



**EFFECT OF EXERCISE THERAPY ON ABDOMINAL MUSCULAR STRENGTH  
OF MIDDLE AGED MALE SUFFERING FROM LUMBAR  
HYPER LORDOSIS**  
Maryam shahzamani <sup>1</sup>

**Affiliation:**

- <sup>1.</sup> Ph.D. student , Department of Physical Education,. Mysore university , Maysore (Karnataka)
- 

**ABSTRACT**

The purpose of this study was to assess the effect of exercise therapy for improvement of abdominal muscles strength. The data were considered in relation to recommended levels of exercise therapy can be effective helping to improve abdominal muscle's strength in middle aged male who had hyper lordosis deformity. 20 middle aged male.10 were experimental group (affected by hyper lordosis deformity with lower back pain) and 10 were control group (affected by hyper lordosis with lower back pain). The sample was collected through non- random sampling method. To assess the strength of the abdominal muscles, two tests were used to evaluate the subjects before (pretest) the beginning of the program, the first and the last of each month (posttest). the push up test is used as a general test of strength. The results of the study revealed that most of the middle age male were found under excellent category in abdominal muscular strength. William exercises therapy had positive effect on Abdominal muscular strength of middle aged male from pretest to post test after three month. Dissimilarity in abdominal muscular strength among middle aged male of experimental and control group was observed after implication of three month William exercises therapy.

**Keywords:** William exercises, hyper lordosis, lower back pain. Muscular strength

---

## 1. INTRODUCTION

The normal spine is structurally balanced for best flexibility and support of the body's weight. once viewed from the side. It has three curves. The traditional body part spinal curvature is between forty to seventy degrees with an apex placed at the L3-4 interspace. These curves add harmony to stay the body's center of gravity aligned over the hips and pelvis. spinal deformity within which the lower back curves to a fault inward, often referred to as hyperlordosis.

In the scenario of body part spinal curvature muscles of the erectors of spine and hip flexors are become short and stiff abdominal muscles (musculus Abdominus, Internal oblique and External oblique) and hip extensors are become weak or stretches. The muscular imbalance leads to knocking down the pelvis within the front of the body, making the lordotic within the spine. For treatment of hyperlordosis, the patient will enroll in an exceedingly therapy program wherever exercises will be done, beneath the steering of a healer, so as to strengthen the muscles and to extend the vary of motion. doing exercises to boost posture are typically the primary intervention.

Williams flexion exercises additionally referred to as Williams body part flexion exercises, or just Williams exercises are a group or system of connected physical exercises meant to reinforce body part flexion, avoid body part extension, and strengthen the abdominal and striated muscles. The goals of doing these exercises is providing lower trunk stability by actively developing the gluteus maximums, hamstring and abdominal, muscles. Moreover as the exercises outlined will accomplish a correct balance between the skeletal muscle and therefore the skeletal muscle group of bodily properly muscles.

Hosseinfar et.al. (2017) ended that each body part stabilization and routine therapy cause decreasing in pain, disability, and alter body part spinal curvature in patients with chronic LBP. Gordon and Bloxham (2016) reviewed that a general exercise programme that mixes muscular strength, flexibility and aerobic fitness is useful for rehabilitation of non-specific chronic low back pain. Increasing core muscular strength will assist in supporting the body part spine. up the flexibility of the muscle-tendons and ligaments within the back will increase the vary of motion and assists with the patient's practical movement. cardiopulmonary exercise will increase the blood flow and nutrients to the soft tissues within the back, up the healing method and reducing stiffness that may end in back pain. Levine, horny Walker and Larry (1997) unconcealed that dominant for pre-test scores, post-test mean muscle strength within the experimental cluster was found to be considerably bigger than within the management cluster. However, there have been no variations in mean post-test girdle tilt or body part spinal curvature between the teams. Karimi and Rahnama, (2016) ended that hydrotherapy exercises in conjunction with onto land exercises can improve body part spinal curvature and pain in patients with sciatic pain. Therefore, it will be suggested as a modality for these patients. It will be ended that combined exercises will scale back spinal curvature abnormalities and scale back the pains ensuing from abnormalities like sciatic back pain investigated during this study. Combined exercises in water and land will be used as complementary exercises to cut back the fatigue caused by style of exercise and its monotony, and increase exercise effectiveness in keeping with quantity of pain.

Some researchers have examined the connection between back pain and changes within the angle of the body part spine (Berlemann, et.al., 1999 and Lin, Jou, and Yu, 1992). increased spinal curvature has been advocated because the major reason behind bodily property pain, radiculopathy, and side pain (Lin, Jou, and Yu, 1992 and Cailliet, 1995). Excessive spinal

curvature results in increase compression of the enation joint and increase anterior shear force at the lumbosacral junction (Berlemann, et.al., 1999 and Neumann, 2009).

Similarly, Heino, Godges, and Carter (1990) examined the connection between hip extension vary of motion, standing girdle tilt, depth of body part spinal curvature, and abdominal force. They found that there's a weak relationship between variables. No relationship was found among clinical variables unremarkably determined by physical therapists throughout a standing bodily property analysis of the lumbopelvic advanced (Heino, Godges, and Carter, 1990). González-Gálvez, Gea-García, and Marcos-Pardo (2019) urged that strengthening instead of stretching can be a lot of relevant for spinal curvature and each qualities square measure necessary for spinal curvature. it's necessary to conduct a lot of irregular controlled trials to assess the results of strengthening and/or stretching program on spinal curvature and unfit angle and to determine the kind of the exercise that's higher for maintaining the mesial disposition among traditional ranges.

Low back pain (LBP) has been connected with measurement, postural, muscular, and quality characteristics (Kim, 2006). body part spinal curvature may be a key feature in maintaining mesial balance (Been and Kalichman (2014). it's one in all the foremost necessary components of the spinal pillar that includes a special importance thanks to the distinctive position and having an instantaneous contact the pelvis ( Fatemi, et.al., 2015) . Mesial balance or “neutral upright mesial spinal alignment” may be a bodily property goal of surgical, technology and therapy intervention (Been and Kalichman (2014).

The body part spinal curvature serves to supply strength against the compressive forces of gravity (Morningstar, 2003 ; Swärd , Eriksson and Peterson, 1990). a traditional body part spinal curvature protects the posterior spinal ligament system from excess strain (Cyriax, 1978). and acts as a damper throughout abrupt applied vertical forces (Hultman, Saraste, and Ohlsen, 1992). Gracovetsky (1986) has illustrated that due to body part curve, a person's will raise regarding three times his weight. Therefore, it's obvious, the role of body part curve in biomechanics, and performance of human.

Importance of this article is knowing about human back and lumbar spine. This article answer to important questions such as what is lordosis deformity? How lordosis deformity is happening? What is exercise therapy and William exercises? How William exercises effect on body strength in lordosis deformity.

The aim of the present study was to assess the effectiveness of exercise therapy to improvement of body strength on lumbar hyper lordosis. William exercise has been shown positively influence of improve body strength.

## **2. METHODOLOGY**

### **2.1 Selection of Subjects**

A total of twenty middle aged male employed in the Isfahan Refinery oil industry, were selected as the subject for the present investigation.. These middle aged male were found affected by hyper lordosis. These selected subjects were divided into experimental group (N=10) and control group (N=10) for the purpose of study.

The subjects with hyper lordosis were identified in the clinic under the supervision of the physician. Subjects with Hyper lordosis were all with back muscular pain, that had previously also been diagnosed by a doctor.

## 2.2 Training Programme

Exercise	Type of exercise	Time allocated	Repetition	Recovery between Exercise
Exercise no.1 Posterior pelvic tilt	Strength exercise	40 second	Depend on ability	2 and half minutes
Exercise no.2 Single knee to chest stretch	Strength exercise	40 second	Depend on ability	2 and half minutes
Exercise no.3 double knee to chest	Strength exercise	40 second	Depend on ability	2 and half minutes
Exercise no.4 standing lumbar flexion	Endurance exercise	40 second	Depend on ability	2 and half minutes
Exercise no.5 partial sit-up	Endurance exercise	40 second	Depend on ability	2 and half minutes
Exercise no.6 Partial diagonal sit-up	Endurance exercise	40 second	Depend on ability	2 and half minutes

## 2.3 Frequency, Density and Intensity of exercises

<b>Time allocated</b>	In first month six exercises the time which allocated is 40 sec and the time for one day is about an hour and twenty minutes.
	In second month of six exercises the time which allocated is 40 sec and the time for one day is about an hour and twenty minutes.
	In third month of six exercises the time which allocated is 40 sec and the time for one day is about an hour and twenty minutes.
<b>Organization based on sets(for three times a week)</b>	six exercises of the first month include one set
	Six exercises of the second month include one set
	Six exercises of the third month include one set
<b>Intensity</b>	The intensity of the first month during one months is the 40%
	The intensity of the second month during one months is the 70%
	The intensity of the third month during one months is the 100%

## 2.4 Instrumentation

Purpose: the push up test is used as a general test of strength and endurance. Procedure: Measures abdominal muscular strength and endurance of the abdominals and hip-flexors, important in back support and core stability. Determining muscle endurance and upper strength. Equipment required: Depending on which protocol you use, you will need a floor mat, metronome (or audio tape, clapping, drums), stopwatch, wall, chair. Procedure: A standard push up begins with the hands and toes touching the floor, the body and legs in a straight line, feet slightly apart, the arms at shoulder width apart, extended and at a right angle to the body. Keeping the back and knees straight, the subject lowers the body to a predetermined point, to touch some other object, or until there is a 90-degree angle at the elbows, hold the same position whatever you can. Time allocated is maximum 40 second. Three repetitions will be performed. Best trial will be counted. Scoring: Timed Test: A common version of the push up test is to measure the maximum number of push up in a set time, such as one or two minutes.

## 2.5 Statistical Analysis

To assess the effectiveness of exercise therapy on abdominal muscular strength of middle aged male suffering from back muscular pain (lumbar hyper lordosis ), mean, standard deviation and repeated measure ANOVA were computed with the help of SPSS 16.0. The level of significant was set at .05 level of confidence.

## 3. RESULTS

To examine the effectiveness of exercise therapy on abdominal muscular strength of middle aged male among experimental and control groups, Mean, SD and ANOVA. were calculated and data pertaining to this has been presented in Table 1 to 2 .

**TABLE 1**  
**DESCRIPTIVE STATISTICS OF ABDOMINAL MUSCULAR STRENGTH DURING PRE, 1-MONTH, 2- MONTHS AND 3 -MONTHS DURATION OF EXPERIMENTAL AND CONTROL GROUP**

Group	Duration								Change
	Pre test		One month		2 months		3 months		
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	
Experimental (N=10)	5.50	1.84	15.90	2.60	21.70	3.30	28.40	3.50	22.90
Control (N=10)	4.90	2.02	14.70	3.33	21.70	3.53	30.08	3.58	25.18
Total (N=20)	5.20	1.91	15.30	2.98	21.70	3.33	29.60	3.66	24.40

Table 1 reveals that experimental group had a gain of 22.90 degrees change from pretest to 3 months (pre 5.50; post 28.40) in abdominal muscular strength. In case of control group which had gained 25.18 degrees change from pretest to 3 month (pre 4.90; post 30.08) in case of abdominal muscular strength.. Irrespective of the groups on the whole, an increase of 24.40 degree change from pre to 3 months observed (pre 5.20; 3 months 29.60).

**TABLE 2**  
**REPEATED MEASURE ANOVA ON ABDOMINAL MUSCULAR STRENGTH DURING PRE, ONE MONTH, 2 MONTHS AND 3 MONTHS DURATION**

Source of Variance	Sum of Squares	df	Mean Square	F-ratio
Change	6387.40	3	2129.13	724.24
Change * Group	37.35	3	12.45	4.24
Error(Change)	158.75	54	2.94	

Significant at .05 level,  $F_{05}(3, 54) = 2.79$

Table 2 reveals that there was highly significant increase in mean degree values ( $F=724.24$ ;  $p=.001$ ) in case of abdominal muscular strength. However, when group wise comparison was made, again repeated measure ANOVA revealed a significant difference between the experimental and control groups ( $F=4.24$ ;  $p=.001$ ).

## 4. DISCUSSION

Experimental group had gained of high degrees change from pretest to 3 months in abdominal muscular strength. In case of control group which had also gained high degrees change from pretest to 3 month. In case of abdominal muscular strength.. Irrespective of the groups on the whole, an increase of degrees change was observed from pre to 3 months in the abdominal muscular strength of middle aged male. It means, the significant change in mean degree values was observed between experimental group and control group in abdominal muscular strength among middle aged male after applying the William exercise therapy. It showed the improvement in back pain symptoms. When the repeated

measure ANOVA was applied, significant difference existed among middle aged male of experimental and control groups in their abdominal muscular strength from pretest to three month William exercises. There was highly significant increase in mean degree values of abdominal muscular strength. However, when group wise comparison was made, again repeated measure ANOVA revealed a significant difference between the experimental and control groups.

#### 5. CONCLUSIONS

1. Most of the middle age male were found under excellent category of Abdominal muscular strength .
2. William exercises therapy had positive effect on Abdominal muscular strength of middle aged male from pretest to post test after three month.
3. Dissimilarity in abdominal muscular strength among middle aged male of experimental and control group was observed after implication of three month William exercises therapy.
4. Middle aged male had significant difference in their abdominal muscles strength between the experimental and control groups of middle aged male
5. Irrespective of the groups of middle aged male on the whole had a gain of change from pretest to third months in abdominal muscular strength.

#### REFERENCES

- Kim, Ho-Jun, et al. (2006)**, "Influences of trunk muscles on lumbar lordosis and sacral angle." *European Spine Journal* 15.4 (2006): 409-414.
- Been, Ella, and Leonid Kalichman (2014)**. "Lumbar lordosis." *The Spine Journal* 2014; 14.1: 87-97.
- Fatemi, Rouholah, Marziyeh Javid, and Ebrahim Moslehi Najafabadi (2015)**. "Effects of William training on lumbosacral muscles function, lumbar curve and pain." *Journal of back and musculoskeletal rehabilitation* 2015; 28.3: 591-597.
- Rebecca Gordon and Saul Bloxham (2016)** A Systematic Review of the Effects of Exercise and Physical Activity on Non-Specific Chronic Low Back Pain. *Healthcare (Basel)*. 2016 Jun; 4(2): 22. doi: 10.3390/healthcare4020022
- Hosseinifar M, Ghiasi F, Akbari A, Ghorbani M.(2017)**, The effect of stabilization exercises on lumbar lordosis in patients with low back pain. *Ann Trop Med Public Health*, 10 (6):1779-84
- Levine, David., Randy Walker J. and Larry, Tillman (1997)**, The effect of abdominal muscle strengthening on pelvic tilt and lumbar lordosis, *Physiotherapy Theory and Practice* 13(3):217-226. DOI: 10.3109/09593989709036465
- Karimi, Behnaz and Rahnema, Nader (2016)**, The Effect of 8 weeks of combined training on the angle of lumbar lordosis and pain of male suffering from sciatica pain *Int J Med Res Health Sci.*, 5(11):673-679
- González-Gálvez, N., Gea-García, G.M., Marcos-Pardo, P.J. (2019)**, Effects of exercise programs on kyphosis and lordosis angle: A systematic review and meta-analysis. *PLOS ONE* 14(4): <https://doi.org/10.1371/journal.pone.0216180>
- Morningstar, M. W. (2003)**, Strength gains through lumbar lordosis restoration. *J Chiropr Med.*, ;2:137-41.
- Swärd, L, Eriksson B, Peterson L. (1990)**, Anthropometric characteristics, passive hip flexion, and spinal mobility in relation to back pain in athletes. *Spine, Phila Pa*;15:376-82.

- Cyriax, J. (1978)**, Textbook of Orthopedic Medicine: Diagnosis of Soft Tissue Lesions. 7<sup>th</sup> ed. Vol. 1. London: Balliere Tindall; 1978
- Gracovetsky, S. (1986)**, Function of the spine. J Biomed Eng;8:217-23.
- Hultman G, Saraste H, Ohlsen H. (1992)**, Anthropometry, spinal canal width, and flexibility of the spine and hamstring muscles in 45-55-year-old men with and without low back pain. J Spinal Disord, 5:245-53.
- Berlemann U, Jeszenszky D, Bühler DW, et al.(1999)**, The role of lumbar lordosis, vertebral end-plate inclination, disk height, and facet orientation in degenerative Spondylolisthesis. J Spinal Disord, 12:68-73.
- Lin, R.M., Jou, I.M., and Yu, C.Y.(1992)**, Lumbar lordosis: Normal adults. J Formos Med Assoc, 91:329-33.
- Cailliet, R. (1995)**, Low Back Pain Syndrome. 5<sup>th</sup> ed. Philadelphia: F. A. Davis Company.
- Neumann, D.A. (2009)**, Kinesiology of the Musculoskeletal System: Foundations for Physical Rehabilitation. New Zealand, St. Louis: Spinal Publications, Mosby.
- Heino, J.G., Godges, J.J., and Carter, C.L. (1990)**, Relationship between hip extension range of motion and postural alignment. J Orthop Sports Phys Ther, 12:243-7.



**A COMPARATIVE STUDY OF SPORTS COMPETITION ANXIETY BETWEEN  
MALE AND FEMALE INTER-COLLEGIATE  
SOFTBALL PLAYERS OF MANIPUR**

**Dr. Abdul Rahaman<sup>1</sup>**

**Affiliation:**

- 1. Guest Faculty, Department of Physical Education and Sports Science, Manipur University, Canchipur (India). [abdulrahaman09@gmail.com](mailto:abdulrahaman09@gmail.com)**

---

**ABSTRACT**

The purpose of the present investigation was to compare the level of competition anxiety between male and female inter-collegiate softball players of Manipur. Forty (40) softball players (male = 20, female = 20) who have participated in the inter-collegiate softball tournament held at Regional college, Imphal west district under the aegis of Manipur University, Canchipur (India) in 2013 were considered as the subjects. The age of the subjects ranged between 17 to 28 years. To find out their level of competition anxiety, Sports Competition Anxiety Test (SCAT) developed by Martens (1977) was administered on the subjects. t-test was used to analyze the data. Results of the study revealed the insignificant difference between male and female softball players of Manipur in regard to sports competition anxiety.

**Keywords:** Competition, Anxiety, Softball, Players, Male, Female, Inter-collegiate.

---



## 1. INTRODUCTION

Softball is a game. It's more commonly played at a recreational level and played on a pitch smaller than that of baseball. The object of softball is to hit the ball with a bat before the player tries to run around an infield with four bases. Once a player manages to get right round without being given out a run is scored. The team with the most runs at the end of the game is deemed the winner. The winners of the game will be decided after the 7 innings have all been completed. The team with most runs after 7 innings will be declared the winner. If after 7 innings the game is tied, then an extra innings will be played until a winner is found.

Competition is a situation in which two or more individuals or groups struggles for the complete or larger share of a particular goal, and in which the success of their performance is related to each other. The existence of various situations is a must for competition to get in progress in any field of life as well as the game of softball.

Anxiety is the state of mind in which the individual responds with discomfort to some event that has occurred or is going to occur. The person's worries about events, their occurrence and consequences, in general are the sources of anxiety; however the anxiety can be either somatic or cognitive in nature (Bell, 1983).

Performance is the outcome of athlete's biological, psychological, sociological, and physical construct. In the games and sports, psychological and physiological factors play a significant role in determining the performance level. However, in recent time's great importance has been laid to psychological parameters in sports competition anxiety (Ali & Bashir, 2018; Chauhan & Das, 2018; Kumar, 2016; Srivastava & Prasad, 2015; Lal, Patial & Kumar, 2014; Rastogi & Katiyar, 2014; Sharma, Tomar & Goswami, 2014; Singh, 2013).

## 2. METHODOLOGY

### 2.1 Participants

For the purpose of this study forty (40) softball players (male = 20, female = 20) who participated in the inter-collegiate softball tournament held at Regional college, Imphal west district under the aegis of Manipur University, Canchipur (India) in 2013 were considered as the subjects. The age of the subjects ranged between 17 to 28 years.

