.93	1.84	19.47	1.63	18.97	1.87

M = Mean, S.D. = Standard Deviation

COMPARISON OF DIFFERENT GROUPS OF NETBALL PLAYERS IN RELATION TO SELECTED PHYSIOLOGICAL VARIABLES

The subjects of different groups namely beginners, intermediate and advanced level were compared. The results of analysis of variance are presented in Table 2–6 and Fig. 1–5.

Table 2: Analysis of Variance of Different Groups of Netball Players in Relation to Resting Pulse Rate of the Subjects

Source of Variance	df	SS	MSS	F-ratio
Between Groups (B)	2	5.089	2.544	0.058
Within Groups (W)	87	3831.23	44.037	

N=90, $F_{.05}$ (2, 87) = 3.11

As evident from Table 2, that variability does not exist among the netball players of different groups with respect to resting pulse rate. Since the value of F-ratio was not found to be significant at 0.05 level. Results are
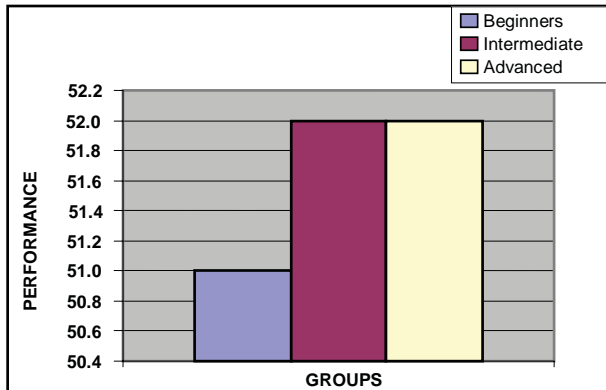
presented in Fig. 1.

Fig. 1: Comparison of the Means of Different Groups of Netball Players in Relation to Resting Pulse Rate

Table 3: Analysis of Variance of Selected Groups of Netball Players in Relation to Resting Systolic Blood Pressure

Source of Variance	Df	SS	MSS	F-ratio
Between Groups (B)	2	30.49	15.24	0.283
Within Groups (W)	87	4688.50	53.89	

N=90, F.$_{05}$ (2, 87) = 3.11

As evident from Table 3, that variability does not exist among the netball players of different groups with respect to resting systolic blood pressure. Since the value of F-ratio was not found to be significant at 0.05 level. Results are presented in Fig. 2.
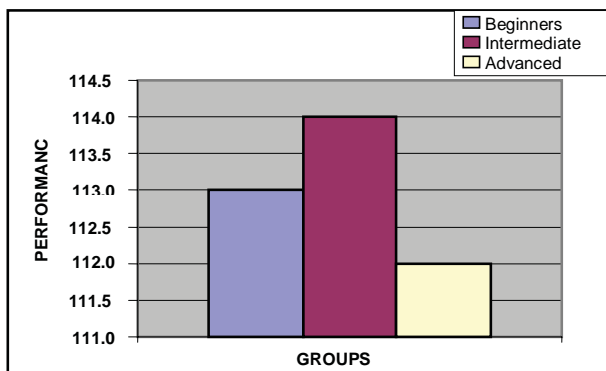

Fig. 2: Comparison of the Means of Different Groups of Netball Players in Relation to Systolic Blood Pressure

Table 4: Analysis of Variance of Different Groups of Netball Players in Relation to Resting Diastolic Blood Pressure

Source of Variance	df	SS	MSS	F-ratio
Between Groups (B)	2	33.76	16.88	0.216
Within Groups (W)	87	6799.37	78.15	

N=90, F.$_{05}$ (2, 87) = 3.11

As evident from Table 4, that variability does not exist among the netball players of different groups with respect to resting diastolic blood pressure. Since the value of F-ratio was not found to be significant at 0.05 level. Results are presented in Fig. 3.
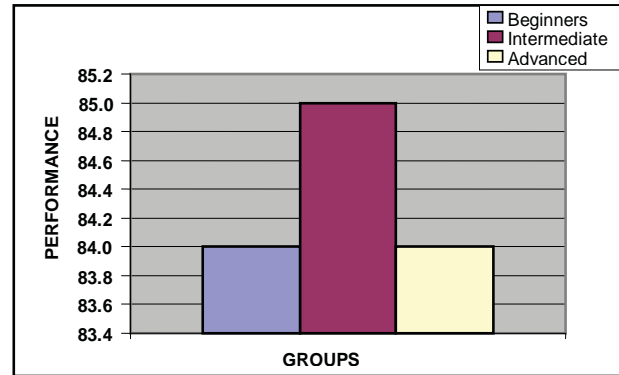

Fig. 3: Comparison of the Means of Different Groups of Netball Players in Relation to Diastolic Blood Pressure

Table 4: Analysis of Variance of Different Groups of Netball Players in Relation to Vital Capacity

Source of Variance	df	SS	MSS	F-ratio
Between Groups (B)	2	0.033	0.016	0.187
Within Groups (W)	87	7.61	0.087	

N=90, F.$_{05}$ (2, 87) = 3.11

As evident from Table 4, that variability does not exist among the netball players of different groups with respect to vital capacity. Since the value of F-ratio was not found to be significant at 0.05 level. Results are presented in Fig. 4.
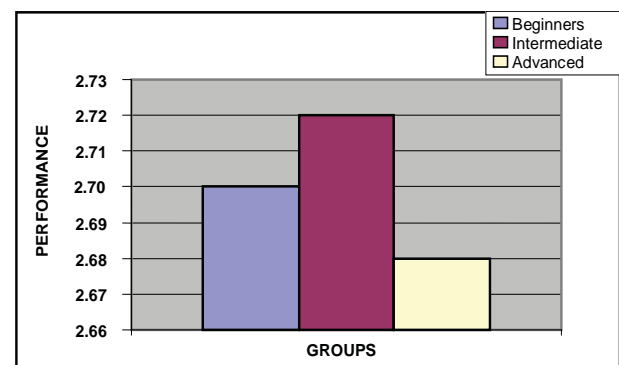

Fig. 4: Comparison of the Means of Different Groups of Netball Players in Relation to Vital Capacity

Table 5: Analysis of Variance of Different Groups of Netball Players in Relation to Resting Respiratory Rate

Source of Variance	df	SS	MSS	F-ratio
Between	2	5.36	2.678	
Groups (B)				0.843
Within Groups (W)	87	276.30	3.176	

N=90, F.$_{05}$ (2, 87) = 3.11

As evident from Table 5, that variability does not exist among the netball players of different groups with respect to resting respiratory rate. Since the value of F-ratio was not found to be significant at 0.05 level. Results are presented in Fig. 5.
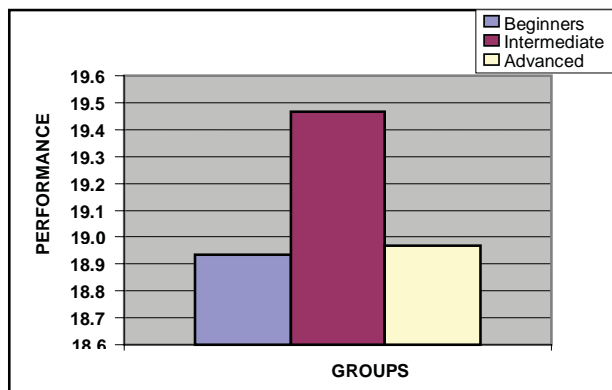

Fig. 5: Comparison of the Means of Different Groups of Netball Players in Relation to Resting Respiratory Rate

