

A study of Performance Variables of Athletic Potentiality among High School Boys**Manoj Goel**

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Abstract: Today, in the modern competitive era sportsman is in a race to excel others and competition has become a fundamental mode of human expression as it is one of the very important functions by which National and International recognition and prestige is gained. From its very simple form, sports have emerged into highly organized activity of human society and it has become a complex social and cultural phenomenon.

Keywords: Athletic Potentiality, Performance Variables, High School Boys, University level

Introduction

During fourth century B.C. Plato (429.C. -347B.C) recorded such observations that, "The chief instruments of education from the age of six will be music and gymnastics. At that age they begin actual lessons. The boys are to be taught riding and archery and the use of sling. We must not teach the children anything elaborate or professional, but only simple physical drill with simple songs, taking as our model what is required in war and the service of the Gods. The question of the games and toys becomes more important at this age. The greatest of all revolutionaries is the man who invents new games and finer toys, for the boy who has played different games in youth will grow up a different sort of man".

Sports: "Sports by their very nature are enjoyable, challenging, all absorbing and require a certain amount of skill and physical conditions".

In the order of human values conquest in the field of sports holds on unique place. It is success, victory, triumph and domination of some over others because a sport is comradeship and friendship. The sublimity of competition lies in the loser's acclaim for the winner, which along with the friendly handshake acknowledges both defeat and triumph. Sport is many sided social phenomenon which under certain social conditions has general, cultural, ideological, aesthetic, pedagogical and economic significance. Hence the reasons of all- incoming attention to sport in a society become understandable.

Sports Today:

Sports are as old as the human society, and it has achieved an universal following in the modern times. It now enjoys a popularity which outstrips any other form of social activity. It

has become an integral part of educational process. Millions of fans are participating in sports activities with full enthusiasm for the fun of it or for health, strength and fitness. It is taking the shape of a profession to some with high skills, with ample financial benefits linked with high degree of popularity.

It holds a prominent place in the modern life. Millions of people participate in sports activities, watch and read about them and spend huge amount of money annually on sports related activities and equipments. Technology permeates every aspects of life. Sports are no exception to it. Science applied to sport has enabled modern youth to develop physical capacities beyond anything earlier imagined. Sports have become highly competitive and records are being broken with great rapidity. With the rapid development of sports into a highly organized and intensely completive social phenomenon, the re has emerge a clear cut classification of sports on the basis of goal and intensity of participation, namely, recreation sports, health or conditioning sports and competitive sports.

Sports in Indian Context:

In India, education as a whole is going through radical changes. The Government of Indian keeping in conformity with the UNESCO Charter has accepted in principle to introduce sports and physical educational system for fosterin fundamental human values, solidarity, fraternity and mutual respect of the human beings. Unfortunately all that were planned and thought of could not be implemented and Indian youths including children are still lagging far behind. After the successful completion of IX Asian Games at Delhi, India, in 1982 and Commonwealth Games at New Delhi, India, in 2010 there were a radical change in affairs of sports and physical education in our country. Serious endeavors have been made to develop the sports talent from grass root level. Search for sports talent and to groom them in a desire manner is going on. Government of Maharashtra, Physical Educational Directorate, has also taken a drive since 1982 to select potential athletes, through the competition among the primary students at each District.

As a matter of fact the competitions right from primary School level to higher level – step by step – up to state level has been introduced in search of sports talents. And the present research is directed to find the qualities of the young primary level boys and focus lights on this talent search process.

Physical Activity and Childhood- A Historical Perspective:

Physical activity and childhood have a very natural relationship. We have no clear information about the behavior of children in prehistoric times. Archeological evidences from early civilizations have revealed a variety of sports and games, participated not only by the adult but also the youngsters. Greek civilization was marked by major interest in games and sports. At that time boys from the ages 7-18 years has to attain a semi military School. They were trained in such a manner from early childhood so that they could develop a strong body, physical beauty, mighty skill, irresistible strength. Sports became linked with philosophy, music,

literature, painting and sculpture acquiring an intellectual respectability, all to commonly lacked today.

In the High age, the church retracted behind the walls of its monasteries and the negative aspects of asceticism gained the upper hand. Fasting and contemplation were reinforced by a stern opposition to such body building pursuits as athletics. Even during this period some famous painters in their works illustrated many informal activities enjoyed by mediaeval children.