### 2.2 Tool Used

For assessing the sports competition anxiety of the subjects a questionnaire developed by Martens (1977) was used. It is a three point likert type scale having 15 items. It is an accepted tool being used by the psychologists for assessing the anxiety level. Its reliability has been reported as 0.85 according to its norms.

### 2.3 Procedure

The questionnaire was administered on the subjects during inter-collegiate softball (Men & Male) tournament held at Regional College, Imphal West district under the aegis of Manipur University, Canchipur (India) from 11<sup>th</sup> to 13<sup>th</sup> September, 2013. Prior to administration of questionnaire, the researcher approached the subjects through their coaches and managers at the personal level requesting them to extend their persistent cooperation in the data collection.

### 2.4 Statistical Analysis

To assess the sports competition anxiety between inter-collegiate level male and female softball players, mean, standard Deviation and t-ratio were computed. The level of significant was set at .05 level of confidence.

### 3. RESULTS

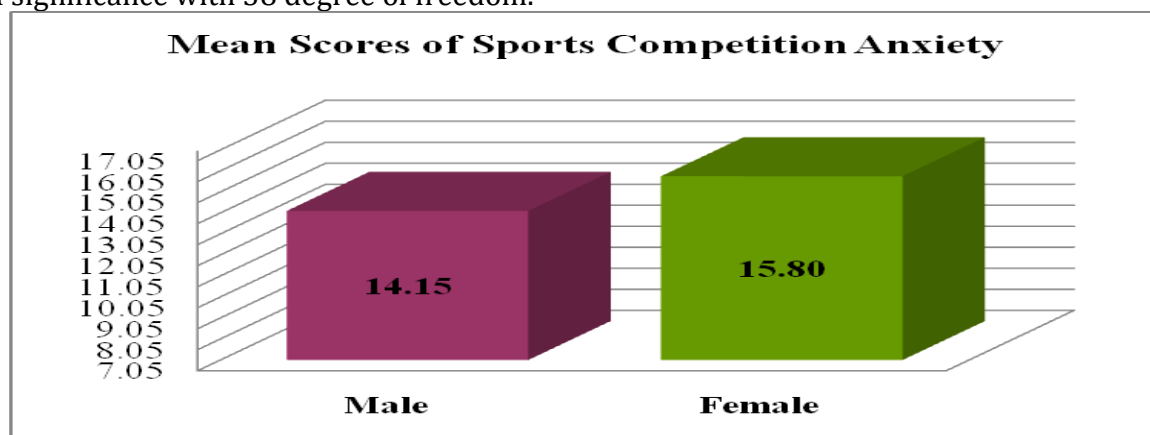
To find out the significance of difference between mean scores of sports competition anxiety between inter-collegiate level male and female softball players,. mean, standard Deviation and t-ratio were computed and data pertaining to this, has been presented Table 1 and depicted in Figure 1.

**TABLE 1**  
**SIGNIFICANCE OF DIFFERENCE BETWEEN MEAN SCORES ON SPORTS COMPETITION ANXIETY OF MALE AND FEMALE INTER-COLLEGIATE SOFTBALL PLAYERS OF MANIPUR.**

<b>Sports Competition Anxiety</b>				
<b>Experimental Groups</b>	<b>No. of Subject</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>calculated t-test</b>
Male	20	14.15	± 3.26	1.24
Female	20	15.80	± 4.95	

Tabled value of 't' at 0.05 level of significance with 38 df = 2.02

It has been depicted from the table that insignificant difference subsists between male and female softball players of Manipur on their level of sport competition anxiety. As, the calculated 't' (1.24) value is much lesser than the tabulated 't' value (2.02) at 0.05 level of significance with 38 degree of freedom.



**Figure-1: Mean Scores of Sports Competition Anxiety of Male and Female inter-collegiate softball player of Manipur**

### 4. DISCUSSION

As per the scoring manual (Martens, 1977), the subjects who score less than 17 they fall in the category of players having low level of anxiety. If score lies between 17 and 24, it indicates average level of anxiety and the score more than 24 predicts high level of anxiety. Thus, in the present study the subjects have shown low level of anxiety (Male = 14.15, Female = 15.80).

The result may be substantiated with the findings of Balwinder (2016) who compared sport competition anxiety between college level male and female cricket players and advocated that insignificant difference exist between male and female inter-college cricket players in regard to sports competition anxiety. In an akin study, Singh, Rahaman and Singh (2013) who compared sports competition anxiety between male and female inter-collegiate badminton players of Manipur and observed that insignificant difference

subsists between male and female inter-collegiate badminton players of Manipur in relation to competition anxiety.

## 5. CONCLUSION

On the basis of the results obtained from the present pragmatic investigation it may be concluded that male and female inter-collegiate softball players of Manipur did not drastically differ on their level of sports competition anxiety. The findings also suggest that the level of sports competition anxiety of these softball inter-collegiate players (male and female) falls in the low range which seemed to be necessary for excelling maximum competitive sporting spirit.

## REFERENCES

- Ali, M. and Bashir, M. (2018)**, 'Comparative study of sport competition and anxiety among Volleyball and Kho-Kho player of girls high school of Kargil Ladakh', *International Journal of Yoga, Physiotherapy and Physical Education*, 3(2): 246-247.
- Balwinder (2016)**, 'Sport competition anxiety between college level cricket male and female players', *International Journal of Physical Education, Sports and Health*, 3(5): 403-404.
- Bell, K. (1983)**, *Championship Thinking: the Athletics Guide to Winning Performance in All Sports*, London: Prentice Hall, p.125.
- Chauhan, S.N. and Das, R. (2018)**, 'A comparative study of sports competition anxiety between basketball and volleyball players', *International Journal of Physical Education and Sports*, 3(4): 15-18.
- Kumar, A. (2016)**, 'A comparative study of sports competitive anxiety among players', *International Journal of Physical Education, Sports and Health*, 3(5): 120-121.
- Lal, M., Patial, V. S. and Kumar, J. (2014)**, 'Comparative study of sports competition anxiety between north zone and south zone Kho-Kho players of all India inter university', *Academic Sports Scholar*, 3(3): 1-3.
- Martens, R. (1977)** *Sport competition anxiety test*. Champaign, IL: Human kinetics.
- Rastogi, N. K. and Katiyar, V. (2014)**, 'A comparative study of sports competition anxiety test between college level chess and cricket players', *International Journal of Physical Education, Fitness and Sports*, 3(3): 22-25.
- Sharma, V., Tomar, A. and Goswami, V. (2014)**, 'A study of sports competition anxiety on national level netball players of Delhi', *International Educational E-Journal*, 3(1): 179-181.
- Singh, M.N., Rahaman, A. and Singh, K.M. (2013)**, 'A comparative study of sports competition anxiety between male and female inter-collegiate badminton players of Manipur', *Indian Streams Research Journal*, 3(9): 1-2.
- Singh, S. (2013)**, 'Sport competition anxiety among university level cricket players: A comparative study', *International Journal of Research Pedagogy and Technology in Education and Movement Sciences*, 1(3): 133-139.
- Srivastava, R. and Prasad, R. (2015)**, 'A comparative study of sports competition anxiety between the athletes of track and field events', *Indian Journal of Agriculture and Allied Sciences*, 1(1): 77-79.



## INFLUENCE OF RECOVERY HEART RATE ON PERFORMANCE OF MIDDLE DISTANCE ATHLETES

Limon Kumar Saha<sup>1</sup> and Dr. Ashim Kumar Bose<sup>2</sup>

### Affiliations:

- <sup>1</sup> Assistant Professor in Physical education, Post Graduate Govt. Institute For Physical Education, Banipur, 24 Pgs(n), W.B., e-mail : limonmisti@gmail.com
- <sup>2</sup> Professor, Post Graduate Govt. Institute For Physical Education, Banipur, 24 Pgs(n), W.B., e-mail : ashimbani@gmail.com

---

### ABSTRACT

The purpose of the present study was to evaluate the influence of recovery heart rate after immediate exercise on performance of middle distance athletes. Seventeen (N=17) middle distance tribal athletes were selected purposively as subjects for this study who belonged from Dooars of Jalpaiguri district. Their age ranged from 18 to 22 years. Initially, pulse rate of athletes were recorded as resting heart rate. Performance level was measured through time in 1500mt. run. Recovery heart rate of athletes were measured in three phases. Immediate after finishing of 1500mt. run, pulse rate was measured as predictive maximum heart rate. During recovery period, pulse was counted for three times that was on 1-1:30 min., 2-2:30 min. and 3-3:30 min. respectively after completion of race. Relative change in heart rate was calculated as maximum heart rate minus heart rate in 1st phase or heart rate in 2nd phase divided by HRmax minus HRresting. To mark the association of performance level of tribal athletes with recovery heart rate, Pearson's Product Moment correlation of coefficient was employed. No significant results were obtained in relation to recovery heart rate after exercise with performance of middle distance tribal athletes. Although a positive relationship was existed in each phases of recovery heart rate and performance of middle distance tribal athletes.

**Key words :** Recovery heart rate, Performance, Middle distance athletes

## 1. INTRODUCTION

An enduring and fascinating question in sports science is the dominance of specific population groups at the extreme ends of the competitive running spectrum. Sports talent or potentiality is the fundamental basis of genetics or heredity. Only limited literature is available documenting the development of a specific race or genetic population in relation to sports performance. In order to identify talent train and to provide better opportunities of performance, we chose tribal runners because they have been widely studied, and physiological characteristics and candidate genes for endurance in this population has been described extensively in previous literatures.

Tribal establish a platform around the world on the basis of their evolutionary success in sports. Mainly their customs, physical and physiological responses, psychological traits differentiate them from others. Genetics play a indispensable role in their outstanding sports performance. Genetic variations provide them a separate and self recognition in global scale. The tribes are an intrinsic part of our nation with their rich cultural heritage. Among the total population 8.2% is tribes with varying population in different states. West Bengal is not an exception. Dooars in Jalpaiguri district of West Bengal is a land of diverse ethnic communities. In north Bengal, jalpaiguri ranks first in the state in ST population(18.87% of total.

In order to adapt the training load, the athletes have to develop physiologically to meet the physical demand required at elite levels. After exercising, a person's heart takes how long to resume its resting rate is referred to as heart-rate recovery. Heart rate recovery is usually quantified by taking the absolute difference between the maximum heart rate at exercise completion and heart rate recorded after a certain period. The recovery heart rate has been used frequently in monitoring of overall fitness and training status (Lamberts, et al., 2009). Because a faster recovery heart rate indicates higher cardio-respiratory fitness level.

Previous cross-sectional studies have showed that recovery heart rate is accelerated in endurance-trained subjects with elevated aerobic capacity. Recovery heart rate is the rate at which heart rate decreases or the time taken for heart rate to recover after exercise. This response has been widely studied and it has been shown that its exponential feature can be attributed to the autonomic nervous system (ANS) and it is characterized by the parasympathetic reactivation and sympathetic withdrawal (Borresen & Lambert, 2008). Recovery heart rate discriminates modes and intensities of exercise. It has been observed that recovery heart rate after maximal aerobic exercise is slower compared to sub-maximal exercise (Borresen & Lambert, 2008). Although the mechanisms behind endurance training-induced changes in recovery heart rate are still not fully understood. The main focus of this study was to examine the influence of recovery heart rate on performance level of middle distance athletes.

## 2. METHODOLOGY

### 2.1 Selection of Subjects

The subject for the present study was confined to male athletes from different tribal communities living in Dooars of Jalpiguri district. Only middle distance runners (800mt. and 1500mt.) were drawn as subjects assuring their minimum district level participation for two times. Seventeen (N=17) subjects were selected purposively as representative of

whole population of tribal athlete for this study and the age of the subjects were ranged from 18 to 22 years.

### 2.2 Criterion Measures

The following variables were selected to fulfill the objective of the present study and the tests were conducted to measure the parameters were:

VARIABLES	Measuring Tools	Unit of Measurement
Recovery Heart Rate	Stop-Watch (Casio)	In %
Performance Level Over 1500mt. Run	Stop-Watch	min. (Casio- 1/100)

### 2.3 Testing Protocol

Initially in resting condition, pulse rate of athletes were recorded as resting heart rate To determine the recovery heart rate after exercise, subjects were asked to perform 1500mt. run in minimum possible time. Immediate after finishing the race, pulse rate was measured for 30 seconds as predictive maximum heart rate. Further after every 30 seconds pulse was counted for three times consecutively, that means pulse counted again for measuring recovery heart rate on 1-1:30 min., 2-2:30 min. and 3-3:30 min. after completion of race. After collection of all data, scores were multiplied with two to convert in beats / minute. Relative change in heart rate was calculated as maximum heart rate minus heart rate in 1st phase or heart rate in 2nd phase divided by HRmax minus HRresting (Kelia et al., 2014). In this context, to obtain recovery heart rate, scores were converted into same by applying percent recovery method for each phase in present study. Times in 1500mt. run were recorded as performance level of athletes.

### 2.4 Statistical Procedure

In order to analyze the collected data and to investigate the existence of significant relationship correlation of co-efficient was employed and to analyze the hypothesis level of significance was set at 0.05. Prior evaluating, the relevant data were converted into standard score as measuring units were not in uniform in nature. Mean, standard deviation and standard error were calculated as descriptive statistics to interpret the assessment of each variable.

## 3. RESULTS

The results of the present investigation reflect in the following tables and the interpretation of such results are as follows:

**TABLE 1**  
**SUBJECT CHARACTERISTICS REGARDING RECOVERY HEART RATE IN 1ST PHASE AND PERFORMANCE LEVEL OVER 1500MT. RUN AND RATIO OF ASSOCIATION BETWEEN THEM**

Name of the Variables	Mean	Standard Deviation	Standard Error	Highest Score	Lowest Score	'r' Ratio
Recovery Heart Rate in 1st Phase (%)	30.21	±7.69	1.87	44.44	19.44	0.104
Performance (Minute)	5.1	±0.28	0.067	5.65	4.62	

Insignificant at .05 level.  
r-.05 (15) = 0.482

Table-1 reveals the descriptive analysis of recovery heart rate in 1st phase and performance level over 1500mt.run of middle distance athletes as well as the degree of association between them. Descriptive statistics such as mean and standard deviation of recovery heart rate in 1st phase were  $30.21 \pm 7.69$  and  $SE_M$  was 1.87. On other hand, mean and standard deviation of performance level over 1500mt. run was  $5.1 \pm 0.28$  and  $SE_M$  was 0.067. It was also clearly observed through this table that recovery heart rate in 1st phase was not significantly associated with performance as the calculated value of correlation of coefficient ( $r = 0.104$ ) was lesser than the tabulated value ( $r = 0.482$ ) at 0.05 level of significance with 15 degree of freedom and in nature, inversely they were related. On the basis of the previous interpretation, here also the nature of relationship shows reversely. So the actual fact was that an positive insignificant relationship existed between them. The degree of association was almost negligible. The structure of strength of relationship is shown in the following table 2

**TABLE 2**  
**THE STRENGTH OF CORRELATION OF CO-EFFICIENT**

Range	Strength of association
0 (zero value)	Zero relation or absolutely no relationship
From 0.01 to $\pm 0.20$	Slight or almost negligible relationship
From $\pm 0.21$ to $\pm 0.40$	Low correlation or small relationship
From $\pm 0.41$ to $\pm 0.70$	Moderate correlation
From $\pm 0.71$ to $\pm 0.90$	High correlation or marked relationship
From $\pm 0.91$ to $\pm 0.99$	Very high correlation or quite dependable relationship
$\pm 1$	Perfect correlation

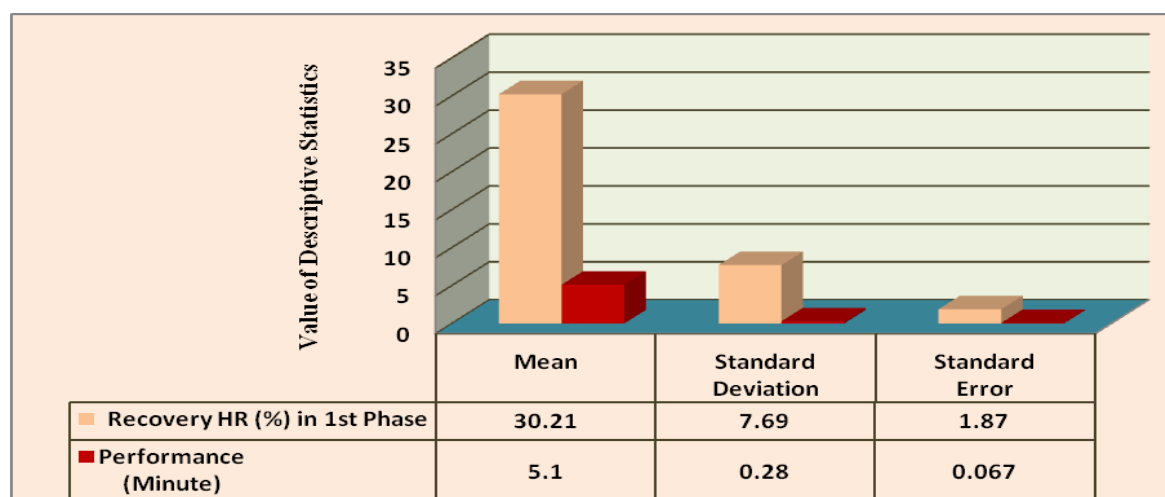


Fig-1: Graphical Presentation of Descriptive Analysis of Recovery Heart Rate in 1st Phase and Performance Level Over 1500mt. Run

**TABLE 3**  
**SUBJECT CHARACTERISTICS REGARDING RECOVERY HEART RATE IN 2ND PHASE**  
**AND PERFORMANCE LEVEL OVER 1500MT. RUN AND RATIO OF**  
**ASSOCIATION BETWEEN THEM**

Name of the Variables	Mean	Standard Deviation	Standard Error	Highest Score	Lowest Score	'r' Ratio
Recovery Heart Rate in 2nd Phase (%)	48.43	±8.08	1.96	63.16	33.33	-0.39
Performance(Minute)	5.1	±0.28	0.067	5.65	4.62	

Insignificant at .05 level.

$r_{.05}(15) = 0.482$

Table-3 depicts the value of mean and standard deviation of recovery heart rate in 2nd phase were 48.43 ±8.08 and  $SE_M$  was 1.96 as characteristics of middle distance athletes. In performance level over 1500mt. run, mean and standard deviation of subjects were 5.1 ±0.28 with  $SE_M$  0.067. The above table also indicates that an inverse insignificant relationship was found between recovery heart rate in 2nd phase and performance of tribal athletes as the value of coefficient of correlation ( $r = 0.39$ ) was lesser than the tabulated value ( $r(15)=0.482$ ) at 0.05 level. Just like the previous interpretation, here we can also conclude that as 1500mt. run has an inverse relation with performance, the revealing correlation which indicated inversely insignificant was actually existed as a positive insignificant relationship between recovery heart rate in 2nd phase and Performance. The strength of relationship was low between them.