DISCUSSION OF FINDINGS

In case of all the selected physiological variables namely resting pulse rate such studies which stating the results of the resting pulse rate on the netball players was conducted by Lin ZP, Chen YH, Fan C, Wu HJ, Lan LW, Lin JG. This study investigated the effects of auricular acupuncture on athletes' recovery abilities after exercise. Subjects were selected from twenty-four male elite university netball players, randomly divided into two groups: auricular acupuncture group (AAG), and normal control group (NCG), each group containing twelve subjects. Auricular acupuncture was experimented to each AAG athlete while no auricular acupuncture was conducted to each NCG athlete. Each subject in both groups performed a ride on the stationary bike until exhausted. The data of heart rate (HR (max)), oxygen consumption (VO (2 max)), and blood lactic acid were measured at four points of time: during the rest period after warm-ups and at the 5th, 30th and 60th minutes post-exercise, respectively. One-way ANOVA and repeated Scheffé methods were used to test the differences of the data between these two groups. The results showed that both HR(max) and blood lactic acid in AAG were significantly lower than those in NCG at the 30th and 60th minutes post-exercise. This suggests that auricular acupuncture can enhance athletes' recovery abilities after aggressive exercise. (*et. al.* 2011)

Resting blood pressure (systolic and diastolic), such studies which stating the results of the blood pressure on the netball players was conducted by Otsuka Y., Shima N., Moritani T., Okuda K., Yabe K. To examine the orthostatic influence on heart rate and blood pressure variability in persons with tetraplegia playing wheelchair netball, ten trained persons with tetraplegia, ten untrained persons with tetraplegia, and ten able-bodied participated in this study. Spectrum analysis of the ECG R-R interval and blood-pressure on a beat-by-beat basis during head-up tilt 60 degrees sitting were performed. The ratio of the high frequency to total frequency (HF/TF) in the R-R interval decreased from supine (0.5 +/-0.2) to sitting (0.3 +/-0.2), and the low frequency (LF) power in systolic blood pressure increased from 4.7 +/-9.1 to 15.0 +/-13.1 mmHg(2) only in the untrained persons with tetraplegia (P < 0.01). The decrease in the HF/TF ratio in the untrained persons with tetraplegia indicates attenuated parasympathetic activity to the orthostatic challenge and the similar increase in LF power indicate that parasympathetic activity was reduced and sympathetic activity increased only in these persons. These results suggest that training enhances cardiovascular stability in tetraplegic subjects. (*et al.* 2011) vital capacity such studies which stating the results of the vital capacity on the netball players was conducted by Goosey-Tolfrey V, Foden E, Perret C, Degens H. and it was found out that there is considerable evidence that respiratory muscle training improves pulmonary function, quality of life and exercise performance in healthy athletic populations. The benefits for wheelchair athletes are less well understood. Therefore, in the present study, influence of inspiratory muscle training (IMT) on respiratory function and repetitive propulsive sprint performance in wheelchair netball players was examined. In the IMT group, both MIP and maximum expiratory pressure (17% and 23%, respectively; p< or =0.03) were improved. Similar improvements were noted for the sham-IMT group with 23% and 33% from baseline for MIP and maximum expiratory pressure, respectively (p< or = 0.03). There were no significant changes in pulmonary function at rest and any of the performance parameters associated with the repetitive sprint test

(sprint and recovery times, peak heart rate and peak blood lactate concentration). Reported experiences of using the IMT training device suggested "less breathlessness" and "less tightness in the chest during the training". Although there was no improvement in sprint performance, an improved respiratory muscle function and quality of life were reported by participants in both the IMT and sham-IMT groups. and resting respiratory rate, no significant difference existed between the means of beginners, intermediate and advanced netball players. All the groups proved to be equal. (*et al.* 2011)

This might be attributed to the fact that change in the physiological variables depends on the training age of the individual. The subjects of the present study were having the same age group i.e., 18–25 years. They were having more or less same training age in all the three selected groups. This categorization is only on the basis of performance, technical level, tactical level and fitness level.

CONCLUSION

Variability does not exist among the netball players of different groups with respect to their Selected Physiological Variables i.e.,

1. Resting Pulse Rate would have been same because at higher levels of participation every individual tends to possess equal amount of fitness level.

2. Resting Blood Pressure would have been same because at higher levels of participation every individual tends to possess equal amount body functions only varying in there skill level hence the difference was not found.

3. Vital Capacity would have been same because at higher levels of participation every individual tends to possess equal amount of fitness level.

4. Resting Respiratory Rate at higher levels of participation every individual tends to possess equal amount body functions only varying in there skill level hence the difference was not found.

REFERENCES

H. Becker, "Relationship of Sports and Peace" International Journal of Physical Education 2nd Issue 25 (1988): 27.

Warren R. Johnson *et. al.*, Science and Medicine of Exercise and Sports (New York: Harper and Row Publishers, 1974), P.94.

Laurence E. Morehouse and Augusts T. Miller, Physiology of Exercise (Saint Louis: The C.V. Mosby Company, 1976), p.225.

Robert N. Singer *et. al.*, Physical Education an Interdisciplinary Approach (New York: The Mc Milan Company, 1972), p.16.

L. Matveyer, Fundamentals of Sports Training (Moscow: Progress Publishers, 1981), P.22.

Johanne Reh, Introduction into Sports Biology. (Leipzig: German College for Physical Mm, 1972), p. 161.

Lucien Brouha, Norman Co. Fradd and Beatrice M. Savage, "Studies in Physical Efficiency of College Students" Research Quarterly 15:3 (Oct. 1944).p.211.

David H. Clarke and Harrison Clarke, Research Process in Physical Education 2nd ed. (Inglewood Cliffs, N.J.: Prentice Hall Inc., 1984), p.219.

Lin ZP, Chen YH, Fan C, Wu HJ, Lan LW, Lin JG.AmEffects of auricular acupuncture on heart rate, oxygen consumption and blood lactic acid for elite netball athletes. Journal of Chin Med. 2011; 39(6):1131–8.

Otsuka Y, Shima N, Moritani T, Okuda K, Yabe K. Orthostatic influence on heart rate and blood pressure variability in trained persons with tetraplegia. European Journal of Applied Physiology. 2008 Sep; 104(1):75–8. Epub 2008 Jun 10.

Goosey-Tolfrey V, Foden E, Perret C, Degens H. Effects of inspiratory muscle training on respiratory function and repetitive sprint performance in wheelchair netball players. British Journal of Sports Medicine 2011 Jul;44(9):665–8. Epub 2008 Jul 4.

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Comparative Study on Selected Anthropometric Measurement of National and State Level Junior Athletes

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ABSTRACT

The purpose of the study was to compare selected anthropometric measurement of national and state level junior athletes. Forty (40) National level and State level junior athletes of which twenty of each level (age ranging-14–19 y.) was selected from North East region of India especially from SAI complex of Guwahati. Players were selected from Sprint, Long jump, Shot put, Javelin and Long distance running events where four athletes from each event. Subjects Height, Body weights were measured by 'Stadiometer' and 'Weighing' machine whereas Thigh Girth, Leg length, Hand length were measured by 'Freeman Steel Tape' as an anthropometric measurement. To find out the significant differences of collecting data were calculated by applying students "t" test at 0.05 level of confidence. Result of the study showed that significant difference has been noticed on Height, Leg length and Thigh Girth whereas no significant difference was found in case of Body weight, and hand length.

Keyword: *Anthropometric Measurement, Height, Weight, Thigh Girth, LEG and Hand Length*

INTRODUCTION

Anthropometry is the branch of Anthropology which is concerned with taking of measurements of human body. This definition has been confined to the kinds of measurements commonly used in associating physical performance with body build (Warren 1974). Anthropometrical measurement focused on three areas-growth measures, body type and body composition. The use of such measures helps to prediction of growth patterns and predictions of success in motor activities as well as assessment of obesity (Correlation 1974). The major role for physical performance is partly dependent upon the physique and body composition of an individual (Bubruben 1975). Measurements of body size include such descriptive information as height weight and surface area while measurements of body proportion describe the comparative of on height and weight and among length of various body segments. It has been found that top athlete in some sports tends to have those proportions that bio mechanically and the particular performance required (Early 1982). Athletes for superior performance in any is selected on the basis of his physical structure and body size, which has proved to appropriate for high performance in the given sport (Tanner 1964). Therefore this study has been undertaken with a view to find out the selected anthropometric measurement of national and state level junior athletes.