The Renaissance weakened the hold of the Church on education and it became possible to contemplate again the balanced pattern of instruction favored in ancient for improvement of performance slowly gained and increasing popularity during this period. The emphasis on physical culture was not only for the development of the strength and military skill, but also a beautiful and graceful body.

A summary of the writings of recognized authorities and of previous research provides evidence that the researcher is familiar with what is already known and what is still unknown and interested. Since effective research is based upon past knowledge, this helps to eliminate the duplication of what has been done and provides useful hypotheses and helpful suggestions for significant investigation.

Various Studies on Physical Fitness:

Shrivastav (2009), Studied to find out the effect of yogic Asanas upon Motor Ability which can help the people involved in physical activity 100 male subjects were selected ranging age group between 15 to 18 years. The basic motor ability of all 1000 subjects tested according to Barrow's Motor Ability Test, i.e. Standing Broad Jump Zig-Zag run, and Six Ponds Medicine Ball Put. From this 100 subjects 60 subjects were selected according to Barrow's Motor Ability by random sampling and they were divided into two equal group i.e. control group and experimental group. Following Asanas had been selected for experiment to ascertain to ascertain its effect upon motor ability i.e. Vrikshansan, Parivartta Trikonasan, Parivrattra Parshwakonasana, Lolasana, Gomukhasana, Yogamudrasana, Ardha badha Padma Paschimothanasan. The Findings were

The agility has been developed through yogic asanas with high level of significance.

1. Yogic Asanas have improved the strength Low-Significantly at 10 level of confidence.
2. Power has been developed through of Yogic Asanas.

The purpose of the study done by Toka et al. (2009) was to find out the relationship between academic achievement and physical fitness Among university students of two Asian countries viz. Iran and India. This research was carried out among 1120 regular university students. The sample is consisting Pune university boys students (PUBS = 56) and Teharan University boys students (TUBS = 560) of age ranging 16 to 25 years. All the subjects were measured in selected physical fitness tests and the data of Academic achievement of all the subjects was

also collected. The results indicated that there is no Significant Positive correlation found between Academic Achievement and Physical Fitness Components of Tehran university students. In case of Pune university students one physical fitness component i.e. Flexibility has significant positive correlation with Academic Achievement and in case of other components no significant Positive correlation was found.

Sajwan (2006), conducted study on 1200 boys of 10-11 years of age taken from four different states of south India, Namely Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. 150 subjects belong to each age group were selected randomly from various Schools, these adding to a total of 600 subjects. To compare the physical development and motor performance of four groups, one-way Analysis of variance (ANOVA) followed by Sheffe's Post-Hoc Test was applied to find out the significance of differences between paired mean at 0.05 level.

It was found that body weight and all motor performance components namely speed, explosive power, agility, endurance and strength endurance were significant. In case of stature (Height) F-ratio was not found to be statistically significant. This indicates that variability exists among the motor performance components and body weight of 10 years boys from the four different states of South India.

The further finding of present study in comparing the physical development and motor performance of 10-11 years boys from different states of South India revealed contrasting results in the selected traits and abilities.

And also the findings related to physical development as observed from change in height and weight revealed that in the 10 years age group, there were no significant differences among the boys from the four states.

In 11 year age group, Andhra Pradesh boys were found to be significantly taller than those from Kerala, Karnataka and Tamil Nadu. Similar to the development of stature, the Andhra Pradesh boys were found to be the heaviest in 10 and 11 year age and significantly differed from the boys of all other three states.

The purpose of the study of Ghuman, et al. (2006), was to investigate the Motor Fitness and Personality of University level Individual and Team Game Players. A sample of 400 players for the study was taken from Amravati University, Amravati (M.S.) India. The sports disciplines namely. Track and field, Wrestling, Judo, Swimming, Basketball, Handball, Football and Volleyball were included and each group consisting of at least 50 players. Motor fitness of the subjects was assessed by AAHPER Youth Fitness Test where as personality fitness of the subjects was measured by employing Eysenck Personality Questionnaire (Eysenck, 1980). Data were analyzed by applying test of significance to examine the significance of mean difference, if any, between individual and team game groups. Analysis of data revealed that individual and team game players significantly differed on extroversion trait of personality ($t=2.41$; $p<.5$). However, individual and team players did not show any significant differences on other personality traits namely psychoticism, neuroticism and social desirability ($t= 0.20, 1.16$ and 0.2 ; $P<0.05$). ANOVA showed social desirability traits of

personality ($F= 13.98, 5.11, 4.83$ and $19.78; P<0.05$). Scheffe's Post hoc analysis further indicated that Volleyball players showed more Psychoticism as compared to other game players- individual as well as team. Judokas were more neurotic among all games investigated in this study. Basketballers and Athletes showed more extroversion tendencies than other sports groups. Basketballers and wrestlers showed more tendencies of social desirability.