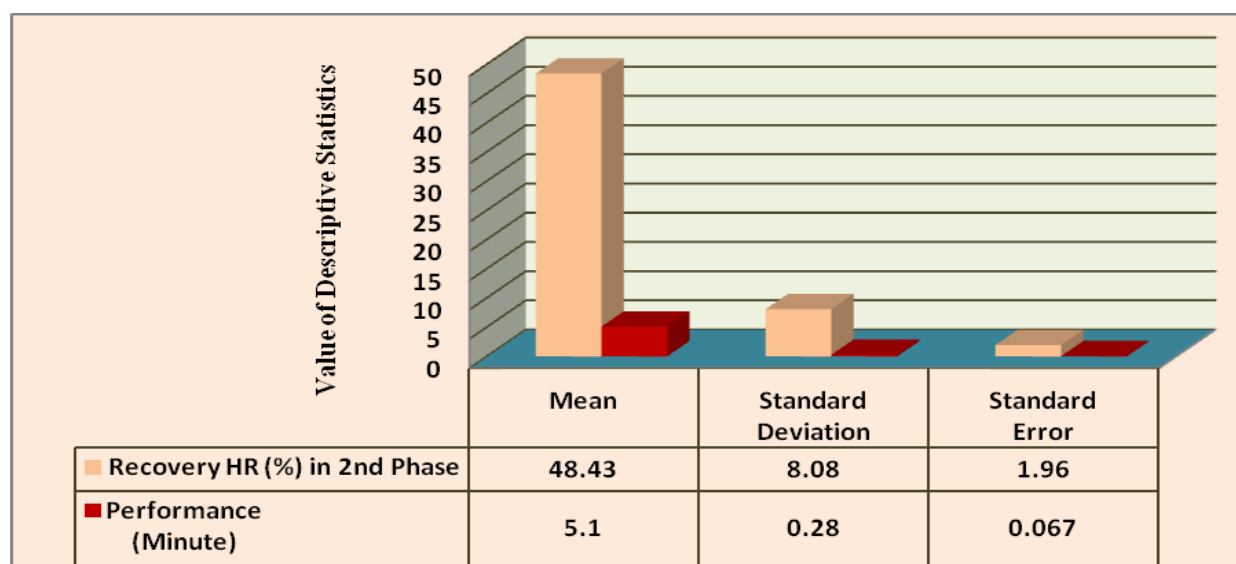


Fig-2: Graphical Presentation of Descriptive Analysis of Recovery Heart Rate in 2nd Phase and Performance Level Over 1500mt. Run



**TABLE 4**  
**SUBJECT CHARACTERISTICS REGARDING RECOVERY HEART RATE IN 3RD PHASE**  
**AND PERFORMANCE LEVEL OVER 1500MT. RUN AND RATIO OF**  
**ASSOCIATION BETWEEN THEM**

Name of the Variables	Mean	Standard Deviation	Standard Error	Highest Score	Lowest Score	'r' Ratio
Recovery Heart Rate in 3rd Phase (%)	63.07	±9.57	2.32	77.78	44.44	-0.407
Performance(Minute)	5.1	±0.28	0.067	5.65	4.62	

Insignificant at .05 level.

$r_{.05(15)} = 0.482$

It can be observed in table no.4 that the descriptive analysis as mean and standard deviation of recovery heart rate in 3rd phase were 63.07 ±9.57 and  $SE_M$  was 2.32. The value of mean and standard deviation of performance level over 1500mt. run were 5.1 ±0.28 and  $SE_M$  was 0.067. It also reflects that there was a negative insignificant relationship of recovery heart rate in 3rd phase with performance of middle distance athletes as calculated value ( $r = 0.407$ ) was lesser than tabulated value ( $r(15) = 0.482$ ) at 0.05 level of significance. But on the basis of the inverse relationship of 1500mt. run with performance, the nature of relationship was transformed into reverse. So a conclusion can be drawn that recovery heart rate in 3rd phase and performance were positively associated with each other and the relationship was categorically moderate.

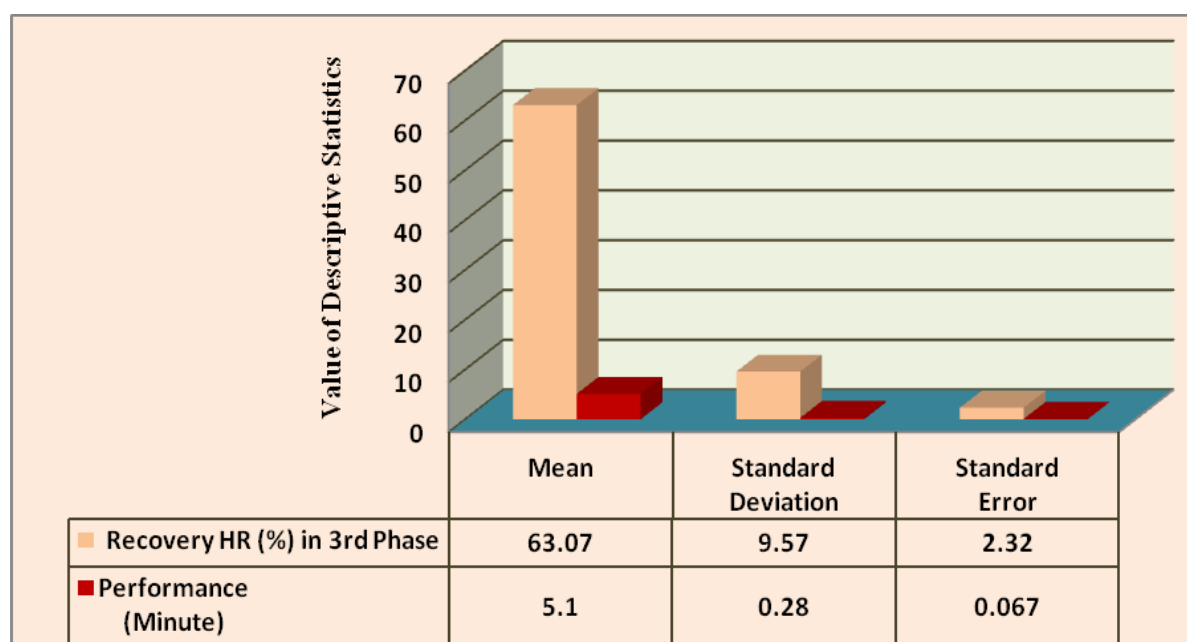


Fig-3: Graphical Presentation of Descriptive Analysis of Recovery Heart Rate in 3rd Phase and Performance Level Over 1500mt. Run

#### 4. DISCUSSION

The findings on the basis of the results revealed that no significant association were found in relation to every phases of recovery heart rate with performance of middle distance athletes.

Results of the present study related to recovery heart rate and performance clearly showed that recovery heart rate of all the three phases were not significantly associated with performance level of middle distance tribal athletes, even a positive relation existed between them in relation to every phase. But their degree of association were not been lie in same category as in 1st phase 'r' was -0.104, in 2nd phase 'r' was -0.39 and in last i.e. 3rd phase 'r' was -0.407 respectively showed in table no. 1,3 & 4. The researcher minutely observed from the findings that the results of these three phases reflected as time passes in recovery period after exercise the recovery heart rate become more associated with performance level. Although its a true fact that different degrees of intensity of exercise would result in diverse types of heart rate recovery. After moderate or heavy exercise, the recovery pattern is characterized by two distinct phases, an initial exponential drop followed by a slower decline to resting level (Darr et al., 1988).

Du et al. (2005) noted after his experiment that endurance training significantly improved heart rate recovery and suggested that faster heart rate recovery after exercise resulted due to higher aerobic capacity. Another cross sectional study done by Vlatko et al. (2011) which demonstrated that the aerobic capacity was moderately, but significantly correlated with the kinetics of heart rate recovery that could be of particular interest for athletes. The current result also depicted the same fact that better performance in middle distance running positively influenced by the faster heart rate recovery.

Heart rate recovery after exercise depends on several factors: the intensity of exercise, the cardio-respiratory fitness, cardiac autonomic nervous system modulation, hormones changes and baroreflex sensitivity (Du, et al., 2005). During rest, the heart rate is lowered to a resting rate via muscarinic activation by acetylcholine through reactivation of the vagal nerve by the parasympathetic nervous system (Borresen and Lambert, 2008). Physical training was shown to increase cardiac vagal tone (Levy et al., 1998) and to accelerate HR recovery after exercise (Darr, et al., 1988),

Heart rate recovery depends on the relationship between parasympathetic and sympathetic nervous activity (Borresen and Lambert, 2008). Post-exercise decreases in heart rate likely reflect both sympathetic withdrawal and parasympathetic reactivation which helps the body to return in resting state (Imai, et al 1994). After high levels of exercise during which sympathetic stimulation dominates, the sympathetic drive may continue well into the recovery phase and contribute to sustained tachycardia despite the re-activation of the parasympathetic system. This would alter or delay the first order exponential decay that can be applied to heart rate recovery (Pierpont, et al 2000). In current study, this could be the reason behind the slight relationship found in 1st phase between recovery heart rate and performance level in comparison to other phases.

Heart rate recovery was shown to be faster in athletes, who had a higher aerobic capacity than non-athletes (Darr, et al., 1988). Heart rate recovery influences the predominant aerobic and anaerobic metabolic demands on heart rate responses after exercise. Among the athletes of different metabolic demands, those engaged in continuous endurance sports like long distance and middle distance runners have faster heart rate

recovery after maximal exercise than the sprinters (Vlatko, et al., 2011). Vlatko, et al. (2011) suggested based on his experiment that athletes competing in running events with predominantly aerobic metabolic demands are likely to have lower maximum heart rate and faster heart rate recovery. In this account, it can be concluded that a linear relationship may exist between recovery heart rate and middle distance athletic performance. Hence, in this investigation, recovery heart rate in 3<sup>rd</sup> phase tends to be significant as the value of correlation coefficient is closer to be significant.

## 5. CONCLUSION

Recovery heart rate was not proved as a significant factor in case of all the three phases for higher performance in middle distance running. Although performance level was positively influenced by recovery heart rate. As the result of present study, at initial stage immediate after completion of activity, recovery heart rate had less impact on performance. But as the time passes in recovery period immediate after exercise, recovery heart rate was indicated greater association with performance level.

## REFERENCES

- Borresen, J., & Lambert, M. I. (2008).** Autonomic control of heart rate during and after exercise. *Sports medicine*, 38(8), 633-646.
- Darr, K. C., Bassett, D. R., Morgan, B. J., & Thomas, D. P. (1988).** Effects of age and training status on heart rate recovery after peak exercise. *American Journal of Physiology-Heart and Circulatory Physiology*, 254(2), H340-H343.
- Du, N., Bai, S., Oguri, K., Kato, Y., Matsumoto, I., Kawase, H., & Matsuoka, T. (2005).** Heart rate recovery after exercise and neural regulation of heart rate variability in 30-40 year old female marathon runners. *Journal of sports science & medicine*, 4(1), 9.
- Imai, K., Sato, H., Hori, M., Kusuoka, H., Ozaki, H., Yokoyama, H. & Kamada, T. (1994).** Vagally mediated heart rate recovery after exercise is accelerated in athletes but blunted in patients with chronic heart failure. *Journal of the American College of Cardiology*, 24(6), 1529-1535.
- Lamberts, R. P., Swart, J., Noakes, T. D., & Lambert, M. I. (2009).** Changes in heart rate recovery after high-intensity training in well-trained cyclists. *European journal of applied physiology*, 105(5), 705-713.
- Pierpont, G. L., Stolpman, D. R., & Gornick, C. C. (2000).** Heart rate recovery post-exercise as an index of parasympathetic activity. *Journal of the autonomic nervous system*, 80(3), 169-174.
- Vlatko, V., Tomislav, D., & Davor, S. (2011).** Heart rate recovery after a graded exercise test in sprinters, middle distance, long distance and 400m runners.



## EFFECT OF AEROBIC AND ANAEROBIC TRAINING ON PLATELET COUNT OF MIDDLE DISTANCE RUNNERS

Biswabandhu Nayek<sup>1</sup> and Dr. Malay Kumar Mukhopadhyay<sup>2</sup>

### Affiliations:

- <sup>1</sup> Ph. D. Scholar, West Bengal State University, Barasat, West Bengal, ( India)  
email-bandhu992@gmail.com
- <sup>2</sup> Asst. Professor, P.G.G.I.P.E, Banipur, North 24 Pgs. West Bengal (India)

### ABSTRACT

Aerobic or anaerobic training programmed has influence on the blood hematology on human body. There is every possibility to differ in the blood hematology of human due to any kind of training. Some studies indicated such changes. With this concept the researcher fixed up the purpose to determine the Effect of Aerobic and Anaerobic Training on Platelet Count of Middle Distance Runners. Fifteen middle distance runners (N=15) were selected as subjects and their age group ranging from eighteen to twenty two years for achieving the objectives. The experimental group was given aerobic and anaerobic exercises as treatment for three days in a week in one session per day for twenty six (26) weeks. In the present study Platelet Count were measured in the SERUM Analysis Centre (P) Ltd laboratory at the beginning of the training (baseline data, BD) and at the end of each training phase (Preparatory Phase-I (PP-I) for 12 weeks, Preparatory Phase-II (PP-II) for 5 weeks, Competitive Phase-I (CP-I) for 5 weeks, Competitive Phase-II (CP-II) for 4 weeks. 5 milliliters of venous blood from right/left upper arm was collected for testing. The study was performed in (10/07/2017 to 07/01/2018) 90 minutes of all 78 training units were administered and supervised by the same instructor. The training programmed was scheduled at 7.00 am to 8.30 am each test was scheduled at the morning time of day (8.00am to 9.00am) analysis of variance (ANOVA) to determine the differences, if any, among the groups on selected Hematological variables during preparation to competitive period of middle distance runners. Whenever they obtained 'F' ratio was found to be significant the LSD test was applied as a post hoc test to find out the paired mean differences, if any. The 0.05 level of confidence was fixed as the level of significance. The result revealed that there was significant difference on Platelet Count on different phase.

**Keywords:** Aerobic exercises, anaerobic exercise, hematology, Training phase, Platelet Count

## 1. INTRODUCTION

Modern sports is influenced by various physical, Physiological, sociological and psychological, Bio-chemical factors. Besides good physique and physical fitness of the athlete, more importance is laid on the development of various types of motor skills embroiled in the game as well as on teaching the strategies, techniques and tactics of the game during training. Now-a-days athletes face some unique challenges. The standards are higher, the competition is tougher and the stakes are greater. Among the best, physical formulation is more complete and the psychological component is more vital than ever before.

Training fluctuation is increasingly acknowledged as serving a key function in flourishing training prescriptions. Periodization offers a framework for planned and organized variation of training parameters, in a way that directs physiological version to the training goals required of the sport.

The event 800 meters is combined with aerobic endurance, anaerobic conditioning, and sprint speed. Both the aerobic and anaerobic systems are being taxed to a high extent, thus the 800-meter athlete is required to combine training between both systems with a different training plan. The 800-meter event is also famed for its tactical racing techniques. Because the 800 meter is the shortest event that has all the runners fitting on lane one, positioning on the cut-ins is captious to the outcome of the race. Two demotic tactics for the 800 meters are running a negative split or a positive split between laps. The positive split is broad reckoned to be the more efficacious strategy, but on juncture, content runners have been known to use a negative split to their advantage. A positive split is accomplished by running the first lap faster than the second lap, and a negative split is accomplished by the opposite, running the second lap faster than the first.

Platelets represent the smallest formed elements of blood. They are a nucleate cell with a life-span of 7–10 days and contain a variety of intracellular organelles, including different types of secretary granules.

Activation of platelets, finally resulting in platelet de-granulation and aggregation, is indispensable for homeostasis and can be triggered by different circumstantial platelet- stimulating mediators as well as by shear and oxidative stress.

As blood platelets are of central grandness to the procedure of homeostasis and coagulation, abnormalities in platelet utility result in severe and latent lethal consequences. In Principle, stimulation of platelets contiguous results in platelet aggregation and subsequent thrombus formation—however, these consequences of platelet activation can to some extent be antagonized by functional endothelium, pointing to a critical role of endothelium-derived mediators that antagonize platelet in this process. However, as treated platelets compromise endothelial use, the situation is complex

The importance of platelets to the development of the atherosclerotic disease is apparent from the fact that platelet activation is associated with accelerated atherosclerosis and correlates with the severity of this disease in humans. An insertion of actuating platelets exacerbate the formation of native atherosclerotic lesions and a change in systemic platelet stimulation has been described for a variety of atherosclerotic diseases reckon coronary artery disease and cardio-vascular disease. While the in vitro arrangement of platelet sensibility in different settings might consider

the final issue of platelet energizing, measurement of in vivo platelet energizing calculate on more subtle parameters.

As antithetic pathways of platelet stimulation might result in distinct patterns of "platelet activation markers," studies necessitate the cerebration of several aspects of platelet stimulation for a final interpretation of obtained results. The purpose of the study was to compare the Effect of aerobic and anaerobic Training on Platelet Count of Middle Distance Runners

## **2. METHODOLOGY**

### **2.1 Selection of Subjects**

For the purpose of the study Fifteen (15) male Districts level Middle Distance Runners were selected purposively from Rural Athletic Develop Academy, Bongaon, North 24 Porganas, West Bengal, India and their age was 18 to 22 years.

### **2.2 Training Procedure**

The Middle Distance Runners underwent aerobic and anaerobic exercises for one hour thirty minutes per day (1hour 30 minutes) three alternate days a week for the period of 26 weeks. To compare the Platelet Count were measured in the laboratory at the beginning of the training (baseline data, BD) and at the end of each training phase (Preparatory Phase-I (PP-I) for 12 weeks, Preparatory Phase-II(PP-II) for 5 weeks, Competitive Phase-I (CP-I) for 5 weeks, Competitive Phase-II (CP-II) for 4 weeks. 5 milliliters of venous blood from right/left upper arm was collected for testing. The study was performed in (10/07/2017to07/01/2018)90 minutes of all 78 training units were administered and supervised by the same instructor. The training programmed was scheduled at 7.00 am to 8.30 am Each test was scheduled at the morning time of day (8.00am to 9.00am) in order to minimize the effect of diurnal variation. All the experiments were performed at  $25 \pm 1^{\circ}\text{C}$ , with relative humidity of 60 - 65%. The subjects were informed about the possible complications of the study and gave their consent.

### **2.3 Laboratory Methods**

Platelet Count was taken from blood sample of each subject and it was tested by electronic method and result was recorded in cells/ cubic millimeter (cells/cu.mm).

### **2.4 Training Protocol**

A 26 week training programmed aimed at (18-22 year olds) district level middle distance Male athletes who would be expected in the morning between 7.00 am-8.30am for three alternate days a week.

While framing the Training Protocol the following Principles of sports training was followed.

They were statistically analyzed by using the analysis of variance (ANOVA) to determine the differences, if any, among the groups on Platelet Count of Middle Distance Runners. Whenever they obtained 'F' ratio was found to be significant the LSD test was applied as a post hoc test to find out the paired mean differences, if any. The 0.05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of variance, which was considered as an appropriate.

- 1 Principles of continuity in long-term
2. Principles of progression of load
3. Principles of variation in load
4. Principles of load and adaptation
5. Optimum Load as per the individual capacity
6. Density between two training session

7. Principles of general and specific load
8. Principles of proper ratio between intensity and volume
9. Load was administered through Training Cycle.

### 2.5 Statistical Analysis

They were statistically analyzed by using the analysis of variance (ANOVA) to determine the differences, if any, among the groups on Platelet Count of Middle Distance Runners. Whenever they obtained 'F' ratio was found to be significant the LSD test was applied as a post hoc test to find out the paired mean differences, if any. The 0.05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of variance, which was considered as an appropriate.

## 2. RESULTS

**TABLE 1**  
**TABULAR PRESENTATION OF DATA IN RESPECT OF PLATELET COUNT AMONG**  
**DIFFERENT TRAINING PHASES OF MIDDLE DISTANCE RUNNERS**

Phase	Mean (cells/cu.mm)	Standard Deviation	Standard Error	Minimum Value	Maximum Value	df	"F"- Ratio
Initial Phase	166800.00	22252.44	5745.55	115000.00	218000.00	4	6.139*
Preparatory Phase-I	172666.66	10634.62	2745.84	150000.00	190000.00	70	
Preparatory Phase-II	176600.00	16745.14	4323.57	148000.00	218000.00		
Competitive Phase-I	179200.00	14178.45	3660.86	160000.00	210000.00		
Competitive Phase-II	198266.66	25248.66	6519.17	176000.00	250000.00		

\*Significant at 0.05 level,  
F<sub>0.05(4,70)</sub> = 2.50

It was evident from the table-1 that Mean (Mn) ± Standard Deviation (SD) in respect of Platelet Count Initial Phase, Preparatory Phase-I, Preparatory Phase-II, Competitive Phase-I and Competitive Phase-II were respectively 166800.00± 22252.44, 172666.66± 10634.62, 176600.00± 16745.14, 179200.00± 14178.45, 198266.66± 25248.66 Minimum Value and Maximum value in respect of Platelet Count during Initial Phase, Preparatory Phase-I, Preparatory Phase-II, Competitive Phase-I and Competitive Phase-II were respectively 115000, 150000, 148000, 160000, 176000 and 218000, 190000, 218000, 210000, 250000.