METHOD AND METARIALS

In order to compare selected anthropometric measurement of national and state level junior athletes, Forty (40) National level and State level junior athletes of which twenty of each level (age ranging-14–19 y.) were selected from North East region of India Specially from SAI complex of Guwahati. Players were selected from sprint, Long jump, shot put, javelin and long distance running events where four athletes of each event. Subjects Height, Body weight, Thigh Girth, Leg length, Hand length (D.K. Kansal 2007) were measured as an anthropometric measurement by using Stadiometer, Weighing machine and 'Freeman Steel tape'. Corresponding Date were collected in a day shift with the help of Govt. employ PE teachers on the SAI sports ground Guwahati.

STATISTICAL PROCEDURE

The gathered data were duly analyzed through statistical procedure using Descriptive statistics and 't' test was applied to find out significant differences between

selected anthropometric measurement and of national and state level athletes, The level of significant was set at 0.05 level of confidence.

RESULT OF THE STUDY

Table 1: Mean, SD and "t" Test on Height of National and State Level Junior Athletes

Level	Mean	SD	Mean Difference	Standard Error	"t"
National	172.05	6.91			
State	168.05	4.67	4.00	1.86	2.15*

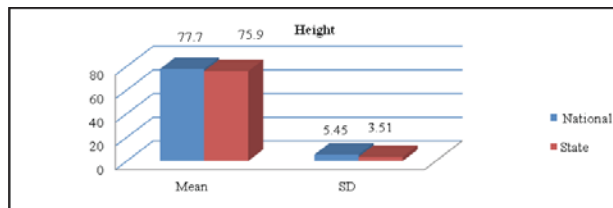*Significance at 0.05 level, Tabulated $t_{0.05}$ (38) =2.024

Fig. 1

Findings

In the Table 1 & Fig. 1, it is clearly reveled that, significant difference exist on Height between national and state level athletes as because Cal "t" value (2.15*) is higher than Tab t $_{0.05}$ (38) value (2.024*). Mean of performance of national athletes were better than state athletes.

Table 2: Mean, SD and "t" Test on Body Weight of National and State Level Junior Athletes

Level	Mean	SD	Mean Difference	Standard Error	"t"
National	67.7	13.8			
State	65.85	8.89	1.85	3.67	0.50

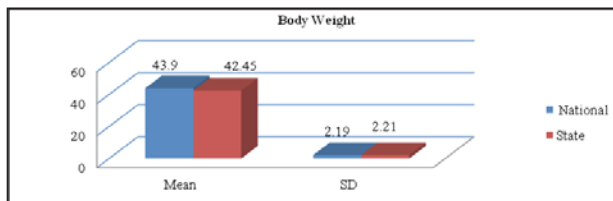*Significance at 0.05 level, Tabulated $t_{0.05}$ (38) =2.024

Fig. 2

Findings

In the Table 2 and Fig. 2, it is clearly reveled that, no significant difference exist on Body weight between

national and state level athletes as because Cal "t" value (0.50) is lower than Tab t $_{0.05}$ (38) value (2.024*). Mean of performance of national athletes were better than state athletes.

Table 3: Mean, SD and "t" Test on Hand Length of National and State Level Junior Athletes

Level	Mean	SD	Mean Difference	Standard Error	"t"
National	77.7	5.45			
State	75.9	3.51	1.8	1.45	1.24

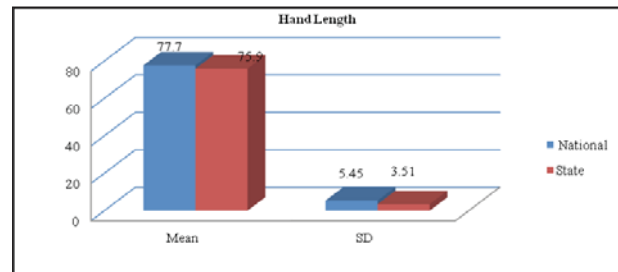*Significance at 0.05 level, Tabulated $t_{0.05}$ (38) =2.024

Fig. 3

Findings

In the Table 3 and Fig. 3, it is clearly reveled that, no significant difference exist on Hand length between national and state level athletes as because Cal "t" value (1.24) is lower than Tab t $_{0.05}$ (38) value (2.024*). Mean of performance of national athletes were better than state athletes.

Table 4: Mean, SD and "t" Test on Leg Length of National and State Level Junior Athletes

Level	Mean	SD	Mean Difference	Standard Error	"t"
National	101.55	7.07			
State	97.5	4.82	4.05	1.91	2.12*

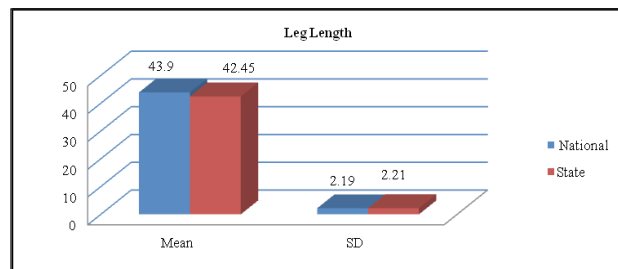*Significance at 0.05 level, Tabulated $t_{0.05}$ (38) =2.024

Fig. 4

Findings

In the Table 4 & Fig. 4, it is clearly reveled that, significant difference exist on Leg length between national and state level athletes as because Cal "t" value (2.12*) is higher than Tab t $_{0.05}$ (38) value (2.024*). Mean of performance of national athletes were better than state athletes.

Table 5: Mean, SD and "t" Test on Thigh Girth of National and State Level Junior Athletes

Level	Mean	SD	Mean Difference	Standard Error	"t"
National	43.9	2.19			
State	42.45	2.21	1.45	0.68	2.10*

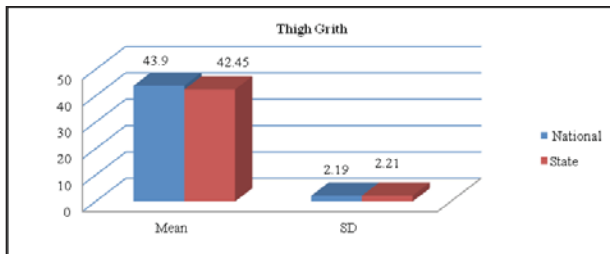*Significance at 0.05 level, Tabulated t$_{0.05}$ (38) =2.024

Fig. 5

Findings

In the Table 5 & Fig. 5, it is clearly reveled that, significant difference exist on Thigh Girth between national and state level athletes as because Cal "t" value (2.10*) is higher than Tab t $_{0.05}$ (38) value (2.024*). Mean of performance of national athletes were better than state athletes.

DISCUSSION AND CONCLUSION

The main results of the present study, conducted in 40 junior National and State athletes aged 14–19 years from North east region of India, SAI complex of Guwahati, are the following:

Result of the study showed that anthropometric characteristics such as-Height, Leg length and Thigh Girth were found to be significant whereas no significant difference was found in case of Body weight, and hand length.