Arya (2004), studies seventy two male Basketball players of different Universities of Madhya Pradesh those who participated in M.P State Inter Division (Inter University) Basketball championship were selected as subject. Subjects selected for this study were studying in graduate and post graduate classes of different colleges of Madhya Pradesh and the average of the subjects were from 18-25 years of age. In order to, study the relationship of selected physical fitness variables i.e Speed, Strength, Endurance, Flexibility and Agility with the scores of Basketball playing ability.

The study showed that the strength of R.D. University, Jabalpur ($r= 0.591$) Endurance of H. S. Gaur, Sagar ($r= 0.822$), Flexibility ($r= 0.584$) and agility ($r= 0.604$) of Jiwaji University, Gwalior has exhibited significant relationship with the performance of the subject while other variables has shown insignificant relationship.

Vorster (2000), studied the impact of urbanization on Physical, Physiological and Mental Health of Africans in the Northwest Province of South Africa. For comparing physical fitness test items, pull-ups, sit-ups, shuttle run, standing broad jump, 50 meter dash, soft ball throw for distance, 600 meters run/walk and NPED 100 meters run was used. Two hundred subjects were involved from high School of Delhi, both in rural as well as urban areas. The results showed that there is no significant difference in the physical fitness level obtained from AAHPER youth fitness tests between rural and urban high School of Delhi. There is no significant difference in the physical fitness level obtained from NPED test between rural and urban high School of Delhi. Significant relationship exists between AAHPER test and NPED test performance. Same rate and girls were significantly taller and heavier than boys during adolescence. American girls and boys were taller and heavier than Brazilian boys and girls.

Bawa et al). (2000) Studied Fitness is a pre-requisite to the desired end of optimum efficiency in high class volleyball team, which can be achieved through appropriate conditioning programme. As "Gymnastics as a mother sport", gymnastic exercises with and without apparatus are extremely important for developing over all and all around fitness of an athlete. A good training programme includes, activities aimed at improving each component of physical fitness and fortunately almost all components can be developed by gymnastic exercises. Russel (1984) commented that an athlete's physical or motor attribute could be enhanced through the use of gymnastics. He stated further that athletes from other sports could supplement their training with gymnastics conditioning program for developing fitness and skills in volleyball, the present investigation was planned to find out the effect of gymnastics oriented training programme on physical fitness and technical performance level of the volleyball players. The study was conducted on 27 male volleyball players of Diploma Course in Sports Coaching at NS, NIS, Patiala and NS Eastern Center, Calcutta. Out of 27 subjects, 12

students were taken as the experimental group, where as 15 students taken as control group for the study. The following physical fitness tests and technical skill tests were administrated on each subject before implementing the gymnastic oriented training programme and also after completion of 4 weeks gymnastic oriented training programme. The physical fitness, measuring tests; Vertical Jump, Pushups, Chin ups, Sit ups, Back strength, 30m sprint, Boom rang test, 6000 m. run. Sit and Reach, Bridge up and Shoulder rotation were conducted to measure the physical fitness of the subjects where as self- guarding. One arm pass with side rolling and forward dive tests were conducted to measure the technical performance of the subjects. The above physical fitness and technical skill measuring tests were administered on each subject before starting the training programme and after 4 weeks. It has been found that both the physical fitness and skill proficiency of the volleyball players can be increased through participation in gymnastic oriented conditioning programme.

Pal and Bora (1993), Studied to establish the relationship between scores. Obtained by subjects on various tests for selected components of Motor fitness and their performances in High Jump, Product Moment Correlation was applied.