The calculated "F" value (6.139) was found to be statistically significant [F<sub>0.05</sub> (4,70) < 6.139] at 0.05 level of confidence. In order to find out the exact location of differences in means LSD test was applied as a Post-hoc test and have been presented in Mean value and Standard Deviation in respect of Platelet Count during Initial Phase, Preparatory Phase-I, Preparatory Phase-II, Competitive Phase-I and Competitive Phase-II have been presented graphically.

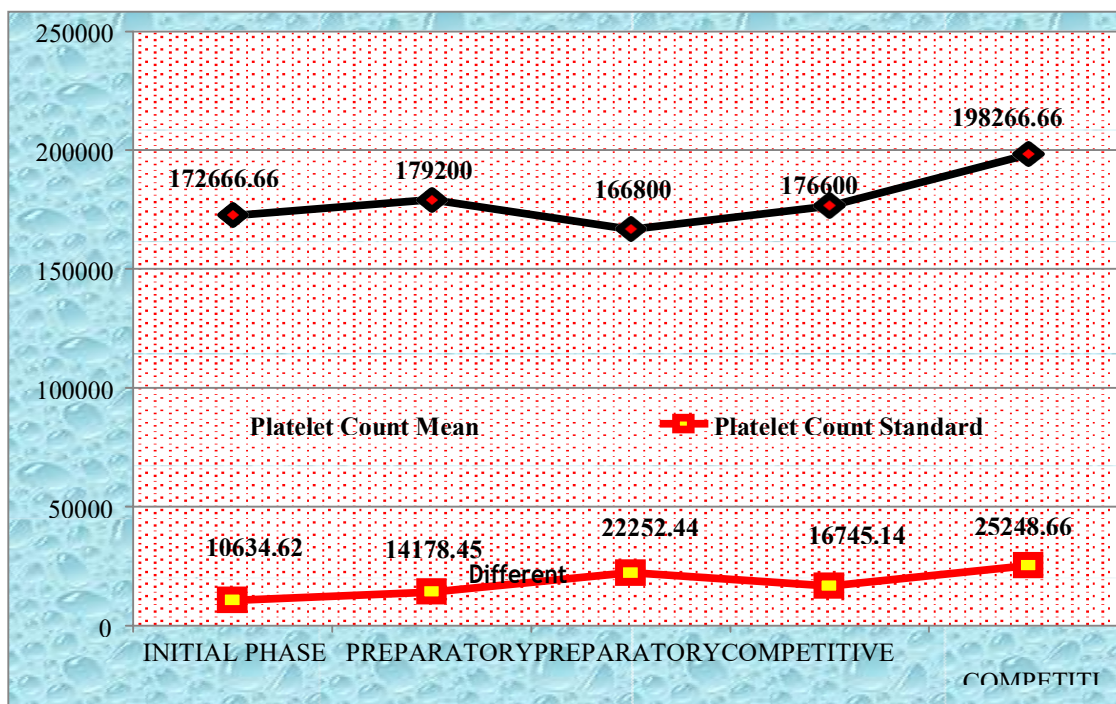


Figure- 1:- Mean, Standard Deviation on Platelet Count among Different Training Phase of Middle Distance Runners.

**TABLE 2**  
**ANALYSIS OF CRITICAL DIFFERENCE ON DIFFERENT TRAINING PHASE OF PLATELET COUNT OF MIDDLE DISTANCE RUNNERS**

Phase Compared	Mean(cells /cu. mm)	Mean Difference	Critical Difference
Initial Phase and Preparatory Phase-I	166800 172666.66	5866.66	13437.53
Initial Phase and Preparatory Phase-II	166800 176600	9800.00	13437.53
Initial Phase and Competitive Phase-I	166800 179200	12400	13437.53
Initial Phase and Competitive Phase-II	166800 198266.66	31466.66*	13437.53
Preparatory Phase-I and Preparatory Phase-II	172666.66 176600	3933.34	13437.53
Preparatory Phase-I and Competitive Phase-I	172666.66 179200	6533.34	13437.53
Preparatory Phase-I and Competitive Phase-II	17266.66 198266.66	25600*	13437.53
Preparatory Phase-II and Competitive Phase-I	176600 179200	2600	13437.53
Preparatory Phase-II and Competitive Phase-II	176600 198266.66	21666.66*	13437.53
Competitive Phase-I and Competitive Phase-II	179200 198266.66	19066.66*	13437.53

\* Significant at .05Level.

It was evident from the Table no-14 there was significant difference between Initial Phase and Competitive Phase-II, Preparatory Phase-I and Competitive Phase-II, Preparatory



Phase-II and Competitive Phase-II, Competitive Phase-I and Competitive Phase-II. It also reflects that Initial Phase and Competitive Phase-II are showed higher significant result.

#### 4. DISCUSSION

Platelets count of Middle Distance Runners when comparing base line data with that of the Preparatory Phase-I, Preparatory Phase-II, Competitive Phase-I and Competitive Phase-II was significantly increased of Middle Distance Runners. The main finding of this study is showed that (Table no-2) there was significant difference between Initial Phase and Competitive Phase-II, Preparatory Phase-I and Competitive Phase-II, Preparatory Phase-II and Competitive Phase-II, Competitive Phase-I and Competitive Phase-II. It also reflects that (Table no-14) Initial Phase and Competitive Phase-II is showed higher significant result. The reasons of consistency may be duration of exercise, exercise intensity, exercise type, exercise protocol nature, severity which reflect in the study (Sadeghi et.al., 2014). Platelets are made in controlled, stimulated production conditions. The number of platelets will be increased during sports, because of fresh platelet release originating in spleen vessels, bone marrow, and some other platelet supply in the body. Epinephrine release will cause strong contraction of the spleen, where there is nearly one-third of all saved platelets of the body. This mechanism can justify the reasons of increase of platelets in sports. In addition in extreme steps of platelet activation, such kinds of increases can be caused by formation changes in megakaryocytic components of the cytoplasm (Wu, et.al., 2004; Karakoc, et.al., 2005). There is no consensus on the effects of exercises on platelet concentration and symptoms of platelet activation. (Ahmadizad, et. al., 2010) found a significant increase in the platelet count of anaerobic exercise. It has been reported that platelet secretion increases by increasing the secretion of epinephrine during high-intensity interval training. Platelet function is directly and indirectly affected by physical activity. In this regard, several mechanisms and cell/tissue types are supposed to contribute to the observed effects. Acute exercise results in increased levels of catecholamine as well as increased shear and oxidative stress, all of which are known to activate platelets. This is especially relevant as artery blood flow and shear rate increase in parallel to exercise intensity (Thijssen, et.al., 2009) while enhanced shear tends to activate platelets, it also stimulates the endothelial production of nitric oxide. Endothelial nitric oxide affects bypassing platelets (thereby counteracting their activation) as well as vascular smooth muscle cells in the medial layer of the artery. The latter results in vessel dilation and, consequently, increased blood flow at lower shear. Similar findings were also noted by some researchers (Ahmadizad and El-Sayed, 2003; Lekakis, et.al., 2008; Singh, et. Al., 2006)

#### REFERENCES

- Ahmadizad, S. A. J. A. D., & El-Sayed, M. S. (2003).** The effects of graded resistance exercise on platelet aggregation and activation. *Medicine and science in sports and exercise*, 35(6), 1026-1032\
- Ahmadizad, S., El-Sayed, M. S., & MacLaren, D. P. (2010).** Effects of time of day and acute resistance exercise on platelet activation and function. *Clinical hemorheology and microcirculation*, 45(2-4), 391- 399.
- Karakoc, Y., Duzova, H., Polat, A., Emre, M. H., & Arabaci, I. (2005).** Effects of training period on haemorheological variables in regularly trained footballers. *British journal of sports medicine*, 39(2), e4-e4

- Lekakis, J., Triantafyllidi, H., Galea, V., Koutroumbi, M., Theodoridis, T., Komporozos, C., & Kremastinos, D. T. (2008).** The immediate effect of aerobic exercise on haemostatic parameters in patients with recently diagnosed mild to moderate essential hypertension. *Journal of thrombosis and thrombolysis*, 25(2), 179-184.
- Sadeghi, E., Omid, M., Yousefi, M., & Rahimi, A. (2014).** The Impact of One Aerobic and Resistance Training Session on Some Hematological Responses of Non-Athlete Male. *Indian Journal of Fundamental and Applied Life Sciences*, 4(4), 2667-2672.
- Singh, I., Quinn, H., Mok, M., Southgate, R. J., Turner, A. H., Li, D., ...& Hawley, J. A. (2006).** The effect of exercise and training status on platelet activation: Do cocoa polyphenols play a role?. *Platelets*, 17(6), 361-367.
- Thijssen, D. H., Dawson, E. A., Black, M. A., Hopman, M. T., Cable, N. T., & Green, D. J. (2009).** Brachial artery blood flow responses to different modalities of lower limb exercise. *Med Sci Sports Exerc*, 41(5), 1072-9.
- Wu, H. J., Chen, K. T., Shee, B. W., Chang, H. C., Huang, Y. J., & Yang, R. S. (2004).** Effects of 24 h ultra-marathon on biochemical and hematological parameters. *World journal of gastroenterology: WJG*, 10(18), 2711.



## **EFFECT OF HIIT & SET TRAINING ON REPEATED SPRINT ABILITY OF FOOTBALL PLAYERS**

**Mr. Gopal Mondal<sup>1</sup> and Dr. Sentu Mitra<sup>2</sup>**

### **Affiliations:**

<sup>1</sup> Ph.D Research Scholar , Dept. of Physical Education, Visva-Bharati, Santiniketan, WB Email. gopalmondal76@gmail.com, Contact. no. 9836584183

<sup>2</sup> Assistant Professor, Dept. of Physical Education, Visva-Bharati, Santiniketan, WB Email. sentu.mitra81@gmail.com, Contact no.9476355642

---

### **ABSTRACT**

The objective of the study was to find out the effect of HIIT & SET training on repeated sprint ability of football players. For the purpose of study seventy five male district level football players, aged between 18-25 years, were randomly selected from Birbhum, WB. Twenty five were randomly selected for high intensity interval training (HIIT) group, twenty five were randomly selected for SET group and twenty five were selected as the control group for the study. Repeated sprint ability was considered as the variable for the study. Eight weeks high intensity interval training (HIIT) and SET training were administered to the experimental group. The data was computed by descriptive statistics, ANCOVA and LSD post-hoc test were used for the analysis of the data. The result of the study revealed that the HIIT group significantly improves the repeated sprint ability.

**Key Word:** HIIT training, SET training, Repeated sprint ability Football players

---

## 1. INTRODUCTION

Football is the most popular sport in the world and is performed by men and male, children and adults with different levels of expertise. Football performance depends upon a variety of factors such as technical/biomechanical, tactical, mental and physiological areas. As the game is played for long time (ninety minutes or more) the aerobic capacity plays a major role in giving best performance throughout the game time. Repeated sprint ability is one of the key factor for the aerobic capacity of the players. Therefore the researcher showed interest to do the research on the effect of HIT & SET training on repeated sprint ability of football players. Soccer is a sport which requires a unique combination of anaerobic and aerobic fitness. That is, elite level soccer players must possess speed and jumping power, as well as aerobic endurance and recovery, similar to elite track and field athletes. The sport also requires a significant amount of very specific movements, including accelerating/decelerating, cutting and turning, backwards and lateral movements, plus of course all of the technical movements involving the ball. With all of these unique physical requirements, designing physical training programs for soccer players can be a difficult task. After all, focusing too much training time on speed and power training can negate improvements in aerobic fitness, and too much time spent on improving aerobic fitness can cause a decrease in speed and power. One unique way to target the two different energy systems (anaerobic and aerobic) used in the sport simultaneously, while also providing a specific and relevant stimulus to the muscular system through soccer-specific movements, is to use on-field speed endurance training. Several recent research studies, including **Iaia & Bangsbo (2010)**, **Iaia et. al. (2009)**, and **Skovgaard et. al. (2014)**, have demonstrated that speed endurance training can elicit significant improvements in markers of anaerobic and aerobic fitness in running athletes and soccer players.

The contemporary way of soccer playing requires from the athletes to maximize their performance which is consisted by factors such as the physical conditioning, the technical tasks, the team tactics and the psychological parameters (**Eklblom, 1986; Balsom, 1994**). Specifically in physical conditioning, the intensity, the volume and the rest periods are important components of the soccer annual training plan both in top-level as well as in amateur players (**Wenger & Bell, 1986**).

In addition, it could be beneficial for the coaching procedures to work simultaneously on the player's technique as well as on the team tactics during the conditioning training especially in top-level soccer players, (Reilly, 2005). An improvement in the players' VO<sub>2</sub>max was recorded for the first time in a 6-week program of high intensity bouts and short durations of rest intervals (**Tabata et al., 1996**). During the competitive season, additionally to the normal team program, a high intensity 10-week interval training protocol increased the players' aerobic capacity resulting in an important improvement of the overall team competitive performance (**Dupont, Akakpo & Berthoin, 2004**). Top soccer players do not necessarily have an extraordinary capacity in any of the areas of physical performance. Soccer training is largely based on the game itself, and a common recruitment pattern from player to coach and manager reinforces this tradition.

The aim of the study was to find out the effect of HIIT & SET training on repeated sprint ability of football players.

## 2. METHODOLOGY

For the purpose of study seventy five male district level football players, aged between 18-25 years, were randomly selected from Birbhum, WB. Among them twenty five were randomly selected for high intensity interval training (HIIT) group, twenty five selected as SET group and twenty five were selected as active control group for the study. Repeated sprint ability was considered as the variable for the study. Eight weeks high intensity interval training (HIIT) and SET training were administered to the experimental group. The data was computed by descriptive statistics, ANCOVA and LSD post-hoc test were used for the analysis of the data. The result of the study revealed that the HIIT group significantly improve the repeated sprint ability.

### 2.1 Selection of Subjects

For the purpose of study seventy five male district level football players, aged between 18-25 years, were randomly selected from Birbhum, WB. Among them twenty five were randomly selected for high intensity interval training (HIIT) group, twenty five selected as SET group and twenty five were selected as active control group for the study.

### 2.2 Test and Criterion Measure:

Repeated sprint ability was considered as the variable for the study. It was tested by an expert Pathlogician and the data was recorded in mt.

### 2.3 Design of the Study:

Pre test- post test randomized group design was used for the study. Pre test data was collected from both the groups (experimental and control group) before administering the experiment to the experimental group. Then the high intensity interval training programme was applied to the experimental group three alternate days per week for 8 weeks. The control group was not given any treatment during this 8 weeks. Immediately after completion of the experiment the post data were collected from both the experimental and control group.

### 2.4 Statistical Analyses

For determining the effect of the HIIT training and SET training, descriptive statistics , ANCOVA and LSD post-hoc test were used for the analysis of the data.

## 3. RESULT

The findings pertaining to the study are presented in table-1, 2 and 3 and Graph-1.

Table-1: Descriptive Statistics of RSA of different Groups						
Treatment Group	Groups	Minimum Value (sec)	Maximum Value (sec)	Mean (sec)	Std. Error	Std. Deviation
HIIT Group	Pre-Test	6.09	6.186	6.14	0.01	0.03
	Post-Test	6.06	6.121	6.08	0.01	0.03
SET Group	Pre-Test	6.063	6.286	6.15	0.01	0.06
	Post-Test	6.06	6.173	6.09	0.01	0.03
Control Group	Pre-Test	6.09	6.205	6.14	0.01	0.03
	Post-Test	6.011	6.161	6.12	0.01	0.05

Table-1 describes the mean (M), standard deviation (SD), Maximum value (Max.) and Minimum Value (Min.) scores of subjects in RSA of the HIIT, SET and AC group. In the pre test phase, the mean of HIIT group, SET group and AC group were 6.14sec, 6.15sec, and 6.14sec respectively. The post test mean of HIIT group, SET group and AC group were 6.08sec, 6.09sec, and 6.12sec respectively. The standard deviation for pre-test phase of HIIT group, SET group and AC group were 0.03, 0.06 and 0.03 respectively. The post test standard deviation for HIIT group, SET group and AC group were 0.03, 0.03 and 0.05. The Maximum value for HIIT group in pre test phase was 6.186sec. Whereas the Minimum value was 6.09. For the SET group the Maximum value in pre test was 6.286sec where as the Minimum value was 6.063sec. The Maximum value for AC group in pre test phase was 6.205sec where as the Minimum value was 6.09sec. In the post test phase for HIIT group the Maximum value was 6.121sec and the Minimum value was 6.06sec, for SET group the Maximum value was 6.173sec and the Minimum value was 6.06sec, and for the AC group the Maximum value was 6.161sec and the Minimum value was 6.011sec.

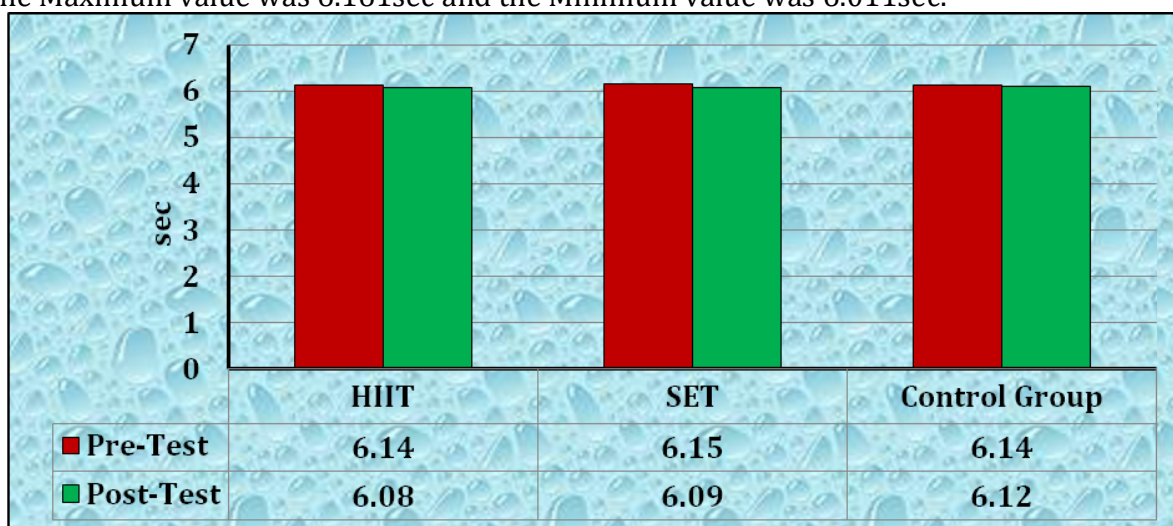


Figure 1: Graphical Representation of Pre-Test & Post-Test Mean for Distinct Treatment Groups on RSA

Source	df	Sum of Squares	Mean Square	F-value
Treatment Group	2	0.017	0.008	6.064*
Error	71	0.099	0.001	
Total	73	0.116		

Table value of F (2,71) = 3.13 \*. Significant at the .05 level

Table 2 reveals the significant improvement (F=6.064) among the HIIT Group, SET group and AC group. Whereas no significant difference seen in both experimental group. The obtained F value 6.064 was found to be greater than that of tabulated F value 3.13 at 0.05 level of significance with 2, 71 degree of freedom.

HIIT	SET	Control Group	Mean Difference	Critical Difference
6.08	6.09		0.01	0.021
6.08		6.12	0.04*	
	6.09	6.12	0.03*	
*. The mean difference is significant at the .05 level				

Table 3 in the paired adjusted final mean differences in repeated sprint ability (RSA) clearly indicates significant differences between high intensity interval training group(HIIT) and active control group(MD- 0.04) and between speed endurance training group (SET) and active control group (MD-0.03) where as the CD was 0.021.