In the present study average height of the national athletes 172.05 cm. was recorded which is better than State athletes (168.05 cm.). Here researcher believed that due to Biological, environmental & Genetic makeup of the

athletes may be causes of obtaining grater height (Nudri *et al* 1996). Rather it can be said that in the adolescence stages (13 to 19 years) height is increase steadily and obtained near top height than other growth stages (Singh A. *et al.* 2007). The average age of both level (N, S) athletes were 17 & 15 years respectively, so they belongs to this stages and achieved more height, but due to greater age national athletes were found better than state athletes because height of the normal peoples is increased proportionally with age (Singh A.*et al.* 2007). Leg lengths of the national athletes were found better than state athletes. Leg length also increases due to increasing overall height of the athletes and development of lower limb is quicker than upper limb (D Gunnell 2001). Thigh circumference of the national athletes were found better, in this case researcher believed that due to strenuous practice, exercise, and nutritional aspect of the athletes thigh muscle hypertrophy is occurred (Hug F 2006) so that overall circumference of the thigh muscles is increase. Although there was age difference between both levels of athletes but due to scientific training, conditioning, dieting, and maintaining physical fitness, body weight of the athletes is on control (Train 2004 reported) therefore we found no significant difference of body weight in this study. In case of hand length there was no differences between them as because development of upper limb is comparatively slower than lower limb in all growth stages (D Gunnell 2001). Important that there was not enough age difference between national and state level athletes so that due to closer age difference upper limb development is same and no difference was found.

CONCLUSION

In the study anthropometric characteristics such as-Height, Leg length and Thigh Girth were foud to be significant whereas no significant difference was found in case of Body weight, and hand length between national and state level junior athletes.

REFERENCES

Barrow, Harold M. & Rosmary Megee "A Practical Approach to Measurement in physical education". Philadelphia: Lee and Febiger 1979, p. 179.

Bubruben, B frost "Physical Education practices principles". Philadelphia, London. Addison Wesley pub. Company 1975, p. 230

.Correlation R Meyers "Measurements in physical education". The Ronald press Company, 1974, p. 258.

Mathews D.K. "Measurement in physical Education" 1958 by W.B. Saunders company Aug 1958.p. 101

Nelson Jack K. and Johnson Barry L. "Practical measurement for Evaluation in physical education". Surjeet Publication, 2007 (p. 369 & 370). Blication, Ludhiana.

Singh Ajmer, Baina lagdish, Gill Singh Jagtar, Bras Singh Rachhpal-"Essential Of Physical Education". 2007 Page 535, 537, Pub–Kalyani publisher New Delhi.

Tanner, J.M. "The physique of Olympic Athletes". London Georage Allen and UN Ltd, 1964, p. 13.

Thomas Kirk, Cureton "The Physical Fitness of Champion Athletes". Jr. Urbana, IU.: University of lUinois Press, 1951. 458 pp.

Chiara Milanese, Oscar Bortolami, Matteo Bertucco, Giuseppe Verlato, Carlo Zancanaro "Anthropometry and motor fitness in children aged 6–12 years" University of Verona, Italy, Received: 9 January 2010; received in revised form: 7 March 2010; accepted: 15 April 2010

Early, F. Zeighler "Physical education and sports and introduction". Philadelphia, Lea and Febeger 1982, p. 78.

Gunnell David "Commentary early insights in to height, leg length, proportionate growth and health". International journal of Epidemiology, Vol. 30 issue 2001.

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Effect of Interval Training on Selected Physical and Physiological Variables of University Women Students

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ABSTRACT

The purpose of the study was to investigate the effect of Interval training on selected Physical variables of University students. To achieve the purpose of the study, twenty subjects were randomly selected from the B.P.Ed students of College of Physical Education, Tamilnadu and were divided into two equal groups. Group I (n = 10) acted as control group and Group II (n = 10) acted as experimental group. Group I under gone regular activity and Group II under gone interval training for 8 weeks. The age of the subjects ranged from 18–24 years. Physical fitness variables such as Speed and Strength were selected as criterion variables for the study. The data were collected from both the groups prior to the interval training and after the training period (8 weeks). Analysis of covariance (ANCOVA) was used to find out the significant difference, if any, differences between control and experimental groups on selected Physical variables of University students. The level of confidence was fixed at 0.05 level to test the significance. From the results of the study, it was concluded that there was a significant difference in Speed, whereas there was no significant difference in Muscular Strength between Control and Experimental group of University students.

INTRODUCTION

Internal Training involves a repeated series of exercise work outs interspersed with rest or relief periods. Due to the discontinuous nature of this form of training the exercise intensity and the total amount of work performed can be greater than that of the continuous training Sports Performance is indeed an aspect of complex human performance which has several aspects or dimensions. These disciplines include sports medicine, sports physiology, sports training, sports bio-mechanics, sports psychology and so on.

Speed plays a vital role in most of the games. All the track events are conducted against time, speed mostly in the form of acceleration speed as an important factor

Exercise strengths the heart muscles. The number of repetitions of exercise should be increased with the person's adaptation to the training, and that increase depends on the distance of the race, the speed attained and time taken to recuperate.

OBJECTIVES

The purpose of the study was to assess the effect of interval training on selected physical variables of University students.

METHOD

Twenty students studying Bachelor of Physical Education and sports sciences, (B.P.Ed) students of College of Physical Education, Tamilnadu were selected at random as subjects. The selected subjects were of age group ranging from 18 to 20 years. The subjects were randomly divided into two groups and each group contained 10 subjects. Group I acted as control group and Group II acted as experimental group. Group I underwent regular training and Group II underwent interval training for 8 weeks. The interval training was selected as an independent variable whereas Physical (Speed and Strength).

ANALYSIS OF DATA

The data were collected from both the groups prior to the training and after the training (8 weeks). Analysis of covariance (ANCOVA) was used to find out the significant differences, if any between control and experimental groups on physical variables of students. In all the cases, the level of confidence was fixed at 0.05 level which was as appropriate.

Variables	Test & Apparatus
Speed	60 meter run
Strength	Sit ups

SPEED

The Analysis of covariance on speed of control and experimental group of University students have been presented in Table 1.

Table 1 showed that the pre test mean values of Speed for control and experimental group were 7.918 and 7.842 respectively. The obtained 'F-ratio' value of 2.08 for pre test scores of control and experimental group on speed was less than the required table value of 4.41 for significance with df 1 and 18 at 0.05 level of confidence. The post test mean values of speed for control and experimental group were 7.848 and 7.252 respectively. The obtained 'F-ratio of 21.63 for post test scores of control experimental group on speed was more than the required table value of 4.41 for significance with dF 1 and 18 at 0.05 level of confidence. The adjusted post test mean values of speed for control and experimental group were 7.829 and 7.829 respectively. The obtained 'F-ratio value of 29.46 for adjusted group was less than the required table of 4.45 for significance with df 1 and 17 at 0.05 level of confidence.

The result of the study showed that there was a significant difference between control and experimental group on Speed of students. The mean values of control and experimental group on Speed of University students are graphically represented in Fig. 1.
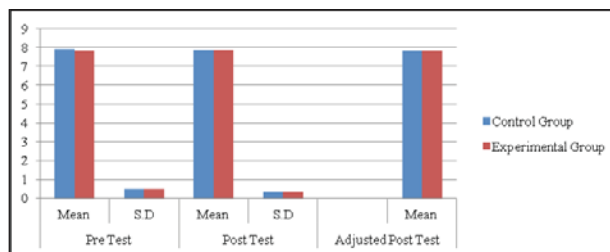

Fig. 1: Speed

Table 1: Analysis of Covariance on Speed Between Control and Experimental Group of University Students

Speed		Control Group	Experimental Group	Source of Variance	SS	dF	MS	F Ratio	Table Value
Pre Test	Mean	7.918	7.842	Between	0.027	1	0.27	2.08	4.41
	S.D	0.49	0.49	Within	2.403	18	0.13		
Post Test	Mean	7.848	7.848	Between	1.73	1	1.73	21.63*	4.41
	S.D	0.32	0.32	Within	1.49	18	0.08		
Adjusted Post Test	Mean	7.829	7.829	Between	1.473	1	1.473	29.46*	4.45
				Within	0.82	17	0.05		

*Significant at 0.05 level of confidence.