Fifty-five male students, whose performances in high jump were ranging from 140 to 170 cm. were selected as subjects of the study. Subjects studying in three year Bachelor Degree and two-year Master Degree courses in Physical Education at Gwalior and Trivendrum. The subjects belonged to different states of India, and their ages ranged from 17 to 26 years.

The performances of the subjects in selected Component of Motor Fitness i.e. 50 yard dash, 4x10 yards shuttle Run, Bridge-up test, Sit and Reach test, standing Broad Jump. Sergeant jump and performance of High Jump.

The result showed that value of coefficient of co-relation of the performance in High Jump with speed was 0.921, with Flexibility for spine 0.286 and with Explosive strength were 0.392 and 0.664. All these values found to be significant at 0.05 level.

Result also indicated the non-significant values of coefficient of correlation of the performance in High Jump with Agility and of the same with Flexibility for Hip were 0.230 and 0.0 15 respectively. However, the relationship, in case of Agility was closer to the significant value.

The study showed, there was significant relationship between the performance in High Jump and selected Motor fitness Components. Agility and flexibility for Hip Joint did not prove to have significant relationships with the performance of High Jump.

The purpose of the study by Verma and Bhandari (1989), to investigate the comparative study of Physical Fitness variables of players of individual and team games. Selected the total 720 players 90 from each of four individual, i.e. athletics, gymnastic, wrestling and boxing and 90 from each of the four team games, i.e. Hockey, Football, Basketball and Volleyball from different Districts of Haryana State were as the sample. Conducting the physical fitness test of the various components, i.e. Zig-Zag run, Standing Broad Jump, Shut Put, Bend and Reach and Cooper's and 12 minute Run/walk on individual and team games players. The investigator

concluded that team games players had higher speed, agility and endurance than individual games players and more power, strength and flexibility than team games players.

Cab (1988), conducted the study on selected freshmen who had enrolled at the University of North Dakota, but did not participate in inter collegiate athletics during their four years of college and athletes who participated for three years in collegiate football, basketball, wrestling, cross-country etc. The AAHPER Youth Fitness Test was administered in 1963 and both groups were rested during the first semester of 1999-67. Some of the conclusions indicated by this study were that the athletes showed significant improvement in all the selected measures of physical fitness except the 50 yard dash and the non-athletes showed a significant superior in sit-ups, standing broad jump and 600 yard run/walk.

Alfa, (1986), studied the inception of the Department of Physical and Health Education of Ahmadu Bello University, Zaria, Nigeria in 1973 there has been a physical fitness test instituted as a part of the interview conducted for selective admission. The main objective has to provide the department with an opportunity to admit very good students.

The practice has continued to attract criticism from others who consider it as a waste of time and not necessary. This study was undertaken to cross-validate the physical fitness test items used during the test with available data from other nations to examine the achievement of the department's objective, to examine the physical fitness status of the candidates in comparison with available fitness test standards in other nations.

It involved 401 candidates, both male and female who either applied for the Diploma or the undergraduate Degree Programme in year 1985-86 session an average range from 20 to 27 years.

All participated in the physical fitness test items of a 12 minutes run test, a one-minute bend knee sit-ups test a one —minute push up test, a sit and reach test, a standing broad jump test, a pull up test and skin fold test. This was to evaluate their cardio respiratory muscular power, muscular endurance, joint flexibility, muscular dynamic strength and endurance and body composition fitness status.

The data collected were analyzed at the Columbus campus of the Ohio state University Computer center, for t- test, one-way and two-way ANOVA , multiple co-relations and regression. The results from this study suggested that the items were valid the Diploma students performed better in general than their undergraduate counter parts, the department has not fully achieved the objective of using physical fitness as part of the admission requirement because the candidates were found 'to be weak in some fitness parameters other than cardio respiratory and flexibility. However, the practice should continue and the areas where the candidates were found weak be improved through curriculum content review.

The purpose of the study, by Porins (1985) , was to predict the general athletic ability of boys in the elementary School. The three items which were selected for the Prins Motor Ability Test

were the pull-up, the 50 yard dash, and the basketball throw for distance. These were selected after a study was made of 147 Peoria, Arizona elementary School boys. Over a period of two years , scores were gathered on each boy tested in each of the following :pull-ups; push-ups; sit-ups; mile-run; grip strength; standing broad jump; 50 yard dash; football punt for distance; and Harvard Step Test.