#### 4. DISCUSSION

The result of the study is supported by the study of **Matteo Fiorenza et al (2015)** worked on The Effect of Two Speed Endurance Training Regimes on Performance of Soccer Players and concluded that two training strategies target different determinants of soccer-related physical performance. SEP improved repeated sprint and high-intensity intermittent exercise performance, whereas SEM increased muscles' ability to maximize fatigue tolerance and maintain speed development during both repeated all-out and continuous short-duration maximal exercises. These results provide new insight into the precise nature of a stimulus necessary to improve specific types of athletic performance in trained young soccer players

#### 5. CONCLUSION

On the basis of the result of the study, it may reasonably be concluded that high intensity interval training (HIIT) and Speed endurance training (SET) improve Repeated Sprint Ability of football players.

#### REFERENCES

- Balsom, P. (1994).** Evaluation of physical performance.In: Football (Soccer).Oxford: Blackwell Scientific.
- Dupont, G., Akakpo, K. & Berthoin, S. (2004).** The effect of in-season, high-intensity interval training in soccerplayers. Journal of Strength & Conditioning Research,18(3), 584-589
- Eklblom E. (1986).** Applied physiology of soccer. Sports Medicine, 3, 50-60
- Fiorenza, Matteo., Millet, G. P. and Bangsbo, Jens et al. (2015),** Effects of two different anaerobic training regimes on various types of soccer-related exercise performances. Published: September 22, 2015 ,<https://doi.org/10.1371/journal.pone.0138096>
- Iaia FM & Bangsbo J (2010).** Speed endurance training is a powerful stimulus for physiological adaptations and performance improvements of athletes. Scand J Med Sci Sports 20, 11-23.
- Iaia FM, Hellsten Y, Nielsen JJ, Fernström M, Sahlin K & Bangsbo J (2009).** Four weeks of speed endurance training reduces energy expenditure during exercise and maintains muscle oxidative capacity despite a reduction in training volume. J Appl Physiol 106, 73-80.

- Reilly, T. (2005).** An ergonomics model of soccer training process. *Journal of Sports Sciences*,23(6), 561-572.
- Skovgaard C, Christensen PM, Larsen S, Andersen TR, Thomassen M & Bangsbo J (2014).** Concurrent speed endurance and resistance training improves performance, running economy, and muscle NHE1 in moderately trained runners. *J Appl Physiol* 117, 1097-1109.
- Tabata, I, Nishimura, K., Kouzaki, M., Hirai, Y., Ogita, F., Miyachi, M. & Yamamoto, K. (1996).** Effects of moderate-intensity endurance and high-intensity intermittent training on anaerobic capacity and VO<sub>2</sub>max. *Medicine and Science in Sports and Exercise*, 28, 1327-1330
- Wenger, H. & Bell, G. (1986).** The interactions of intensity, frequency and duration of exercise training in altering cardiorespiratory fitness. *Sports Medicine*, 3, 346-356.





**A COMPARISON OF LEADERSHIP BEHAVIOUR OF INTER-UNIVERSITY AND ALL INDIA LEVEL MALE VOLLEYBALL PLAYERS**

**Yamini Jaiswal<sup>1</sup>, Dr. Jai Shankar Yadav<sup>2</sup> & Dr. Ranjeet Singh Pawar**

**Affiliations:**

1. Ph. D Research Scholar, Dr. C.V.Raman University, Kota, Bilaspur CG)
2. Assistant Professor, Physical Education Department, Dr.C.V.Raman University, Kota, Bilaspur CG)
3. Block Education Officer, Kargi Road, Kota, Bilaspur (CG)

---

**ABSTRACT**

The purpose of the study was to analyse and compare the leadership behaviour of inter-university and All India level male Volleyball players. For this purpose, one hundred (Inter-university level =64, All India level=36)) male volleyball players representing their respective university in East zone Inter-university and All India Inter-university Volleyball competitions held in Pt. Ravi Shanker University, Raipur 2009-2010 were selected to serve as subjects for this study. Leadership Scale for Sports developed by P. Chelladurai (1994) was selected as a criterion tool to measure preferred behaviour preferences of inter-university level Volleyball players. Means, standard deviations, one way analysis of variance and t-ratio on five dimensions of preferred leader behaviour with all the subjects were computed. The results of the study revealed that inter-university and All India level male volleyball players exhibited different preferences on five dimensions of leader behaviour. Inter-university level male volleyball players preferred their coaches more on training and instruction followed by Positive feedback, democratic behaviour social support, and autocratic behaviour dimensions. Where as, the All India level male volleyball players preferred their coaches more on training and instruction followed by positive feedback, democratic behaviour, social support and autocratic behaviour) dimensions. Male volleyball players of both levels had similarity in Training and instruction and autocratic behaviour.

**Keywords:** Leadership, Behaviour, Volleyball, preferences, male players

---

## 1. INTRODUCTION

In the modern age of scientific knowledge, man is, making rapid progress in all walks of life including that of sports and games. The progress in sports and games may be attributed to the scientific investigations for the better performance of sportsmen and sportsmales, improved scientific and specific training methods and also to the better understanding of the human organism.

The leader is required to be have in certain ways by the demand and constrains placed by the demand and member's preferences for specific leader behaviours are largely a function of the individual characteristics of the group members. Personality variables such as need for achievement, need for affiliation, cognitive structure and competence in the task influence a members performances for coaching and guidance, social support and feed back. In addition the situation characteristics also affect member's preferences. For example, if there is an organisational expectation, which a leader will behave in a specific manner, this expectation is held jointly by both leaders and members (Singer, Murphy & Tennat, 1993).

The participation in sports contributes to building up self confidence, enhance intellectual level. personality development a no. out going tendency or extraversion as such proficiency leads to enhanced success in sports activities is highly valued in one's group (Simon, 1964).

Success in athletics seems to be dependent in part on psychological status and traits. The use of an athlete's personality profile, in concern with knowledge of their past experience, coach's rating, anatomic and physiological characteristics and so one can enhance the accuracy of prediction in a number of sports (Morgan, 1986).

Terry and Howe(1984) also reported that team sports athletes preferred significantly more training and instruction, autocratic behaviour, and positive feedback, but less democratic behaviour and social support, than individual sports athletes. Lee and Lee (1993) found that these groups differed among themselves in all dimensions except in preferred training and instruction. In general, the combative sports athletes preferred and perceived more autocratic, social support, and positive feedback behaviours from their coaches than did the other groups, individual sports athletes preferred and perceived more democratic behaviour from their coaches than did the other two groups. Riemer and Chelladurai (1995) showed that defensive players preferred and perceived greater amounts of democratic behaviour, autocratic behaviour, and social support than did offensive players. Sherman and Fuller (2000) revealed an overwhelmingly high level of similarity in the coaching preferences between all athletes regardless of gender. Athletes from all three sports indicated that positive feedback, training and instruction and democratic behavior were preferred coaching behaviors. Social support, and autocratic behavior were not preferred. Loughhead and Hardy (2004) indicated that coaches exhibited training and instruction and autocratic behaviors to a greater extent than peer leaders. Conversely, peer leaders exhibited more social support, positive feedback, and democratic behaviors than coaches.

The Purpose of the study was to analyse and compare the leadership behaviour of inter-university and All India level male Volleyball players. It was hypothesized that significant differences in their leadership preferences may exist among Inter-university & All India Inter-university level male volleyball players.

## **2. METHODOLOGY**

### **2.1 Subjects**

One hundred (Inter-university level =64, All India level=36) male volleyball players representing their respective university in East zone Inter-university and All India Inter-university Volleyball competitions held in Pt. Ravi Shanker University, Raipur 2009-2010 were selected to serve as subjects for this study. The subjects were in age ranged from 19 to 24 years. The subjects were selected randomly from amongst the East zone Inter-university Volleyball competition who could not qualified for the All Inter-university male Volleyball Competition.

### **2.2 Instrumentation**

Leadership Scale for Sports developed by P. Chelladurai (1994) was selected as a criterion tool to measure preferred behaviour preferences of inter-university level athletes of different individual games. The Leadership Scale for Sports (L.S.S.) is a valid and reliable instrument. The scale consists of 40 items for athlete's perception of coach's behaviour and 40 items for preference version representing five dimensions of leadership behaviour i.e. training and instruction, democratic behaviour, autocratic behaviour, social supports and positive feedback (Rewarding behaviour). The scale had test-retest reliability 0.72 for training behaviour, 0.82 for democratic behaviour, 0.76 for autocratic behaviour, 0.71 for social supports, and 0.79 for positive feedback.

### **2.3 Administration of Questionnaire**

The necessary permission from the organizing secretary of. All India and East zone Inter-university male volleyball Competitions was obtained by the research scholar to conduct this study on male volleyball players during competitions held during the session 2009-2010 in Pt. Ravi Shanker University, Raipur (CG).

The coaches and subjects were contacted at the site competition personally and their sincere cooperation was solicited. Necessary instructions were given to the subjects before the administration of each test. Confidentiality of responses was guaranteed so that the subjects would not camouflage their real feelings. No time limit for filling the questionnaire was set but subjects were made to respond as quickly as possible. As soon as a group of players completed the questionnaire, it was collected from the athletes and verified that no questionnaire was left without being answered.

## **3. RESULTS**

To assess the preferences on five dimensions of leader behaviour of East zone Inter-university and All India level male volleyball players, mean and standard deviation, one way analysis of variance and t-ratio on five dimensions of preferred leader behaviour with all the subjects were computed and data pertaining to this have been presented in Table 1 to 6.

**TABLE 1**  
**DESCRIPTIVE STATISTICS OF PREFERENCES ON FIVE DIMENSIONS OF LEADER BEHAVIOUR OF INTER-UNIVERSITY AND ALL INDIA LEVEL MALE VOLLEYBALL PLAYERS**

S.NO.	Leader Behaviour Dimensions	Inter-university level		All India level	
		M	SD	M	SD
1.	Training & Instruction	4.287	0.399	4.476	0.455
2.	Democratic Behaviour	3.971	0.544	3.678	0.523
3.	Autocratic Behaviour	3.238	0.893	2.950	0.816
4.	Social Support	3.985	0.525	3.495	0.594
5.	Positive Feedback	4.006	0.985	4.404	0.593

The mean scores of five dimensions of leader behaviour as preferred by East zone Inter-university and All India level male volleyball players have been depicted in figures 1 to 4.

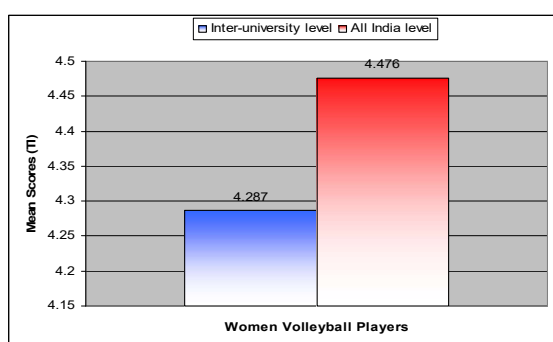


Fig. 1: Mean Scores of Inter-university and All India Level Male Volleyball Players on Democratic Behaviour Dimension of preferred Leadership

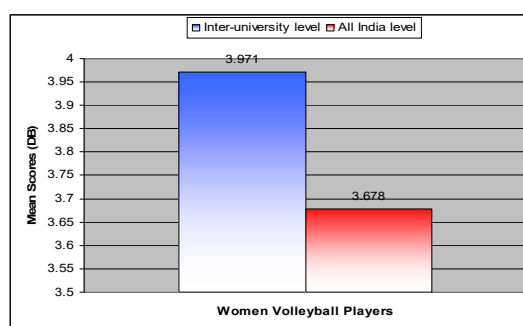


Fig. 2: Mean Scores of Inter-university and All India Level Male Volleyball Players on Training and Instruction Dimension of preferred Leadership.

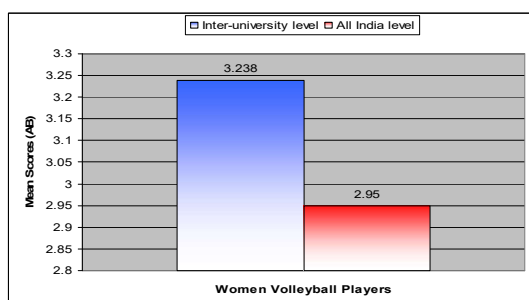


Fig. 3: Mean Scores of Inter-university and All India Level Male Volleyball Players on Autocratic Behaviour Dimension of preferred Leadership Behaviour.

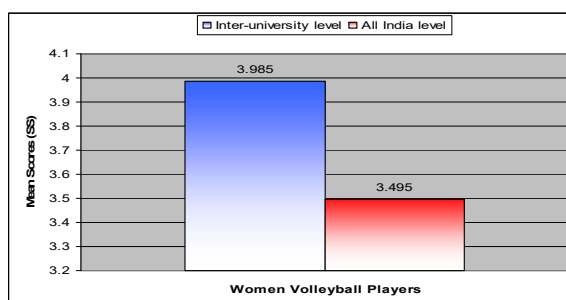


Fig. 4: Mean Scores of Inter-university and All India Level Male Volleyball Players on Social Supports Dimension of preferred Leadership Behaviour.

**TABLE 2**  
**ANALYSIS OF VARIANCE FOR PREFERRED LEADERSHIP OF INTER-UNIVERSITY LEVEL MALE VOLLEYBALL PLAYERS**

Source of Variance	df	Sum of Squares	Mean Square	F-ratio
Between Groups	4	47.19	11.79	
Within Groups	315	157.43	0.50	23.61*
Total	319	204.62		

\*Significant at .05 level.,  $F_{05}(4,315) = 2.40$ .

From Table 2, It is evident that the statistically significant difference existed among inter-university level male Volleyball players on preferred leadership, as the obtained F-value of 23.61 was much higher than the required  $F_{05}(4, 315) = 2.40$ .

As the F-ratio was found to be significant, Scheffe's Test of Post-hoc comparison was applied to study the significance of differences among Inter-university level male Volleyball players on five dimensions of leader behaviour of preferred leadership and the data pertaining to this have been presented in Table 3.

**TABLE 3**  
**SIGNIFICANCE OF DIFFERENCES AMONG INTER-UNIVERSITY LEVEL MALE VOLLEYBALL PLAYERS BETWEEN ORDERED PAIRED MEANS ON FIVE DIMENSIONS OF PREFERRED LEADERSHIP**

T I	DB	AB	SS	PF	Paired mean difference	Confidence Interval (C. I.)
4.287	3.971	-	-	-	0.457*	0.443
4.287	-	3.328	-	-	1.190*	
4.287	-	-	3.985	-	0.444*	
4.287	-	-	-	4.006	0.422	
-	3.971	3.328	-	-	0.733*	
-	3.971	-	3.985	-	0.014	
-	3.971	-	-	4.006	0.035	
-	-	3.328	3.985	-	0.746*	
-	-	3.328	-	4.006	0.768*	
-	-	-	3.985	4.006	0.021	

\*Significant at .05 level.

It is quite obvious from the table 3, that there were significant differences on preferred leadership among Inter-university level male Volleyball players between training and instruction -democratic behaviour followed by autocratic behaviour, and social supports; democratic behaviour - autocratic behaviour; autocratic behaviour-social support followed by positive feedback, as the paired mean differences of 0.457, 1.19, 0.444, 0.733, 0.746 and 0.768 respectively were higher than the confidence interval (C.I.) of 0.443. But the mean differences between training and instruction-positive feedback; democratic behaviour - social support followed by positive feedback and social support - positive feedback respectively were not significant at 0.05 level, as the confidence interval of 0.443 was higher than the mean differences.

**TABLE 4**  
**ANALYSIS OF VARIANCE FOR PREFERRED LEADERSHIP OF ALL INDIA LEVEL MALE VOLLEYBALL PLAYERS**

Source of Variance	df	Sum of Squares	Mean Square	F-ratio
Between Groups	4	50.48	14.87	
Within Groups	175	64.77	0.37	40.18*
Total	179	124.45		

\*Significant at .05 level.,  $F_{.05} (4, 175) = 3.04$ .

From Table 4, It is evident that the statistically significant difference existed among All India level Volleyball players on preferred leadership was very high as the obtained F-value of 40.18 was much higher than the required  $F_{.05} (4, 175) = 3.04$ .

As the F-ratio was found to be significant, Scheffe's Test of Post-hoc comparison was applied to study the significance of differences among All India level male Volleyball players on five dimensions of leader behaviour of preferred leadership and the data pertaining to this have been presented in Table 5.

**TABLE 5**  
SIGNIFICANCE OF DIFFERENCES AMONG ALL INDIA LEVEL MALE VOLLEYBALL PLAYERS BETWEEN ORDERED PAIRED MEANS ON FIVE DIMENSIONS OF PREFERRED LEADERSHIP.

T I	DB	AB	SS	PF	Paired mean difference	Confidence Interval (C. I.)
4.476	3.678	-	-	-	0.796*	0.436
4.476	-	2.950	-	-	1.526*	
4.476	-	-	3.495	-	0.981*	
4.476	-	-	-	4.404	0.072	
-	3.678	2.950	-	-	0.728*	
-	3.678	-	3.495	-	0.183	
-	3.678	-	-	4.404	0.725*	
-	-	2.950	3.495	-	0.544*	
-	-	2.950	-	4.404	1.453*	
-	-	-	3.495	4.404	0.909*	

\*Significant at .05 level.

It is quite obvious from the table 5, that there were significant differences on preferred leadership among All India level male Volleyball players between training and instruction -democratic behaviour followed by autocratic behaviour, and social supports; democratic behaviour - autocratic behaviour followed by positive feedback; autocratic behaviour- social support followed by positive feedback, and social supports- positive feedback, as the paired mean differences of 0.797, 1.526, 0.981, 0.728, 0.725, .544, 1.453 and 0.909 respectively were higher than the confidence interval (C.I.) of 0.436. But the mean differences between training and instruction- positive feedback and social support - positive feedback respectively were not significant at 0.05 level, as the confidence interval of 0.436 was higher than the mean differences

**TABLE 6**  
**SIGNIFICANCE OF DIFFERENCES BETWEEN MEAN SCORES OF INTER-UNIVERSITY AND ALL INDIA LEVEL MALE VOLLYBALL PLAYERS ON FIVE DIMENSIONS OF PREFERRED LEADERSHIP**

Leader Behaviour Dimensions	Participation Level	Mean	MD	$\sigma$ DM	t-ratio
Training & Instruction	Inter-university	4.287	.047	.087	.542
	All India	4.476			
Democratic Behaviour	Inter-university	3.971	.293	.111	2.622*
	All India	3.678			
Autocratic Behaviour	Inter-university	3.238	.288	.181	1.598
	All India	2.950			
Social Support	Inter-university	3.985	.490	.115	4.271*
	All India	3.495			
Positive Feedback	Inter-university	4.006	.398	.180	2.205*
	All India	4.404			

Significant at .05 level,  $t_{.05(98)} = 1.98$

It is evident from table 14, that there were statistically significant differences between the preferences of Inter-university level and All India level male volleyball players in training and instruction, positive feedback and social support dimensions of leader behaviour, as the obtained t-value of 2.622, 4.271, and 2.205 respectively were higher than the required t-value of  $t_{.05(98)} = 1.98$ . But the significant differences were not found in training and instruction and autocratic behaviour dimensions of leader behaviour, as the obtained t-value of 0.542, and 1.598 respectively were lesser than the required t-value of  $t_{.05(98)} = 1.98$ .

#### 4. DISCUSSION

Findings of descriptive data of Inter-university level male volleyball players on five dimensions of preferred leadership behaviour indicated that male volleyball players preferred more democratic behaviour, autocratic behaviour and social support from their coaches than did All India level male volleyball respondents. In case of All India level male volleyball players, they preferred more training and instruction and positive feedback from their coaches than their counter parts.