Table 2: Analysis of Covariance on Muscular Strength Between Control and Experimental Group of University Students

Strength		Control Group	Experimental Group	Source of Variance	SS	dF	MS	F Ratio	Table Value
Pre Test	Mean	31.8	33.1	Between	8.45	1	8.45	0.32	4.41
	S.D	6.09	4.01	Within	478.5	18	26.58		
Post Test	Mean	32.3	33.8	Between	11.25	1	11.25	0.44	4.41
	S.D	5.4	4.69	Within	459.7	18	25.54		
Adjusted Post Test	Mean	32.87	33.23	Between	0.62	1	5.49	0.12	4.45
				Within	87.88	17	5.17		

Strength

The Analysis of covariance on strength of control and experimental group of University students have been analyzed and presented in Table 2.

Table 2 showed that the pre test mean values of Muscular Strength for control and experimental group were 31.8 and 33.1 respectively. The obtained 'F-ratio' value of 0.32 for pre test scores of control and experimental group

on muscular strength was less than the required table value of 4.41 for significance with df 1 and 18 at 0.05 level of confidence. The post test mean values of muscular strength for control and experimental group were 32.3 and 33.8 respectively. The obtained 'F-ratio' of 0.44 for post test scores of the control and experimental group on muscular strength was less than the required table value of 4.41 for significance with df 1 and 18 at 0.05 level of confidence. The adjusted post test mean values of muscular strength for control and experimental group were 32.87 and 33.23 respectively. The obtained 'F-ratio' value of 0.12 for adjusted group was less than required table of 4.45 for significance with df 1 and 17 at 0.05 level of confidence.

The result of the study showed that there was no significant difference between control and experimental group on Muscular strength of University students.

The mean values of control and experimental group on Muscular strength of University students are graphically represented in Fig. 2.
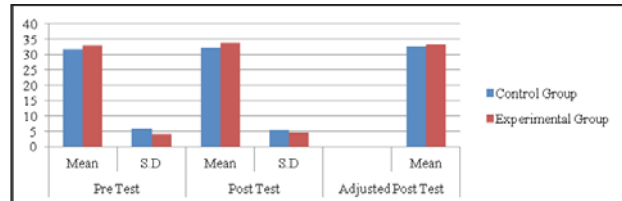

Fig. 2: Strength

CONCLUSION

It was concluded that Interval training had significantly improved speed and did not show any significant effect on muscular strength of university students.

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Skin Sensitivity and Diabetes Type II—A Relationship Study

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ABSTRACT

The aim of this study was to investigate the relationship between skin sensitivity and blood glucose level of type II Diabetic patients. Thirty male Diabetic patients were selected as subjects for this study whose age ranged from 45 to 55 years. The participants were tested on the skin sensitivity and blood glucose levels for the study. Aesthesiometer was used to measure the tactile sensitivity of the skin, whereas fasting blood glucose level and postprandial blood glucose level were measured by the Glucometer. Coefficient of correlation statistical method at 0.05 level of significance was used to find out if any significance relationship exists between blood glucose level and skin sensitivity of aged male diabetic type II patients. In conclusion significant negative relationship was observed between skin sensitivity and blood glucose levels of diabetic type II patients. Maintaining safe blood glucose levels are strongly recommended.

Keywords: *Tactile Sensitivity, Blood Glucose Level, NIDDM*

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INTRODUCTION

The prevalence of diabetes is rapidly rising all over the globe at an alarming rate. Diabetes means that your blood glucose is too high. Your body uses glucose for energy. But having too much glucose in your blood can hurt you. When you will reduce your risk for problems with your kidneys, eyes, nerves, feet and legs and teeth, you will also lower your risk for a heart attack or a stroke.

India leads the world today with the largest number of diabetics in any given country. In the 1970s, the prevalence of diabetes among urban Indians was reported to be 2.1 per cent and this has now risen to 12.1 percent (Sicree *et al.* 2006 and Abuja *et al.* 2979). India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the diabetes capital of the world‖. According to the Diabetes Atlas 2006 published by the International Diabetes Federation(Sicree *et al.* 2006), the number of people with diabetes in India currently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken.

Approximately 90% of people with diabetes have type II diabetes. Some of low levels of insulin production others (who tend to obese) secret enough insulin. Diabetes is a chronic disease which affects virtually every organ in the human system. The World Health Organization projected that 300 million people will suffer from diabetes by 2025*(King et al. 1998)*. India has the largest number of diabetic population in the world and it is expected that there will be 69.9 million diabetic populations in India by 2025.

The International Diabetes Federation estimates that the number of diabetic patients in India more than doubled from 19 million in 1995 to 40.9 million in 2007. It is projected to increase to 69.9 million by 2025. Currently, up to 11 per cent of India's urban population and 3 per cent of rural population above the age of 15 have diabetes. Diabetes affects all people in the society, not just those who live with it. The World Health Organization estimates that mortality from diabetes and heart disease cost India about $210 billion every year and is expected to increase to $335 billion in the next ten years.

Diabetic neuropathy means damage of nerve fibres in people with diabetes. How the nerves are injured is not entirely clear but research suggests that high blood glucose changes the metabolism of nerve cells and causes reduced blood flow to the nerve. There are different types of nerves in the body. (http://sydney.edu.au/medicine/diabetes/foot/Neurop1.html)

Neuropathy is more severe (because more sensation is lost). Diabetes can affect every part of the body, including the skin. As many as one third of people with diabetes will have a skin disorder caused or affected by diabetes at some time in their lives. In fact, such problems are sometimes the first sign that a person has diabetes. Luckily, most skin conditions can be prevented or easily treated if caught early.

Tactile sensitivity is an increased sensitivity to touch that makes the sensory experience of touch feel noxious or peculiar. It is sometimes referred to as tactile defensiveness to distinguish between it and normal levels of sensitivity to touch. People can also develop the opposite issue, insensitivity. There are a number of causes for this sensory disorder and it can be addressed in several different ways. (http://www.wisegeek.com/what-is-tactile-sensitivity.htm)

In very young children, tactile sensitivity can interfere with the development of motor skills and may impede other developmental milestones as well. The sense of touch provides a great deal of information about the world and people who perceive touch as painful and avoid it will have difficulty interacting with their environment. The developing brain may also fail to make some important connections without sensory input to help it understand how to process information. This can lead to learning disabilities and other impairments (http://www.wisegeek.com/what-is-tactile-sensitivity.htm).

Treatments for tactile sensitivity vary, depending on the root cause. Adjusting medications can help people with sensitivity caused by drugs as well as being beneficial for people with neurological disorders. Psychotherapy may be effective in some patients, with a mental health professional using desensitization techniques to make the patient feel more comfortable. For other people, making some lifestyle adjustments may be necessary. Thus the researcher was in the hunch to find out the relationship of tactile skin sensitivity with blood glucose levels of Diabetic type II subjects.

DEFINATION OF THE TERMS

Diabetes Type II

Diabetes mellitus type II (formerly noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes) is a metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency (Kumar et al. 2005). This is in contrast to diabetes mellitus type 1, in which there is an absolute insulin deficiency due to destruction of islet cells in the pancreas (Shoback et al. 2011). The classic symptoms are excess thirst, frequent urination, and constant hunger. Type 2 diabetes makes up about 90% of cases of diabetes with the other 10% due primarily to diabetes mellitus type 1 and gestational diabetes. Obesity is thought to be the primary cause of type 2 diabetes in people who are genetically predisposed to the disease.

Tactile Sensitivity

A capacity to sense the transference of vibrations from the parts of the instrument (e.g., handle, shank, and working end) to the fingers of the clinician (http://www.answers.com/topic/tactile-sensitivity#ixzz2DRPTEwEb).

It refers to the ability of your system to keep in touch with the environment. As it is known sensitivity ensures safety and survival. We have a number of sense organs to achieve these.

Method and Materials

Thirty Diabetes type II male patients were selected randomly for this study, whose age range from 45 to 55 years. To measure the level of blood glucose, two tests were conducted, one fasting blood glucose test and postprandial blood glucose test on the other hand Aesthesiometer was used to measure the sensitivity of the skin.
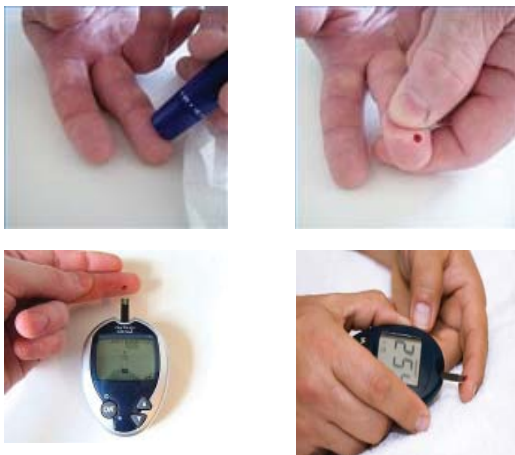
Subject

The study was descriptive survey type. 30 subjects were selected randomly for this study, whose age range from 45 to 55 years. These subjects were selected from different places in West Bengal.

TEST/ TOOLS: FASTING BLOOD GLUCOSE TEST AND POST PARANDIAL BLOOD GLUCOSE TEST

Standard and calibrated Blood Glucometer instrument prepared by Contour Company was used for measuring the level of blood glucose present in the blood of an individual to the nearest mg/dl. For collecting the Data most common blood sugar test was used i.e., simple finger prick test. The finger prick test measures glucose in milligrams (of glucose) per decilitre of blood (mg/dl). For diagnostic purposes, this was done when the individual has not eaten anything for 10 hours (fasting).

Postprandial blood glucose test was done after two hours of meal.

TACTILE SENSITIVITY

Tactile sensitivity was measured by Aesthesiometer. It is a calliper formed of two pieces sliding across one another. One having a graduate scale and the other sliding part with one window also having scales on its sides. Two pointed projections can be increased and decreased through the sliding of sliding part of rider. The rider also have thumping wheel through which the rider is moved forward or backward. The zero distance between the two pointed projections gives a sensation of one point, it is known as Aesthesiometer because it measures the sensitivity of the individual.

A 2 inch line was drawn on the front part of subject's forearm, and he was blind folded so that he may not be able to see the touch by Aesthesiometer. Now the experiment was started. The metronome was set on 60 beats per minute with alternative bell. First of all the rough threshold was found out. The 10 ascending and 10 descending trials were taken. On every tick of the metronome the points of Aesthesiometer was touch and on bell it was removed. The response of the subject was noted down.

plastic with third point

STATISTICAL PROCEDURE

A Pearson's Product Moment Co-relation statistics was used to find out the pattern of relationship between skin sensitivity and blood glucose levels of the Diabetic type II patients at 0.05 level of significance.

FINDINGS

Table 1: Mean, Standard Deviation and Coefficient Corelation of Tactile Sensitivity of the Skin with Fasting Blood Glucose Level and Post Prandial Blood Glucose Level

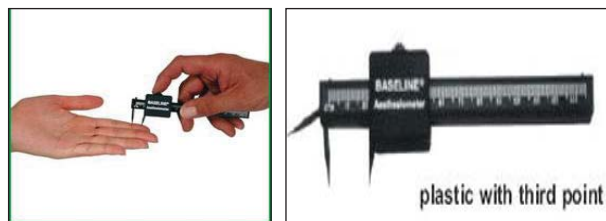| Variables	Mean	S.D	'r'	Remarks
Fasting blood glucose level	151.7	7.75	(-) 0.57	Significant
Post prandial blood glucose level	238.9	18.83	(-) 0.41	

'r' value required to be significant at 0.05 level of confidence with 28 degree of freedom was 0.361

Table 1 clearly indicated significant correlation of Tactile Sensitivity of the Skin with Fasting blood glucose level and Post Prandial blood glucose level (calculated 'r' = -0.57 and -0.47) respectively which is more than tabulated 'r' (0.361) at 0.05 level of significance with 28 degree of freedom.

DISCUSSION OF FINDINGS

In this study, aimed to investigate the relationship of sensation of skin with blood glucose levels in diabetic type II subjects. It was found from the above statistical calculation that a strong negative relationship exists between sensitivity of the skin and blood glucose level.

Many studies have shown a strong association between sensation of skin and blood glucose level. Little *et al.* (2000) also found that diabetic patients loss their sensation. Diabetic neuropathies (damage of nerve fibres and more sensation is lost) are a family of nerve disorders caused by diabetes. People with diabetes can, over time, develop nerve damage throughout the body. Some people with nerve damage have no symptoms. Others may have symptoms such as pain, tingling, or numbness-loss of feeling-in the hands, arms, feet, and legs. (http://diabetes. niddk.nih.gov/dm/pubs/neuropathies/)

Diabetes can affect every part of the body, including the skin. As many as one third of people with diabetes will have a skin disorder caused or affected by diabetes at some time in their lives. Diabetic neuropathy affects all peripheral nerves including pain fibers, motor neurons

and the autonomic nervous system. It therefore can affect all organs and systems, as all are innervated. There are several distinct syndromes based upon the organ systems and members affected, but these are by no means exclusive. A patient can have sensorimotor and autonomic neuropathy or any other combination.

(Http://en.wikipedia.org/wiki/Diabetic_neuropathy).

High blood sugar, through various mechanisms, causes the death of the nerve cells of the limbs. Loss of nerve cells = loss of sensation. One of the theories is high blood sugar causes vasculitis (inflammation of blood vessels) of the vasa nervorum (the blood vessels that supplies the nerve). This reduces the blood delivered to the nerve and causes nerve cell death. Another theory is high blood glucose causes increase of fructose and sorbitol in Schwann cells (the cells that cover and support nerves). This disrupt the structure and hence their function.

Diabetic neuropathy, or nerve damage caused by diabetes, is one of the most common known causes of neuropathy. It is one of many complications associated with diabetes, with nearly 60 percent of diabetics having some form of nerve damage. It is a progressive disease that can involve loss of sensation, as well as pain and weakness, in the feet and sometimes in the hands. Peripheral neuropathy may be more prevalent in people who have difficulty managing their blood sugar levels, have high blood pressure, are overweight, and are over 40 years old.

(http://peripheralneuropathycenter.uchicago.edu/learnaboutpn/typesofpn/diabetes/diabetes.shtml).

It is strongly recommended that the assessment of medical condition periodically is required and brings blood glucose level within the normal range.

REFERENCES

Abuja MMS. (1979). Epidemiological studies on diabetes mellitus in India. In: Abuja MMS, editor. Epidemiology of diabetes in developing countries. New Delhi: Interprint; p. 29–38.

Armstrong, J.J. (1991). A brief overview of diabetes mellitus and exercise. Diabetes Educ.; 17:175–178.)

Eli Lilly (1994). Canada Inc. AUGUST 15, 1994 CAN MED ASSOC J; 151 (4)

Guilford, J.P. (1954). Psychometric Methods. McGraw Hill Book Co., N.Y.

Gavard et al. (1998). Diabetes Care; 21: pp.1414–31

Huizinga, M.M., Rothman, R.L. (2006). Addressing the diabetes pandemic: A comprehensive approach. Indian J Med Res; 124: 481–4.)

King H., Aubert R.E., Herman W.H. (1998). Global Burden of Diabetes 1995–2025. Prevalence, numerical estimates and projections. Diabetes Care; 21: 1414–1431

Kumar, Vinay; Fausto, Nelson; Abbas, Abul K.; Cotran, Ramzi S. Robbins, Stanley L. (2005). Robbins and Cotran Pathologic Basis of Disease (7th Ed.). Philadelphia, Pa.: Saunders. pp. 1194–1195.