The results of one way analysis of variance (ANOVA) for Inter-university level male volleyball players on five dimensions of preferred leadership behaviour expressed significant differences among Inter-university level male volleyball players in their preferences for preferred leadership which may be due to variation in practice method, coaching style, Inter personal relationship and reinforcement. The Scheffe's Test of Post-hoc comparisons showed that Inter-university level male volleyball players preferred more training and instruction followed by Positive feedback, democratic behaviour, social support and autocratic behaviour from their coaches.

In case of All India level male volleyball players on five dimensions of preferred leadership behaviour, they also expressed significant differences among male volleyball players in their preferences for preferred leadership. The Scheffe's Test of Post-hoc comparisons showed that male volleyball players also preferred more training and

instruction followed by positive feedback, democratic behaviour, social support and autocratic behaviour from their coaches.

When the Inter-university and All India level male volleyball players were compared together on five dimensions of leader behaviour, they exhibited significant differences in their preferences for democratic behaviour, social support and positive feedback dimensions of leader behaviour. But They had no significant differences in their preferences for training and instruction and autocratic behaviour dimensions of leader behaviour, which showed that Inter-university and All India level male volleyball players preferred their coaches equally in these dimensions of leader behaviour and differently in other dimension of leader behaviour. The findings are partially supported by Chefladurai and Saleh, 1978.

It was hypothesized that there would be significant difference among Inter-university and All India level male volleyball players on five dimensions of preferred leadership behaviour. This hypothesis has been partially accepted, as the Inter-university level male volleyball players had significant difference in their preferences between training and instruction -democratic behaviour followed by autocratic behaviour, and social supports; democratic behaviour - autocratic behaviour; autocratic behaviour- social support followed by positive feedback But the mean differences between training and instruction- positive feedback; democratic behaviour - social support followed by positive feedback and social support - positive feedback respectively were not significant

In case of All India level male volleyball players, they had significant difference in their preferences between training and instruction -democratic behaviour followed by autocratic behaviour, and social supports; democratic behaviour - autocratic behaviour followed by positive feedback; autocratic behaviour- social support followed by positive feedback, and social supports- positive feedback. But the mean differences between training and instruction- positive feedback and social support - positive feedback respectively were not significant.

## 5. CONCLUSIONS

Within the limitation of present study, the following conclusions are enumerated :

1. Inter-university and All India level male volleyball players exhibited different preferences on five dimensions of leader behaviour.
2. Inter-university level male volleyball players preferred their coaches more on training and instruction followed by Positive feedback, democratic behaviour social support, and autocratic behaviour dimensions.
3. All India level male volleyball players preferred their coaches more on training and instruction followed by positive feedback, democratic behaviour, social support and autocratic behaviour) dimensions .
4. Inter-university and All India level male volleyball players expressed different preferences on democratic behaviour, social support and autocratic behaviour) dimensions of leader behaviour. They had similarity in Training and instruction and autocratic behaviour.



**REFERENCES**

- Chelladuari, P. and Saleh, S.D. (1978)**, "Preferred Leadership in Sports" Canadian Journal of Applied Sport Sciences 3 : 85-92
- Chelladurai, P. (1994)**, Manual of Leadership Scale for Sports, U.S.A:Ohio State University,
- Kim, B. H., Lee, H.K., and Lee, J.Y. (1993)**, "A Study on the Coaches Leadership Behaviour in Sports". (Unpublished Manuscript, Korea Sports Science Institute) Cited by Robert N. Singer, Milledge Murphey and L.Keith Tennant. Handbook of Research on Sport Psychology (New york : Me Millan Publishing Company, p. 653.
- Loughead, T. M. & Hardy, J. (2004)**, "An examination of coach and peer leader behaviors in sport". Psychology of Sport and Exercise, 6 : 303-312.
- Morgan, W.P. (1986)**, Sports Personology. The Credulous - Skeptical Argument in Perspective in Sports Psychology. An Analysis of Athletic Behaviour. (Ed. W. Straub MovementPub.In this N.Y. Cited by Stan-Power Psychological Assessment Procedures at a Track & Reid National Event Squad Training Weekend Sports science Education by J. Watkins. Thomas Reilly and Les Burtwiz (London : E & FN Spon, :p. 181.
- Riemer, Harold A. and Chelladurai, P. (1995)**, "Leadership and Satisfaction in Athletics" Journal of Sport and Exercise Psychology 17(3 ) : 276.
- Singer R.N., Murphy M., and Tennat, L. Keith ( 1993)**, Hand Book of Research on Sport Psychology, New York : McMillan Publishing (Co; pp. 647 - 648.
- Simon E. (1964)**, 'Scope and Function of Research in Sports and Physical Education' Flep Bulletin 34 :98.
- Sherman, C. A. & Fuller, F. (2000)**, "Gender comparisons of preferred coaching behaviors in Australian sports". Journal of Sport Behavior, 23: 389-406.
- Terry P.C. and Howe, B. L. (1984)**, "Coaching Preferences of Athletes" Canadian Journal of Applied Sport Sciences 9 : 188-93.



## DIFFERENCE BETWEEN YOGIC EXERCISES TRAINEES AND UNTRAINEES IN SCHOOL GOING CHILDREN

V. A. M. Padma Kumari<sup>1</sup>

### Affiliation:

<sup>1</sup> Ph.D Research Scholar, Department of Physical Education, Dravidian University, Kuppam, Andhra Pradesh

---

### **ABSTRACT**

School going children are a useful asset of any nation or community as they're the longer term citizen. It is fundamental to take care of their intelligence and health. There must be an attempt to channelize their power accurately. Yogic practices are enormously impressive to manage them. For a healthy functioning of all the tissues and organs as good as for a healthful intellect, follow of Yoga is one of the excellent methods. The present study is a try and imbibes in students the values of self discipline, oneness with nature, introspection and peaceful co-existence. The study has its mere focal point on the area of early age stress in students, declining of concentration levels, day-to-day well being problems and environmental factory including on all these. The study has the target of early development of fundamentals to create a coordinated synergism, peaceful and a more nourished soul. It may be concluded that commonplace observe of Yoga, including asana, Pranayama and meditation, has brought confident upgrades in self-discipline, team work, conduct and sharing, besides eating addiction of the tuition going school children.

**Key words:** Yoga, School, Children, Exercise, Health, Self-discipline

---

## 1. INTRODUCTION

Yoga is the practice of accessing and integrating all elements of our genuine nature - physique, mind, and spirit in the pursuit of internal harmony. As yoga turns into more general in faculties by way of bodily education classes and after-university packages, that fame comes with controversy. Although many adults like the advantages of yoga, some moms and dads suppose that the practice could have a religious organization and, like prayer, isn't allowed in a public house. They argue that yoga is an offshoot of Hinduism and that it disseminates devout and meditation principles with its use of "om" and "namaste" chanting. Some also consider that the asanas, or postures, such because the solar salutation, are a form of Hindu devout worship. To dispel this idea and restrict any devout or cultural messages, most yoga academics focus on the benefits of the exercises and use widespread terms, instead of the Sanskrit names, for the poses, renaming them cat, bridge, desk, tree, downward-going through canine, volcano, and many others. Yoga's rising popularity can be attributed to its common stretching advantages and elevated body attention, with the brought element of a intellect-physique connection.

Scientist says that the youngsters have many unexplained and unexpressed problems; they cannot specific their predicament accurately. That is as a result of their power of expression and their talents of their possess psychology is not mature enough. Now it is the accountability of teachers and guardians to handle their behavior; on the grounds that they mostly express their hindrance in entrance of them handiest.

## 2. REVIEW OF LITERATURE

**Kumar (2012)** Introducing the children to yoga at an early age can support them be trained healthful subculture habits and set the basis for a match future. Here are kid-pleasant yoga poses to get your household practice began.

**Kumar (2011)** Prāna (the inner power) is the key of fickleness of developing youngsters. There should be an effort to channelize effectively that vigor. Their energy should be applied in a constructive manner. The obstinate and destructive nature of the kids may also be converted through suggesting them to work in keeping with their curiosity.

**Rajora and Prajapati (2009)** located the confident outcomes of chosen Yogic workout routines on Emotional Intelligence and Intelligence Quotient of school going children.

**Schonert-Reichl & Lawlor, (2010)**, also discovered scholars who practiced yoga-asana three times a day in brief segments of concentration coaching and intellect-full respiratory improved their wellbeing, and social and emotional competence. A further gain knowledge of conducted with the aid of **Linda, et.al. (2007)** confirmed improvements in kids's habits, self-esteem and relationship fine.

The trained carried out through **Gharote (1976)** after a three week Yoga observe additionally suggests a enormous effect on children's bodily well being. A be trained has been conducted at Bihar university of Yoga through Veena Verma (Sannyasi Soumyashakti); potentialities of Revolutionizing the schooling approach through Yoga Nidra. Some of the stories carried out by means of B. K. Batra, Dr. Nagratna and Dr. H. R. Nanendra at Vivekananda Yoga Anusandhan Sansthan also shows a large affect on children's analysis and memory. We goals of a society where every baby is prepared with the tools provided via Yoga for Self management. Alternatively than relying upon external

aids, each child should be ready to handle more than a few stresses as they show up for the period of their progress.

Each youngster in school is taught that "Prevention is better than treatment". But, what number of understand the best way to enforce this in apply. And for those who do, how many have the desire and wherewithal to do so. Familiarizing the youngster with Yoga tools can aid show them the trail of "Preventive treatment"

There were many reports published within the respective discipline. A randomized managed learn had proven the comparable results of yoga and physical pastime on bodily health and Stroop project performance in pre adolescent university kids in between workforce comparisons at the same time the complete self-esteem was once located higher in within yoga crew (**Telles, et. al. 2013**). In a further gain knowledge of, the yoga team confirmed a colossal increase within the degree of total, basic and social vanity after one month of comprehensive yoga application (**Bhardwaj & Agrawal, 2013**).

**Kumar & Tiwary (2014)** Yoga helps convey about subtle attitudinal changes in lifestyles. If taught previous on in life, they're easier implemented and may deliver a couple of healthy exchange in society. Being equipped to harness ambition in a constructive method as an alternative than via negativity will not best support the pupil excel but additionally make him / her more healthy and happier man or woman. Is that not high precedence what each parent seeks for his child?

Youngsters by way of their very nature have to be dealt with very another way. Educating are not able to be imposed (or else it'll be self defeating). Alternatively, Yogic concepts have to be absorbed via workforce routine and games. It is just then that the seed can also be planted which will endure fruit over time.

Regrettably Yoga is way abused in modern times. Practitioners with shallow competencies inadvertently come to be instructing practices that are probably not suitable for all age agencies. For instance, how many people know that kids will have to not be introduced to Pranayama (respiration) practices at an early age?

For that reason, whilst introducing children to Yoga is very fascinating at present, utmost care ought to be taken whilst initiating them into it, so that they reap the maximum advantages. At H&Y, by way of a qualified community of yoga practitioners, we undertake packages to teach and introduce Yoga in colleges.

Shana Meyerson, the founding father of mini yogis (mini yogis.Com), a yoga studio Southern California that offers lessons for kids, believes that yoga builds self-esteem and self-recognize. "A youngster's yoga apply is a infrequent possibility to expertise play and center of attention without worrying about being fallacious," she says. Meyerson believes that yoga is a choice for youngsters who shy far from bodily activity or team hobbies for fear of failure or being picked last, and it helps athletic youngsters excel in different sporting events and sporting activities. Christina Enneking, the founder of heart pleased Yoga, a studio in Los Gatos, California, believes yoga introduces cornerstone values "corresponding to nonharming, truthfulness, moderation, cleanliness, gratitude, and self-discipline." There are five key areas the place children benefiting from the practice of yoga, and each and every of them improve their overall good-being.

### **3. IMPORTANCE OF YOGA FOR SCHOOL CHILDREN**

Self-self belief is a most important existence skill for youngsters to strengthen, and mum and dad could be a major supply of this. A low self snapshot can lead to many

emotional disorders in maturity, including depression and anxiety. This can also be kept away from with the steering of some very caring function items, and the positive interactions that these relationships impose.

Position items range from dad and mom and academics to medical professionals and physical activities coaches. An additional satisfactory supply of constructive guidance that father and mother must consider is that of a yoga trainer. Combine old potent poses with the information of a benevolent, impartial celebration and your little one immediately has a mentor that he or she can relate to.

There are countless advantages to enrolling your little one right into a yoga classification for youngsters, and even more notably a Hatha Yoga category. Hatha Yoga makes a specialty of four areas that are breathing, rest, meditation, and posture. Each and every Person matter is easily understood, but that doesn't mean there's no project concerned. Yoga seems to contradict the character of a child, however when performed in a group surroundings and noticeable as a necessary life device, kids excel in yoga. Look on the notion of math, for example. Many children find this area of learn complicated, with many asking "When will i take advantage of these methods in my existence?" kids and teens find it tedious and irritating to gain knowledge of things they consider add no price to their lifestyles (math is a primary device for learning and expanding the mind, but most young persons overlook its relevance of their future), however yoga will on no account feel that manner. Immediately your little one will recognize its advantages and can remain eager to continually be taught from this observe. There is not any competitors in yoga, so youngsters aren't competing with one a further which will additionally subconsciously damage the ego.

Within the first set of yoga lessons, your child will be trained self-acceptance and endurance to be able to follow and grow at yoga. He or she will try rough at matters, handiest to galvanize his/ herself. It's also understood (and mentioned) that people are good at extraordinary advantage. Precise youngsters find it handy to meditate and chill out their intellect and physique, even as others may just excel at holding tricky poses. Yoga instructors understand that steadiness and acceptance are indispensable to people of all ages, and consciously praise all of their pupils equally. This unifies the pupils and class as a whole.

The early childhood years are pleasing and transformative. It is inspiring and magical to observe kids as they're immersed in studying and progress. These years, nevertheless, are also mostly difficult and complicated.

School children require a nontoxic, nurturing, and stimulating environment to satisfy the developmental duties of this time interval and to develop into subsequent phases of life well prepared. On no account has the message been clearer that our kids and communities need mild, protection, and constitution to furnish the sustenance for healthful development. Social-emotional studying, trusting relationships and adequate amounts of physical activity, play, and exploration are primary for babies.

Father and mother may notice how yoga benefits their children, however the first-rate judges are the kids themselves. Youngsters who have practiced yoga tell their academics and dad and mom that they are able to concentrate better in the course of the day, focal point better on their routine, and pay higher awareness to their duties -- the entire finest endorsements.

The reason of this be trained can also be to aid to nourish the soul which displays in their intellectual and exercises of their mental and physical games and to construct the personality we need to see in the next decade as per Indian context. We determined a state of urgency to nourish their souls with some mental activities like contemplation, meditation and many others, in different phrases, within-out process alternatively than outside-in approach. We are able to conclude this learn as the within out process meditation, contemplation, introspection have a big improvement in persistence, self self-discipline to reap targets of lifestyles, self self-discipline to control the senses and preserving a stoic life. Additionally, they discovered the worth of sharing. Persistency in these practices will convey the collective progress of psychological wellness of the roots and way forward for this society concerned.

**TABLE 1**  
**DIFFERENCE BETWEEN YOGIC EXERCISES TRAINEES AND UNTRAINEDS IN SCHOOL GOING CHILDREN**

<b>Trainees</b>	<b>Untrainees</b>
Reduces Stress and Anxiety	There is a too Stress and Anxiety
Improves Memory and Attention Span	Decreases Memory and Attention span
Helps To Manage Weight	Unbalancing of Weight
Improves Flexibility, Balance and Posture	Inflexibility, unbalancing and improper body posture
Know Correct Breathing Techniques	Do not know proper breathing techniques
High Self-Love and Self-Care	Low Self-love and Self-care
High level of Peace of Mind	Low level of Peace of Mind
Self-Control	Lack of self control
Low level of Absences and Violence	High level of absence and violence
Adequate Coping Skills	Inadequate Coping Skills
High Immunity Power	High Immunity Power
High self-confidence	Low self-confidence

**Source:** Author's own source

#### **4. CONCLUSION**

Yoga is an ancient Indian science and tradition that entails no longer most effective bodily movements and postures but additionally regulates breathing and meditation. It appears that following Yoga observe, the individuals had been higher ready to focal point their mental assets, procedure knowledge swiftly, more correctly and likewise gain knowledge of, keep, and update pieces of expertise extra without difficulty. The presence of Yoga in fundamental circulation in Indian culture has grown dramatically throughout prior 15 years. Yoga is a mind – body follow that combines bodily postures, respiration workouts, and meditative practices, with the goal of unifying the physical, mental, and emotional selves. Research has verified that average apply of yoga helps within the progress of the physique, intellect, and spirit, leading to more fit and extra satisfying lifestyles.

### **REFERENCES**

- Rajora, Akansha and Prajapati, Vikas (2009)**, "Effect of Selected Yogic Exercises in Emotional Intelligence and Intelligence Quotient of School going Children", Proceedings: India International Congress in sports Psychology, LNUPE, Gwalior, India, pp.270-271.
- Bhardwaj, A. K. and Agrawal, G. (2013)**. Yoga practice enhances the level of self-esteem in pre-adolescent school children. International Journal of Physical and Social Sciences, 3 (10): 189-199.
- Kumar K & Tiwary, S. (2014)**, Academic Anxiety among Student and the Management through Yoga; International Journal of Yoga and Allied Sciences, 3(1): 50-53.
- Kumar, K. (2011)**, Strengthen the Education System through Yogic Intervention; (Book Chapter) Yoga Education, A.P.H Publishing Corporation, New Delhi.
- Kumar, K. (2012)**, Yoga Education: A Text Book, Shipra Publication, Delhi.
- Gharote, M. L. (1976)**, Effect of Yoga Exercises on Failures on the Kraus-Weber Tests. Perceptual and Motor Skills, (43) :654-654.
- Schonert-Reichl, K. & Lawlor, M. S. (2010)**, The effects of a mindfulness-based education program on pre- and early adolescents' well-being and social and emotional competence. Mindfulness, (1) : 137-151.
- Rajora, A. and Prajapati, V. (2009)**, Effect of Selected Yogic Exercises on Emotional Intelligence and Intelligence Quotient of School Going Children. India International Congress in Sports Psychology, IICSP-2009 Papers and Proceedings, pp. 270-271.
- Telles, S., Singh, N., Bhardwaj, A. K., Kumar, A. and Balkrishna, A. (2013)**, Effect of yoga or physical exercise on physical, cognitive and emotional measures in children: a randomized controlled trial. BMC Child and Adolescent Psychiatry and Mental Health, 7:37.
- Harrison, L.J., Clarke, L. and Ungerer, J.A. (2007)**, Children's drawings provide a new perspective on teacher-child relationship quality and school adjustment'. Early Childhood Research Quarterly, (22) : 55-71.



## COMPARISON OF NEURO-MUSCULAR COORDINATION OF HANDBALL AND VOLLEYBALL INTER-COLLEGIATE PLAYERS OF PURULIA DISTRICT

Sajal Maji<sup>1</sup>

**Affiliation:**

<sup>1</sup> Guest lecturer, Achhruram Memorial College, Jhalda, Purulia-723202

---

### ABSTRACT

Neuro-muscular coordination in inter-collegiate players improves skill performance and decreases the risk of injuries during the activities. This coordination is primarily ascribed to the enhancement of eye-hand coordination. The purpose of the study was, "Comparison of Neuro-muscular Coordination of Handball and Volleyball inter-collegiate Players of Purulia district". The Researcher selected the various inter-collegiate players of Purulia district for research purpose. For comparing the neuromuscular researcher had selected total sixty subjects which were further divided into 30 handball and 30 volleyball players and age range from 18 to 21 years are selected for the data collection as per simple random sampling technique. After that researcher collects the data, from those players with the help of selected test. After, the data collection the researcher analysis the data with the help of descriptive statistics (Mean, SD and 't'- test).