Little J.W. (2000). Recent advances in diabetes mellitus of interest to dentistry. Spec Care Dent 20:46–52,

Lalla RV, D'Ambrosio JA. (2001). Dental management considerations for the patient with diabetes mellitus. J Am Dent Assoc 132: 1425–1432,

Shoback, edited by David G. Gardner, Dolores (2011). Greenspan's basic & clinical endocrinology (9th Ed.). New York: McGraw-Hill Medical. pp. Chapter 17.

Sicree R., Shaw J., Zimmet P. (2006). Diabetes and impaired glucose tolerance. In: Gan D, editor. Diabetes Atlas. International Diabetes Federation. 3rd ed. Belgium: International Diabetes Federation; p. 15–103.

Wild et al. Diabetes Care 2004; 27:pp. 1047–1053.

http://en.wikipedia.org/wiki/Diabetic_neuropathy

http://www.wisegeek.com/what-is-tactile-sensitivity.htm

www.ehow.com/about_5104313_ideal-blood-glucose-level.html.)

http://www.buzzle.com/articles/skin-burning-sensation.html

http://www.umm.edu/ency/article/000313.htm

http://diabetes.niddk.nih.gov/dm/pubs/neuropathies/)

http://en.wikipedia.org/wiki/Diabetic_neuropathy

http://peripheralneuropathycenter.uchicago.edu/learnaboutpn/typesofpn/diabetes/diabetes.shtml

http://www.answers.com/topic/tactile-sensitivity#ixzz2DRPTEwEb

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A Comparative Study on Cardiovascular Endurance and Hematological Status among Two Different Physically Active Groups

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ABSTRACT

Introduction: The aim of this study was to compare and examine the Hematological status and cardiovascular endurance between highly physically active and moderate physically active groups.

Methods: Six (6) SAI football students as highly physically active group (HG) and six (6) professional physical education students as moderate physically active group (MG) who has normal blood cell count at the beginning of the session with an average age of 21.16±1.85 have participated in this study voluntarily. After being informed, blood samples of subjects have been taken on an empty stomach at respective ground between 7:00–8:00 in the morning. Levels of Leukocytes (WBC), Erythrocytes (RBC) and Platelets (PLT) parameters have been determined by using auto-hemato analyzer and cooper's 12min run walk test was taken to measure the cardiovascular endurance of the students. Additionally all tests ware taken approximately after their 3 month of respective training.

Result: Measurement results were presented as average and standard deviation. T-test was used in order to make a comparison between BR and AR values. P<-0.01 value was considered to be significant. The result of the study revealed that, there was a significance difference in Hemoglobin%, PCV, MCH, platelet, Neutrophil%, Lymphocyte% and Aerobic capacity among HG and MG.

Conclusion: Although some blood cells of highly physically active group and moderate physically active group were in the reference range, it is thought that their being high or low in number is related to different exercise programs followed for duration of time.

Keywords: *Hematology, PCV, MCV, MCHC, Erythrocyte, Leukocyte, Platelet Aerobic Capacity*

INTRODUCTION

Subjects who are undergoing a coaching program in football under SAI (Sports authority of India) is highly physically active because they have to follow a vigorous conditioning schedule to improve their general as well as specific fitness followed by a coaching schedule for the development of football skills. The schedule is designed following a progressive method and the load is gradually increased with the progress of training period. Such a vigorous training program can only be followed by those who have a high level of physical fitness and the footballers undergoing a training program under SAI process this level of fitness. Whereas Student pursuing the one year program of Physical Education leading to the degree of Bachelor of Physical Education are required to maintain a moderate level of physical fitness in order to follow different practical classes round the year. The B.P.Ed students do regularly take part in a moderate conditioning program to keep them physically fit to that they can participate in practical classes of different types and nature without any difficulty. Their involvement in physical activities is not about such as the footballers of SAI do.

There have been frequent reports of a suboptimal haematological status being observed in athletes involved in intensive physical activity. (Biancotti *et al.*,1992).

Exercise and physical activity is an important function of living systems. It may affect hematologic and biochemical parameters of most systems. Human adaptation to exercise is characterized by adaptation of cardiovascular activity and changes in hematolgical and biochemical parameters (Arslan *et al.*, 1997; Baltaci *et al.*, 1998). Doing exercise regularly has effect initially on preventing cardiovascular illnesses; besides enabling normal performance of most of the biochemical and hematologic parameters, it also regulates breathing system (Thomas *et al.*, 2003; Cakmakci, 2009). When life is sustained without doing exercise, it is an indication that there is a decrease in functional skills and as a result, functional inadequacy illnesses may grow (Colakoglu and Karacan, 2006). But on the other side, exercise causes stress on human organism (Akil *et al.*, 2011) and the result of this stress can cause different physiological and metabolic effects. Some of these effects are the changes arising in blood (Hazar and Yilmaz, 2008). The most important result of exercises done regularly is on blood cell. When blood cell is investigated, exercises done regularly have different effects on blood level (Buyukyazi and Turgay, 2000) and these differences are the result of factors such as experiment method, experiment time, type of exercise done, age, sex and training condition of subjects. It has been expressed that exercise raises blood volume too (Ibis *et al.*, 2010).

The aim of this study was to compare the Hematological status and cardiovascular endurance among highly physically active and moderate physically active student groups.

MATERIALS & METHOD

Participants

Six (06) male football students of SAI coaching center, Burdwan, West Bengal were participated as the highly physically active group (HG) whereas for the moderate physically active group (MG), six (06) physical education students from Department of Physical Education, Jadavpur University, Kolkata were participated. Total twelve (12) subjects who have normal blood cell count at the beginning of the session with an average age of 21.16 ± 1.85 years were participated in this study on voluntary basis. These subjects were healthy, nonsmokers, without history of hematological disease and free of infection.

DATA COLLECTION

All tests ware taken approximately after their 3 month of respective training. After complete information about the tests blood samples were taken in the morning from 7:00 to 8:00 am from their respective grounds. 5 ml blood samples with EDTA (Ethylenediaminetetraacetic acid) were taken from players in the forearm ante cubical area, in line with hygiene rules. Hematological levels including Red Blood Cells (RBC), Hemoglobin (HBG), Pack cell volume (PCV), Mean Red Cell Volume (MCV), Mean Cell Hemoglobin (MCH), Mean Cell Hemoglobin Concentration (MCHC), White Blood Cells (WBC;), Lymphocyte Percentage (LYM%), Neutrophil Percentage (NE%), Eosinophil Percentage (Eos%), Blood Platelets (PLT), were analyzed by the expert pathologist at standard laboratory.

Cooper's 12 min run and walk test were conducted for measuring aerobic capacity of the students. Two separate day and place were considered for collection of all the data.

STATISTICS ANALYSIS

Measurement results were presented as average and standard deviation. T-test was used in order to make a comparison between HG and MG values. *P<0.01* value was considered to be significant.

RESULT

The mean, SD and 'P' value were computed from the raw score for comparing the different physiological variables among the highly physically active students and moderate physically active students, which is presented in Table 1. The analysis of data revealed that there is no significant difference between highly physically active students and moderate physically active students in RBC, MCV, MCHC, WBC and Eosonophil % while researchers found some significant difference in case of Hemoglobin, PCV, MCH, Platelet, Neutrophil %, Lymphocyte% and Aerobic capacity.

Table 1: Mean Standard Deviation and P. Value of Participants' Characteristics

Variables	Moderate Physically Active Students(MG)	Highly Physically ACTIVE Students (HG)	P. Value
RBC (Million)/cmm	4.77 ± 0.050	4.19 ± 0.128	1.32
HBG gm/ld	14.15 ± 0.164	13.02 ± 0.547	0.0006*
PCV (%)	43.75 ± 0.273	38.33 ± 2.581	0.0004*
MCV (fl)	92.16 ± 0.989	88.57 ± 0.440	1.11
MCH (pg)	30.30 ± 0.109	29.78 ± 0.180	0.0001*
MCHC (%)	32.35 v 0.164	32.89 ± 0.858	0.157
PLT (lac)/cmm	2.10 ± 0.161	2.59 ± 0.191	0.0006*
WBC (Thousand)	9.26 ± 0.859	9.55 ± 0.054	0.439
NEU%	63.83 ± 0.983	58.00 ± 4.47	0.010*
LYM%	32.6 ± 4.159	38.8 ± 1.303	0.012*
ESO%	5.66 ± 0.876	6.9 ± 0.894	0.022
Aerobic Capacity	2605 ± 21.21	2852.5 ± 31.81	0.011*

Red Blood Cells (RBC), Hemoglobin (HBG), Pack cell volume (PCV), Mean Red Cell Volume (MCV), Mean Cell Hemoglobin (MCH), Mean Cell Hemoglobin Concentration (MCHC), White Blood Cells (WBC;), Lymphocyte Percentage (LYM%), Neutrophil Percentage (NE%), Eosinophil Percentage (Eos%), Blood Platelets (PLT). *P<0.01*

DISCURSION

This study was conducted for comparing the hemato-physiological parameters among highly physically active and moderate physically active student. Erythrocyte parameters; HGB, PCV, MCH and Neutrophil% have been found to be lower in Highly physically active students, while leukocyte parameters; Lymphocyte% were lower in Moderate physically active students. Platelet count and Aerobic capacity were also found higher in Highly physically active students than Moderate physically active students.

In this study, values of erythrocyte parameters were low in case of highly physically active students which may support the study of Londeann, R (1978) said that sports people who perform intense exercise programs, hemoglobin and hematocrit values decrease and this is recognized as sportsman anemia. In a study conducted by Magazanik and colleagues (1988), effects of chronic exercise were studied and as a result it has been indicated that erythrocyte parameters decrease. But Nieman and colleagues (1999) found out that after the exercise sedentary hemoglobin values increase. Unal (1998) indicated that after 8 weeks of aerobic exercises, hemoglobin values of subjects increased significantly. Arslan and colleagues (1992) indicated that hematocrit and erythrocyte values of elite wrestlers are high in comparison to control group.

The more stress accompanies the exercise, the more the leukocyte increases. Especially in intense exercises, this increase is more obvious. Many studies has indicated that intense exercise increases leukocyte concentration and apart from intensity of the exercise, condition state of the person is also significant in this increase (S., S. Hazar and K. Gökdemir, 2010). Ersoz (1997) indicated that in sub maximal exercises leukocyte number increases. Buyukyaz and Turgay (2000) indicated that constant and common interval running exercises cause acute increases in leukocyte numbers. In this study researcher also found the higher value of Lymphocyte% for Highly physically active students but leukocyte numbers seemed insignificant.

In this study, it has been observed that platelet parameter values of HG are high. Some studies indicated that acute exercise increase the number of platelet (Ozdengul, F., 1998) while other studies indicated it does not have an effect (Unal, M.,1998). Increase in platelet parameters may be explained with exercise related hem concentration. It may also be explained with factors that force the body and cause stress, that way enable nerve system activation and raise the number of platelets (Gunay *et al.* 2006). Özyener and colleagues (1994) indicated that short- term and maximal intensity exercise has an effect on platelet parameters. While Patlar and Keskin (2007) indicated that sub maximal exercise has a significant effect on PLT levels. Ersoz (1997) indicated that sub maximal exercises do not cause a significant increase in platelet numbers. It is indicated that the difference stems come from intensity and duration of the exercise (Manucci *et al.*, 1988).

CONCLUSION

As a conclusion, it is thought that although blood cells of groups are approximately within the reference range, their being low or high in numbers is based on participation in sports depending on type, intensity,

duration and frequency of the exercise and condition state of the subjects. Similar studies with multi subject and multi repetition are needed for gathering more concrete knowledge about this matter.

REFERENCES

Akil M., Kara E., Bicer M., Acat M. (2011). The Effects of Sub maximal Exercises on The Thyroid Hormonal Metabolism of Sedentary Individuals. Nigde University J. Phys. Edu. Sport Sci., 5 (1): 28–32.

Arslan C., Bingolbali A., Kutlu M. ve Baltaci A.K. (1997). The Effects of Volleyball, Track And Field Sports' On Girls' Hematological and Biochemical Parameters. Firat University J. Phys. Edu. Sport Sci., 2: 28–34.

Arslan C., Gonul B., Kaplan B., Dinçer S. (1992). Comparison of some respiration and blood parameters between elite women athletes and sedentary individuals, Turk. J. Sport Med., 27 (4): 113–118.

Biancotti P.P., Caropreso A., Di Vicenzo G.C., *et al.*(1992) Hematological status in a group of male athletes of different sports. J. Sports Med Phys Fitness; 32:70–5.

Baltaci A.K., Mogulkoc R., Ustundag B., Koc S., Ozmerdivenli R (1998). Some hematological parameters, plasma proteins and serum zinc, calcium and phosphor levels in sport girl. J. Gazi Univ. Phys. Edu. Sport Sci., 3: 21–30.

Buyukyaz, G. and F. Turgay, (2000). Acute and Chronic Effects of Continuous and Extensive Interval Running Exercises on Some Hematological Parameters, Turkish Journal of Sports Med., 35: 103–113.

Cakmakci E. (2009). Effects of Camp Term on Some Hematological Parameters in Male Taekwondoers. Nigde University J. Phys. Edu. Sport Sci., 3: 21–29.

Colakoglu F., Karacan S. (2006). The Effects of Aerobic Exercise In Some Physiological Parameters in young and Middle aged women. Kastamonu Edu. J., 14(1): 277–284.

Drygas, W.K., (1988). Changes n Blood Platelet Function, Coagulation and Fibrinolytic Activity in Response to Moderate, Exhaustive and Prolonged Exercise. J. Sports Med., 9: 67–72.

Ersoz G. (1997). Submaximal exercise and platelet functions. Ankara Uni. Med. Faculty J., 50(2):97–112.

Gunay, M.K. Tamer and. Cicio lu, 2006. Exercise and hematology, Ankara, 219: 225–227.

Hazar S., Yilmaz G. (2008). Submaksimal Ko u Bandi Egzersizinin Bagisiklik Sistemine Akut Etkisi. 10th International Sports Science Congress. Bolu, pp. 23–25.

Ibis S., Hazar S., Gokdemir K. (2010). Acute effect of hematological parameters on aerobic and anaerobic exercise. Int. J. Human Sci., 7(1): 70–82.

Londeann, R., (1978). Low Hematocrits During Basic Training: Athlete's Anemia. N. Engl J. Med., 299:1191–2.

Magazanik, A., Y. Weinstein, R.A. Dlin, M.D. Schwartzman and D. Allalouf, (1988). Iron Deficiency Caused By 7 Weeks of Intensive Physical Exercise. Eur. J. Appl. Physiol., 57: 198–202.

Manucci L., Redaelli R., Tremoli E. (1988). Effects of aggregating agents and of blood cells on the aggregation of whole blood by impedance technique. Thromb Res., 52(2): 143–151.

Nieman, D. and K. Pedersen, (1999). Exercise and Immune Functions Recent Development. Sports Med., 27: 73–80.

Ozyener F., Gür H., Özlük K. (1994). Hematological changes following a brief exhaustive maximal exercise in sedentary males. Hacettepe J. Sport Sci., 6(2): 27–37.

Patlar, S. and E. Keskin, (2007). The Effects of Glycerol Supplement on Various Hematologic Parameters in Sedentaries and the Athletes Who Exercise pp: 241, 288, 291, 355. Regularly, Exerc. J., 1: 22–35.

Thomas N.E., Baker J.S., Davies B. (2003). Established and recently identified coronary heart disease risk factors in young people the influence of physical activity and physical fitness. Sport Med., 33: 633–650.

Unal M. (1998). Aerobik ve Anaerobik Akut-Kronik Egzersizlerin Immun Parametreler Uzerindeki Etkileri, Istanbul University Health Science Instute, stanbul.

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