**Keyword:** Neuro-Muscular Coordination, Handball and Volleyball.

---



## 1. INTRODUCTION

Movement analysts ranging from spectators and sportswriters, to teachers and coaches, to biomechanics and kinesiologists, to neuroscientists and robot cists believe that coordination is a desirable aspect of performance. Yet, there has been little coordination among movement analysts in the effort to understand and improve coordinated movement. Perhaps our disjointed activity is due in part to our diverse conceptions of coordination. If so, identifying and clarifying the various meanings of coordination may enable movement analysts to cooperate on the topic of coordination. Thus, the purpose of this paper is to ask and address a series of questions: What is meant by coordination. Are the meanings similar or different for professionals and non-professionals, for scholars and practitioners, Are the meanings complementary or contradictory for researchers in various fields, Is there a common thread of meaning that could be used as both a basis of communication as well as a basis for research. Neuro-muscular coordination studies how to coordinate between the different parts of our body. They study individuals as well as group, observable the coordination's.

When the word coordination was first recorded in 1605, it meant, orderly combination (**Barnhart dictionary of etymology, 1988**). Though the basic meaning of coordination has not changed over the centuries, the contemporary meaning of coordination has become increasingly associated with harmonious and skillful movement; coordination is defined as the "harmonious adjustment of action, as of muscles in producing complex movements."

Webster's connection between harmony and human movement has been accented in the physical education literature for teachers and coaches. For example, coordination has been defined as the harmonious movement of independent body parts (**Dictionary of the sport and exercise sciences, 1991**), the ability to integrate muscle movements into an efficient pattern of movement (**Schurr, 1980**), and the use of muscles in such a manner that they work together smoothly and effectively rather than hinder one another (**Hunter, 1966**). Roget's association of coordination and skillful movement was echoed by Schurr Coordination makes the difference between good performance and poor performance. Also (**Wilmore,1977**). Related coordination to athletic exemplars: Neuromuscular coordination reflects the ability of athletes to perform their sports activities or events with a smooth, balanced, and fluid motion. While many practitioners in physical education describe coordination in terms of harmony or skillfulness, some scholars in physical education are more apt to emphasize the pattern of movement. For instance, coordinated actions of the human body are executed by the controlled application of muscular forces which produce distinctive patterns of segment motions (**Putnam, 1991**). And coordination is the relationship among movement variables that constrains them into a behavioral unit. Further, a coordination variable is a "factor that, when changed, necessitates a new pattern of coordination.

Neuromuscular training programs by evidence have shown a greater improvement in the performance and have become integrated into clinical practice in rehabilitation of an athlete. Information regarding joint movement and joint positions are provided by mechanoreceptors in the skin, muscles, tendons, ligaments, and joints combine with input from the vestibular and visual systems to maintain balance and perform specific activity. Injury can alter the normal physiological process of motor control, leading to insufficient

neurologic input or improper processing at the spinal, brain stem, or cognitive centers leading to an inadequate response by the motor system. The neuromuscular co-ordination and activity is one of the key considerations in sports performance. The motor cortex does not specify motor unit activation rather the body attempts to achieve a specific movement by activating muscle and or muscle groups (**Black Burn, et.al, 1990**). The movements and skilled activity always requires complicated neuromuscular co-ordination, this is learned over time through practice and experience. A trained athlete performance is based on the needs and it is modified according to the changes applied. The motor learning is one of the key principles of neuromuscular training. A trained athlete reaches advanced motor learning skills necessary to accomplish complex motor tasks.

A sportsperson can perform optimally only when he is in a perfect state of physical, physiological and psychological preparedness for a given competitive event or performance. She must, of course, be fully equipped technically and tactically. Such a performance cannot be expected overnight or all of a sudden. It can only be materialized through long and sustained efforts over the years following unflinching discipline and an unwavering commitment. In this process, the pattern, the physical educator and the coach or trainer, have to play a specific role at particular stages in the making of these men of great sporting acumen. Physical proficiency is an important area of motor performance. Ability refers to a more general trait of the individual which has been inferred from response consistencies on certain kinds of tasks. Abilities are fairly enduring traits, which in adults, are more difficult to change. Many of these abilities are, of course, themselves a product of learning and develop at different stages, mainly during childhood and adolescence.

Proficiency in any sport requires an ideal integration of numerous abilities developed into an ideal degree. However, performance measures of these abilities do vary from activity to activity. Fleishman identified the dimensions underlying the human performance into the physical proficiency (fitness) area and the psychomotor area. The factors of strength, power, stamina, flexibility, coordination and balance constituted proficiency whereas reaction-time, speed of movement, arm-hand steadiness, visual perception, manual dexterity and rate control were the abilities considered under psychomotor domain (**shodhganga.inflibnet.ac.in**).

Team-handball is an Olympic sport ball game that is characterized by fast pace defensive and offensive action during the game with the objective of the game to score goals. To score goals, the offensive players attempt to establish an optimal position for the throwing player by fast movements over short distances performing powerful changes in direction (with and without the ball), one-on-one action against defensive players and passing the ball using different offensive tactics.

**Alexandru et al. (2014)** was conducted study to check the specialized sensory receptors in the muscles, joints and connective tissues enable the body to process information from a variety of stimuli, and turn that information into action. The key to creating what specialists refer to as movement intelligence involves individuals becoming consciously aware of their movements, and of the information their body is absorbing. To do this, stimuli are created to elicit a movement reaction through a variety of tasks or exercises. As skill improves, more stimuli are needed to continue improvement. So, the aim of this study was to prove the utility of complex and specific drills using additional materials in young handball players. The study has been developed on a sample of 10

young female handball players from CSS. Bacau, aged between 13-14 years. The evaluation of the subjects has been performed using the "T - Test", the "Slalom Test" and the "ZIGZAG Run Test", taken from the book "Functional Testing in Human Performance". The working protocol consisted in 8 coordinative and proprioceptive drills that were used during the training sessions and during warm-up, before official matches. An improvement in all values was recorded, as compared to the reference values.

**Zebis et al. (2008)** conducted study with aimed to implement neuromuscular training during a full soccer and handball league season and to experimentally analyze the neuromuscular adaptation mechanisms elicited by this training during a standardized side cutting maneuver known to be associated with non-contact anterior cruciate ligament (ACL) injury. Design: The players were tested before and after 1 season without implementation of the prophylactic training and subsequently before and after a full season with the implementation of prophylactic training. Participants: A total of 12 female elite soccer players and 8 female elite team handball players aged 26 6 3 years at the start of the study. Intervention: The subjects participated in a specific neuromuscular training program previously shown to reduce non-contact ACL injury. Methods: Neuromuscular activity at the knee joint, joint angles at the hip and knee, and ground reaction forces were recorded during a side cutting maneuver. Neuromuscular activity in the pre landing phase was obtained 10 and 50 ms before foot strike on a force plate and at 10 and 50 ms after foot strike on a force plate. Results: Neuromuscular training markedly increased pre landing activity and landing activity electromyography (EMG) of the semi-tenderness (P, 0.05), while quadriceps EMG activity remained unchanged. Conclusions: Neuromuscular training increased EMG activity for the medial hamstring muscles, thereby decreasing the risk of dynamic values. This observed neuromuscular adaptation during side cutting could potentially reduce the risk for non-contact ACL injury.

**Valovich McLeod et. al. (2009)** observed poor balance has been associated with increased injury risk among athletes. Neuromuscular-training programs have been advocated as a means of injury prevention, but little is known about the benefits of these programs on balance in high school athletes. Objective: To determine whether there is balance gains after participation in a neuromuscular-training program in high school athletes. Design: Nonrandomized controlled trial. Setting: All data were collected at each participating high school before and after a 6-wk intervention or control period. Participants: 62 female high school basketball players recruited from the local high school community and assigned to a training (n = 37) or control (n = 25) group.

Intervention: Training-group subjects participated in a 6-wk neuromuscular-training program that included polymeric, functional-strengthening, balance, and stability-ball exercises. Main Outcome Measures: Data were collected for the Balance Error Scoring System (BESS) and Star Excursion Balance Test (SEBT) before and after the 6-wk intervention or control period. Results: The authors found a significant decrease in total BESS errors in the trained group at the posttest compared with their pretest and the control group (P = .003). Trained subjects also scored significantly fewer BESS errors on the single foam and tandem-foam conditions at the posttest than the control group and demonstrated improvements on the single-foam compared with their pretest (P = .033). The authors found improvements in reach in the lateral, antero-medial, medial, and posterior directions in the trained group at the posttest compared with the control group (P < .05) using the SEBT. Conclusion: The study demonstrates that a neuro-muscular

training program can increase the balance and proprioceptive capabilities of female high school basketball players and that clinical balance measures are sensitive to detect these differences.

**Eugen et al. (2014)** evaluated the relationship between muscle strength and coordination capacity was examined handball players aged between 16-18 years old (M = 17.06, SD = 0.827). Strength indices were calculated by reporting the measured values to body weight. "The muscle strain differentiation test of hands" was used for the neuromuscular coordination capacity and the "Pendulum-throw target" test for the throwing accuracy. The paper notes that muscle strength, being below the optimal values, does not significantly influence the coordination capacity (CI = 95%). During this period, it is important to intensify the intramuscular coordination training, due to the qualitative aging of the SNC.

## 2. METHODOLOGY

This chapter describes the method of research design, population, sample, tools, used for research apparatus or instrument employed statistical tools and procedures systematically. This is a comparison type of study under the description research. The study was conducted on the handball and volleyball inter-collegiate players of Purulia district. Standard Procedure was followed to conduct this study. This was a comparative type of study under the Laboratory research. This comparison was conducted to find the "Comparison of Neuro-Muscular coordination between Handball and volleyball inter-collegiate players of Purulia district".

### 2.1 Selection of subjects

For comparing the neuromuscular researcher had selected total sixty subjects which were further divided into 30 handball and 30 volleyball inter-collegiate players. All the subjects were students of colleges of Purulia district. The selection process for subjects was purely based on random sampling technique. The subject's age group was ranged from 18 to 21 years.

### 2.2 Sample

Simple random sampling method was employed for the selection of subject from colleges of Purulia district. The subjects were (n=60), 30 Handball and 30 volleyball players and age range from 18 to 21 years.

### 2.3 Selection of variables

- Neuro-Muscular Coordination.

### 2.4 Tools Used

SL. NO.	TEST	PURPOSE OF THE TEST
1.	Eye-Hand Coordination Test	To measure the Neuro-muscular coordination between handball and volleyball inter-collegiate players

### 2.5 Statistical Design

The collected data from selected subjects were treated on following statistical technique:-

The statistical analysis of Independent-'t' test was used for the present study and the level of significance is set at 0.05.

1. Descriptive statistical technique was used to find out the scattering of the score.
2. Independent “t” test was used to find out the significant difference between handball and volleyball players.

### 3. RESULTS

The statistical analysis of data collected on 60 subjects (30 handball and 30 volleyball players) on Neuro-muscular coordination of inter-collegiate players of Purulia district has been presented in this chapter. The detailed statistical analysis are done systematically and presented in the form of tables and graphs. The depth analysis of the data presented in this chapter has been separated into two sections. The first section deals with descriptive statistical measures, of the Neuro-muscular coordination.

This section deal with the descriptive statistical analysis applied on data collected from subjects on the Neuro-muscular coordination that are included in the study in the form of variables.

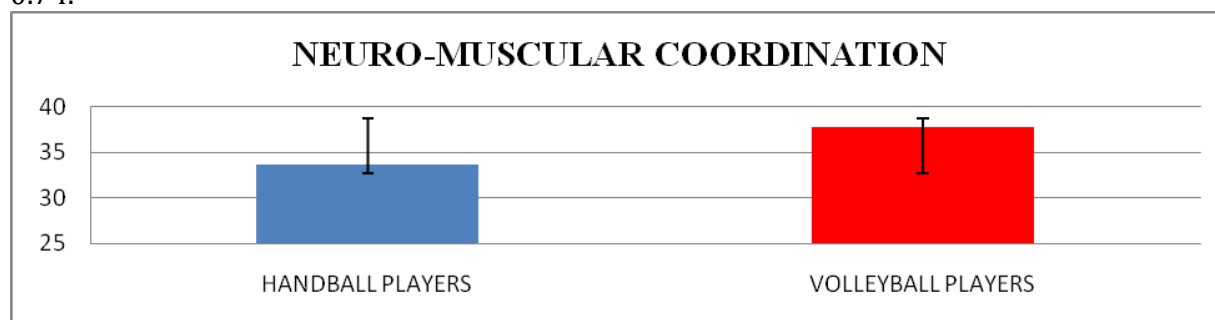
**TABLE 1**  
**DESCRIPTIVE STATISTICS ON THE NEURO-MUSCULAR COORDINATION OF HANDBALL AND VOLLEYBALL INTER-COLLEGIATE PLAYERS**

Group	N	Mean	MD	SD	SEM	Df	t-ratio
Handball Players	30	33.56	4.19	4.83	0.88	58	0.077
Volleyball Players	30	37.77		4.07	0.74		

Insignificant at 0.05

t.05 (58) = 2.00

Table 1 shows that, data collected on 30 handball players the mean was 33.56, standard deviation was 4.83 and standard Error of Mean was 0.88. For 30 volleyball players the mean was 37.77, standard deviation was 4.07 and standard Error of Mean was 0.74.



The graphical presentation of Neuro-muscular coordination between the 30 Handball and 30 Volleyball inter-collegiate Players

### 4. DISCUSSION

Human Physiological is consists of different types of components of fitness which makes every individual humans differ from each other. Hence, when it comes to understand. Human Physiological traits the origin of physiological comes into exit. Physiological is the connection of applied to Neuro-muscular, educational and theoretical science. It is the study of coordination, performance and the mental operations of people. Physiological is also in reference to the usage and application of coordination and

understanding various activities undertaken by humans and how they are used through daily activities, whether that is within events, talking to people, education and employment, relationships and coordination activities.

The research studies conducted on handball and volleyball players revealed that your coordination is very much influence from the different factors. In nut shell your Neuro-muscular coordination reflects the person coordination ability between muscle and neuron. The study was an Endeavour in similar way to find out and compare the diversity among the handball and volleyball inter-collegiate players in terms coordination. In this aspect the researcher had selected 30 handball and 30 volleyball players. The purpose was to assess the Neuro-muscular coordination of handball and volleyball inter-collegiate players of Purulia district.

In the light of the results of analysis researcher found that there were no significant difference was observed between the Neuro-muscular coordination of handball and volleyball inter-collegiate players of Purulia district. As studies shows that you're surrounding specially where you play having no influence on Neuro-muscular coordination. This dispersion because of demand of the sports and works which make you to react differs from situation to situation.

Here, also Neuro-muscular coordination of handball and volleyball players are regularly participating in sports activities and sports involvement bring changes in the performance in terms of coordination. Sports participation requires coordination between the neuron and muscular. Therefore, researcher felt these all above factors might be reasons to bring the no significant difference between handball and volleyball players Neuro-muscular coordination.

On the basis of literature, discussion with experts and the research scholar's own understanding it was hypothesized that-

Ho: There would be no significant difference among handball and volleyball in relation with neuromuscular coordination. Hence, this above hypothesis is accepted.

## **5. SUMMARY**

The purpose of the study was to compare the Neuro-muscular coordination of handball and volleyball inter-collegiate players in Purulia district. The present study was conducted on the 30 handball and 30 volleyball players on the basis of evidence available in the literature and with personal experience as well as discussion with experts the following hypothesis was formulated what there may be significant difference in Neuro-muscular coordination of handball and volleyball players in purulia district. The eye-hand coordination test was conducted for the collected, test was selected for the collection of data because it was found to be most reliable and have been very often used in research in profession physical education and sports.

In order to determine the Neuro-muscular coordination of handball and volleyball players independent 't'-test was employed and the level of significance was set (0.05) It is observe that, calculated value is 0.77 lower than the tabulated t- value 2.000, hence there is no significant difference was found between the Neuro-muscular coordination of handball and volleyball players.

## 6. CONCLUSIONS

On the basis of findings researcher able to draw following conclusion:-

1. Researcher concluded the data collected on Neuro-muscular coordination from selected subject; handball and volleyball players has shown their coordination, but volleyball players had showed better responses in comparison to handball players.
2. Further, researcher able to conclude that there was no statistical significant difference was observed in between handball and volleyball players Neuro-muscular coordination.

## REFERENCES

- Accinte-Alexandru, Alexandru., Eftene, Hantau-Cezar., Oscar-Gutierrez Aquilar., and Makoto, Muramatsu (2014)**, Neuromuscular Coordination and Proprioceptive Training in Young Handball Players”, *Procedia - Social and Behavioral Sciences*, **117**(19): 451-456.
- Black burn, T.A., Mcleod, W.D., White, B., et. al. (1990)**, “EMG Analysis of Post rotator cuff exercises”, *Athl. Train*, (25): 40-45.
- Barnhart dictionary of etymology (1988)**, New York: Wilson.
- Dictionary of the sport and exercise sciences (1991)**, Champaign, IL: Human Kinetics.
- Eugena, Bastiurea., Zenoviaa, Stan., Constantinb, Rizescu., Ionc, Mihaila., and Florinde, Andronic** “The effect of muscle strength on the capacity of coordination in handball”, *Procedia-Social and Behavioral Sciences*, (137):3-10.
- Hunter, M. D. (1966)**, A dictionary for physical educators, Doctoral dissertation, Indiana University, Bloomington
- Putnam, C. A. (1991)**, “A segment interaction analysis of proximal-to-distal sequential segment motion patterns”, *Medicine and Science in Sports and Exercise*, (23): 130-144.
- Schurr, E. L. (1980)**, Movement experiences for children: A humanistic approach to elementary school physical education. Englewood Cliffs, NJ: Prentice-Hall.
- Valovich McLeod, Tamara C., Armstrong, Travis., Miller, Mathew., Sauers, Jamie L.(2009)**, Balance Improvements in Female High School Basketball Players after a 6-Week Neuromuscular-Training Program, *Journal of Sport Rehabilitation*, (18): 1-17.
- Wilmore, J. H. (1977)**, Athletic training and physical fitness: Physiological principles and practices of the conditioning process. Boston: Allyn and Bacon.
- Zebis, Mette K., Bencke, Jesper., Andersen, Lars L., Døssing, Simon., Alkjær, Tine., M. S., Michael Kaer, Peter., and Aagaard, P. (2008)**, “The Effects of Neuromuscular Training on Knee Joint Motor Control During Side cutting in Female Elite Soccer and Handball Players”, *Clin. J Sport Med*, 18(3):29-337.
- Website:**  
[http://shodhganga.inflibnet.ac.in/bitstream/10603/95688/9/09\\_chapter%201.pdf](http://shodhganga.inflibnet.ac.in/bitstream/10603/95688/9/09_chapter%201.pdf)  
(15/01/2017).



## INFLUENCE OF HIGH ALTITUDE TRAINING ON PHYSIOLOGICAL VARIABLES AMONG COLLEGE LONG DISTANCE RUNNER

Javead Ahmed Itoo<sup>1</sup> and Dr. C.Vairavasundaram<sup>2</sup>

### Affiliation:

<sup>1</sup> Ph.D. Research Scholar Alagappa University College of Physical Education, Karaikudi, Tamilnadu, India

<sup>2</sup> Assistant Professor,, Alagappa University College of Physical Education, Karaikudi, Tamilnadu, India

---

### ABSTRACT

The purpose of the study was to find out the influence of high altitude training on physiological variables among college long distance runners. To achieve the purpose of the study thirty long distance runners from affiliated colleges of Kashmir University, Srinagar were selected at random and their age ranged from 18 to 25 years. The subjects were divided into two equal groups of fifteen each. Group I acted as Experimental Group High altitude training and Group II acted as Control Group. The requirement of the experiment procedure testing as well as exercise schedule was explained to the subjects so as to get full co-operation of the effort required on their part and prior to the administration of the study. The study was formulated as a post test only random group design. The duration of experimental period was 8 weeks. After the experimental treatment, all the subjects were tested on physiological variables namely vo<sub>2</sub> max and resting heart rate. This final test scores formed as post test scores of the subjects. The post test scores were subjected to statistical analysis using analysis of co-variance. In all case 0.05 level of confidence was fixed to test hypotheses. The High Altitude training, both in natural/terrestrial and artificial conditions, has been established as an effective means to improve on vo<sub>2</sub> max and resting heart rate among long distance runners after undergoing high altitude training for a period of 8 weeks.

**Keywords:** High altitude training, physiological variables, Long distance runners.

---



## 1. INTRODUCTION

The effect of high altitude on the human body, especially in relation to training, is gaining more popularity than ever. The many physiological effects of altitude on the body are being investigated much more thoroughly than previous research, especially in athletes who train and compete at altitude (Chapman, 2013; Epthorp, 2014; Garvican-Lewis, et.al., 2013; McLean, et.al., 2013 )

Endurance athletes around the globe began training at altitude in earnest in conjunction with the 1968 Mexico City Olympic Games, studies from that era largely failed to conclusively show an advantage to training at altitude for the purposes of enhancing sea-level performance. The physiological changes that occur with altitude exposure, potential mechanisms for improved exercise performance in the heat, and considerations for implementation in a training program (Vandermark, L. W., Lorenzo, S 2018). The required scientists and coaches to cope with the expected decline of performance in endurance athletes and to establish optimal preparation programs for competing at altitude mostly based on the separate consideration of the physiology of acclimatization, psychological issues, performance changes, logistical or individual aspects, but there is no review considering all these aspects in their entirety. Therefore, the primarily focuses on the period of altitude sojourn prior to the competition at altitude based on physiological and psychological aspects complemented by nutritional and sports practical considerations (Cao,Y& Nishiyasu, T. 2019).

The idea is that this method maintains maximal augmentations in total hemoglobin mass while reducing the performance impairment of high-intensity sessions performed at moderate altitude and thus preventing any detraining that can occur when athletes live and train at moderate altitude. Scientific investigation has focused on the optimization of the theoretically beneficial aspects of altitude acclimatization, which include increases in blood hemoglobin concentration, elevated buffering capacity, and improvements in the structural and biochemical properties of skeletal muscle. However, not all aspects of altitude acclimatization are beneficial; cardiac output and blood flow to skeletal muscles decrease, and preliminary evidence has shown that hypoxia in itself is responsible for a depression of immune function and increased tissue damage mediated by oxidative stress (Bailey, D. M., & Davies, B. 1997). The excellent running economy of Eritreans is associated, at least partly, with anthropometric variables. Comparison of their sub maximal running cost with other published data suggests that superior running economy, rather than enhanced aerobic capacity, may be the common denominator in the success of black endurance runners of East African origin.( Lucia, A Foster, C. 2006).

The purpose of the study was to find out the influence of high altitude training on physiological variables among long distance runners. It was also hypothesized that there would be significant difference on the physiological variables of long distance runners due to high altitude training.

## 2. METHODOLOGY

### 2.1 Selection of Subjects

To achieve the aim of present study, a total of thirty long distance runners were selected randomly from affiliated colleges of Kashmir University, Srinagar and treated as subjects. The age ranged was from 18 to 28 years of subjects.

The subjects were divided into two equal groups of fifteen each. Group I acted as Experimental Group (High altitude training Group) and Group II acted as Control Group. The subjects were selected from Srinagar based on high altitude training in Gulmarg.

### 2.2 Selection of Variables and Test

The following physiological variables and tests were selected for the purpose of study:

S.No	variables	Tests	units
1.	Vo2 Max	Harvard Step test	Seconds
2.	Resting Heart Rate	Heart Rate Monitor	Seconds

### 2.3 Research Design

The study was formulated as a posttest only random group design. The duration of experimental period 8 weeks. After the experimental treatment, all the subjects were tested on physiological variables namely vo2 max and resting heart rate. This final test scores formed as post test scores of the subjects.

### 2.4 Training Period

The duration of training programme for the present study was confined to 5 days a week with about 8 weeks as total period

### 2.5 Limitation

Certain factors such as life style, rest period, day to day activities, family factors and food habits and Socio-economic background were not be taken in to consideration.

### 2.6 Statistical Analysis

The post test scores of control and experimental group were subjected to statistical analysis using Analysis of Co-variance (ANACOVA). In all case 0.05 level of confidence was fixed to test hypothesis.

## 3. RESULTS AND DISCUSSION

TABLE 1  
DESCRIPTIVE STATISTICS ON SELECTED PHYSIOLOGICAL VARIABLES AMONG COLLEGE LONG DISTANCE RUNNER

S.No	Physiological Variables	High Altitude Training Group		Control Group	
		Pre-Test Mean	Post-Test Mean	Pre-Test Mean	Post-Test Mean
1	Vo2 Max	75.85	76.31	75.69	75.67
3	Resting Heart Rate	75.60	73.13	75.73	76.46

The table 1 shows that the pre and post test means of two groups on selected vo2 max and resting heart rate of college long distance runner.

**TABLE 2**  
**ANALYSIS OF VARIANCE OF PRE TEST SCORES ON SELECTED PHYSIOLOGICAL VARIABLES**  
**AMONG COLLEGE LONG DISTANCE RUNNER**

Variables	Source of Variance	Sum of Squares	df	Mean Squares	F-Value
Vo2 Max	Between Groups	0.195	1	0.195	0.240
	Within Groups	22.80	28	0.814	
Resting Heart Rate	Between Groups	0.133	1	0.133	0.007
	Within Groups	550.5	28	19.66	

Insignificant at .05 level

$$F_{0.05}(1, 28) = 2.15$$

In table 2, the results of analysis of variance of pre test scores on Vo2 Max (.240), Resting Heart Rate (.007) were lesser than the table value of 2.15 indicating that it was not significant for the degrees of freedom (1, 28) at 0.05 level of confidence indicating that the random sampling was successful.

**TABLE 3**  
**ANALYSIS OF VARIANCE OF POST TEST SCORES ON SELECTED PHYSIOLOGICAL VARIABLES**  
**AMONG COLLEGE LONG DISTANCE RUNNER**

Variables	Source of Variance	Sum of Squares	df	Mean Squares	F-Value
Vo2 Max	Between Groups	3.04	1	3.04	3.83*
	Within Groups	22.20	28	0.793	
Resting Heart Rate	Between Groups	83.33	1	83.33	4.24*
	Within Groups	549.16	28	19.62	

\*Significant at .05 level

$$F_{0.05}(1, 28) = 2.15$$

In table 3, the results of analysis of variance of pre test scores vo2 max (3.83), resting heart rate (4.24) were greater than the table value of 2.15 indicating that it was not significant for the degrees of freedom (1, 28) at 0.05 level of confidence indicating that the random sampling was successful.

**TABLE 4**  
**ANALYSIS OF CO-VARIANCE SCORES ON SELECTED PHYSIOLOGICAL VARIABLES AMONG**  
**COLLEGE LONG DISTANCE RUNNER**

Variables	Source of Variance	Sum of Squares	df	Mean Squares	F-Value
Vo2 Max	Between Groups	1.709	1	1.709	129.8*
	Within Groups	0.355	28	0.013	
Resting Heart Rate	Between Groups	76.90	1	76.90	101.6*
	Within Groups	20.45	28	0.757	

\*Significant at .05 level

$$F_{0.05}(1, 28) = 2.15$$

In table 4, the results of analysis of co-variance of post test scores vo2 max (129.8), resting heart rate (101.6) were greater than the table value of 2.15 indicating that it was not significant for the degrees of freedom (1, 28) at 0.05 level of confidence indicating that the random sampling was successful.

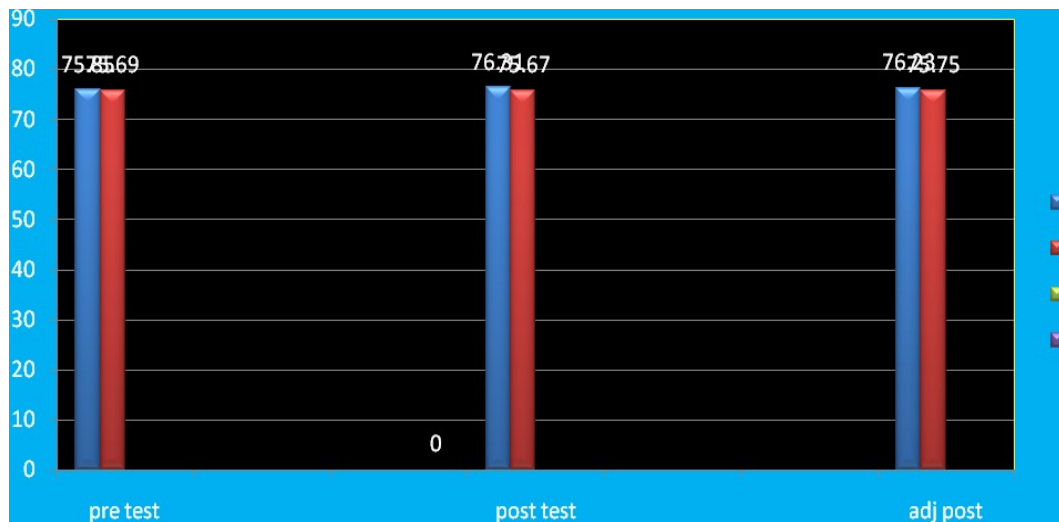


Figure-I: Post Test Differences of the High Altitude Training and Control Groups of Vo2 Max

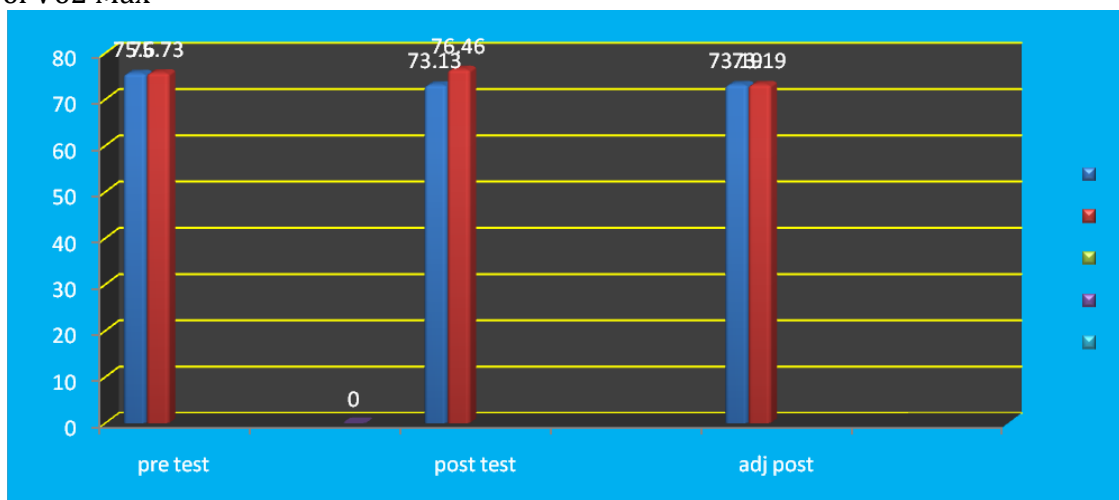


Figure-II: Post Test Differences of the High Altitude Training and Control Groups of Resting Heart Rate

#### 4. CONCLUSION

1. The high altitude training had shown significant improvement in physiological variable vo2 max among college long distance runners after under going high altitude training for a period of eight week
2. The high altitude training had shown significant improvement in physiological variable resting heart rate among college long distance runners after under going high altitude training for a period of eight week.

### REFERENCES

- Bailey, D. M. & Davies, B. (1997).** Physiological implications of altitude training for endurance performance at sea level: a review. *British journal of sports medicine*, 31(3), 183-190.
- Chapman, R. F. (2013).** The individual response to training and competition at altitude. *British Journal Of Sports Medicine*, 1-6.
- Cao, Y., Ichikawa, Y., Sasaki, Y., Ogawa, T., Hiroyama, T., Enomoto, Y., ... & Nishiyasu, T. (2019).** Expiratory flow limitation under moderate hypobaric hypoxia does not influence ventilatory responses during incremental running in endurance runners. *Physiological reports*, 7(3), e13996.
- Epthorp, J. A. (2014).** ALTITUDE TRAINING AND ITS EFFECTS ON PERFORMANCE - SYSTEMATIC REVIEW. *Journal Of Australian Strength & Conditioning*, 22(1), 78-88.
- Garvican-Lewis, L. A., Clark, S. A., Polglaze, T., McFadden, G., & Gore, C. J. (2013).** Ten days of simulated live high:train low altitude training increases Hbmass in elite water polo players. *British Journal Of Sports Medicine*, 1-4
- Lucia, A., Esteve-Lanao, J., Oliván, J., Gomez-Gallego, F., San Juan, A. F., Santiago, C., ... & Foster, C. (2006).** Physiological characteristics of the best Eritrean runners—exceptional running economy. *Applied physiology, nutrition, and metabolism*, 31(5), 530-540.
- Levine, B. D., & Stray-Gundersen, J. (1997).** “Living high-training low”: effect of moderate-altitude acclimatization with low-altitude training on performance. *Journal of applied physiology*, 83(1), 102-112.
- McLean, B. D., Buttifant, D., Gore, C. J., White, K., Liess, C., & Kemp, J. (2013).** Physiological and Performance Responses to a Preseason Altitude-Training Camp in Elite Team-Sport Athletes. *International Journal Of Sports Physiology & Performance*, 8(4), 391-399.
- Vandermark, L. W., Lorenzo, S., & Chapman, R. F. (2018).** Altitude. In *Sport and Physical Activity in the Heat* (pp. 125-144). Springer, Cham.

### **GUIDELINES FOR AUTHOR**

The Indian Journal of Physical Education, Sports and Applied Sciences is a quarterly journal publishes scientific research and review articles on sports and sports science disciplines and other such subjects having inter-disciplinary perspective with specific application to sports.

Manuscripts are accepted for publication with the understanding that they have not been published, simultaneously submitted, or already accepted for publication, elsewhere.

Manuscripts deemed suitable are acknowledged and critically reviewed by a qualified, independent, expert evaluator, through a secret evaluation system. The evaluator's comments may be communicated to the principal author along with the comments of the Editor.

All the manuscripts are to be submitted by the principal author to the Editor-in-Chief/Editor, Indian Journal of Physical Education, Sports and Applied Sciences by e-mail as well as on mailing address along with a letter of intent for publication. This covering letter should also contain the following certificate:

"It is certified that this article is my/ our own original research work which has not been published, simultaneously submitted, or already accepted for publication, elsewhere.

"I have the consent of the co-authors for this submission and I/we transfer the ownership of the copyright to the publisher, in the event of publication of this article."

The covering letter should contain a complete mailing address of the principal author. The Editor-in-Chief/Editor may acknowledge the receipt of the same, as well as, handle all future correspondence.

#### **Manuscript Preparation**

All parts of the manuscript should be typewritten, double-spaced, with margins of at least 3 cm on all sides. Number manuscript pages consecutively throughout the paper. Each manuscript should include title page, the second title page and text, and may contain up to 20 pages. Authors should also supply a shortened version of the title suitable for the running head, not exceeding 50 characters with spaces. Each article should be summarized in an abstract. Abstracts should be accompanied by three to five keywords that will facilitate indexing and data retrieval purposes.

The title page should contain the title of the study and the names, qualifications, employment status, the employing institution and the place and state, of all the authors. The title being brief, should not contain the words like 'A Study Of or 'A Probe into' etc.

The second title, the page following the title page should contain the title of the study, abstract and key words. The numbering of pages should begin here. The third page should contain the text including introduction, methodology, results, discussion, conclusion, and references. All these heads are to be typed on the left hand in upper lower type, in case there are no subheads like purpose of the study, review of literature, hypotheses, and limitations of the study and its implications. When there are sub-heads, the heads are to be typed in all capitals and the sub-heads in upper-lower type letters. Abbreviations must be spelt.

#### **Abstract**

The abstract should be self-explanatory, of about 150 words; suitable for use by the abstracting journals, without rewording and should state what was aimed, what was done,

what was found and what was concluded. For the review article, the abstract should be a concise summary.

### **Keywords**

Following the abstract, the author should list not more than six key words that do not appear in the title, that represent the content of the manuscript.

### **Introduction.**

This describes the present state of knowledge of the subject or the review of the literature, the concise statement of the problem, the aim of the research, and the development of the research hypotheses. It should include the practical and applied questions around which the study was developed.

### **Methodology**

This section should include a complete description of subjects, materials, equipments, procedures and experimental techniques. It should also include the description of the statistical methods used to analyze the data. The methods and the statistical procedures published in detail before hand should be cited. Units of measurement, symbols and abbreviations must conform to the international standards. Metrics system is preferred.

### **Results**

This section should include a concise presentation of the data. Figures, tables and photographs may be used to show the results of the study. Tables and figures should not be used for the presentation of the same data. The subjects must not be identified by name or any other recognizable label.

### **Discussion**

The discussion part should contain the interpretation of the results with possible comparisons with other relevant studies. The discussion must be rigorous and correspond to the data and the hypothesis. New-hypothesis, if any, may be stated. Recommendations, if any, question of practical application, consistent with the limitations of the study, may be included.

### **Conclusion**

This should briefly state the conclusions drawn from the study. Conclusions should not be drawn without any supporting data.

### **References**

All sources, cited in the text, must be also cited in the reference list. The reference list includes circulated material, i.e., books, journal, proceedings, films, etc.

### **Tables**

Each table should be typed on separate sheets, numbered consecutively in Roman numerals at the top centre, and given collectively after the references. Each table should have a brief but meaningful title which should start next to the Table Number after colon. Explanatory matter and non-standard abbreviations should be given in the footnote, and not below the title. Tables should be referred in the text.

### **Illustrations**

All figures and illustrations should be either artwork in black ink on Art Card or 5" x 7" glossy prints. The photographs should be glossy black and white having good contrast. The letters used in the illustrations and photographs should be of sufficient size to withstand reduction to single column size. Figures should be numbered in Arabic numerals. Captions of photos and illustrations and the legends should be typed on a

separate sheet. All illustrations must be identified on the back by gently writing in ink or pencil, indicating illustration number and the author.

Art work should be done professionally, Art work carried out by the publishers, out of necessity, would be charged to the authors.

The authors must send a CD containing the material meant for publication, to facilitate printing.

---

#### **CHECK LIST OF THE DOCUMENTS TO BE SUBMITTED BY THE INVESTIGATOR**

- 1. Individual Subscription form**
- 2. Hard copy of the original Manuscript**
- 3. Soft copy of the original Manuscript**
- 4. Copyright Transfer Statement**
- 5. Subscription Fees in the form of Demand Draft of Nationalized Bank.**
- 6. Manuscript of the research paper will be typed in M. S. Word 2003**
- 7. Follow the other instructions as given in Guidelines for the author.**



**INDIAN JOURNAL OF PHYSICAL EDUCATION , SPORTS AND APPLIED SCIENCES**

ISSN: 2229-550X (P) 2455-0175 (O)  
**COPYRIGHT TRANSFER STATEMENT**

Manuscript Title : .....

Name 1 ..... Address .....

Mailing Address: .....

Telephone: .....Email ..... Institutional Affiliations .....

Name 2 : ....., Address .....

Mailing Address: .....

Telephone: ..... Email .....

Institutional Affiliations .....

Name 3 : ....., Address .....

Mailing Address: .....

Telephone: ..... Email .....

Institutional Affiliations .....

Corresponding Author - Name .....email .....

Each author warrants that his submission to the work is original and that he or she has full power to enter into this agreement. Neither this work nor a similar work has been published elsewhere in any language nor shall be submitted for publication elsewhere while under consideration by IJPESAS Each author also accepts that the IJPESAS will not be held legally responsible for any claims of compensation.

Authors wishing to include figures or text passages that have already been published elsewhere are required to obtain permission from the copyright holder(s) and to include evidence that such permission has been granted when submitting their papers. Any material received without such evidence will be assumed to originate from the authors.

We are in agreement with the statements and we accept scientific and legal responsibility of the article

Name1 .....Date .....Signature.....

Name2 .....Date .....Signature.....

Name3 .....Date .....Signature.....