After completion of the statistical procedure, the investigator made a linear correlation between all of the test items. The pull-ups, 50 yard dash, and the basketball throw for distance proved statistically to be of the most value in predicting general athletic ability for the boys of elementary School age.

Murlidharan (1984), conducted the study to find out relationship between anthropometric and physical performance variable measures to performance in long jump. The average age of the subjects were 22 years Pearson Product Moment was used to compute correlations between performance in each independent variable namely standing broad jump, 50 yard dash, shuttle run (4 X 10 yards), sit and reach, vertical jump (leg length), Height and weight. The data were tabulated in the form of scatter grams. The independent variables were taken on 'X' axis and the dependent variables on 'y' axis. For 'x' axis and the dependent variables on 'y' axis for testing the hypothesis the level of significance was set at .05 level of confidence. The findings indicated that the anthropometric and physical performance variables were very reliable for predicting performance in long jump. From the findings of the study it may be concluded that 1) leg length, height, standing broad jump, 50 Mts. Dash, shuttle run (4 X 10 yards), sit and reach and vertical jump were the most significant independent measurements in prediction sources in running long jump 2) body weight did not prove to be reliable when single independent variable was correlated with the performance of running long jump. Therefore weight should not be used singly for predicting performance in running long jump.

Alam's (1983), study was undertaken to find out the relationship of reaction time, agility and flexibility to performance in running broad jump of the 5 male students form first year degree class of bachelor of physical education at Lakshmibai National College of Physical Education, Gwalior. Pearson Product Moment Correlation Method was used to compute correlation and significance of the study was found by employing Pearson's product moment correlation between running broad jump and reaction time, agility and flexibility. The findings of the study revealed that there was significant correlation between running broad jump and flexibility. The obtained value of correlation was found statistically significant at 0.05 level of confidence. The following conclusions were drawn:

1. There is significant correlation between reaction time and running broad jump.
2. There is significant correlation between agility and running broad jump.

In majority of the sports events and competition, it is the level of the physical variables such as speed, agility, power, strength and endurance etc. Which often decide the fate of the game; based on the above mention criteria the following variables were selected.

Physical Fitness Components

1. Speed
2. Agility
3. Power
4. Muscular strength and Endurance
5. Cardio — Respiratory endurance

Anthropometric Measurements:

1. Standing Height
2. Weight
3. Leg Length
4. Calf Girth
5. Thigh Girth
6. Chest Girth
7. Shoulder Width

Physiological Variables:

1. Resting Pulse Rate
2. Hemoglobin Percentage

3.4.2:PHYSIOLOGICAL VARIABLES:**A) RESTING PULSE RATE (R.P.R)**

Equipment: Stop Watch

Procedure: the resting value of pulse rate was taken after the subject had taken rest for about 30 minutes. The value of R.P.R was determined by feeling the pulse for a minute by palpating the pulse beat at the left wrist at radial artery. Reading was recorded as the resting pulse rate of the subject. , ,

B) HEMOGLOBIN PERCENTAGE (HB %)

Equipment: Sahil's hemoglobinometer

Procedure: this test was chosen with a view to measure the hemoglobin content present in the blood of the subjects. A Sahil's hemoglobinometer was used to measure the hemoglobin

content present in the blood. The index finger of the subject was cleaned with the absolute alcohol. After blood came out by pressing the fingers of the subject the tester used a dry hemoglobin pipe, which was attached with a rubber pipe and its other end was kept in testers mouth and through this pipe and he sucked the blood up to 20 mark.

The blood was then transferred into a test tube containing N/10 HCL about 6 ml. the blood was properly mixed in the solution after shaking the tube. The tube was kept in a stand for five minutes. The distilled water was then added drop by drop until the color of the blood sample after matched exactly with the color of the stand . The volume of the sample after matching the color indicated the result of the hemoglobin content in the blood was recorded as gm/100 ml. of the blood as score of the subjects

Conclusion

Sports are as old as human society and it has achieved a universal following in the modern time. Sports can help to advance the process by virtue of its far reaching appeal and its ability to create new dimensions which has been appreciated by nations. Games and sports are the area of social life which is in opportunities of sociological research. It now enjoys a popularity which out strips any other from of social activity. It holds as a prominent place in modern life. Millions of people participate in sports activities watch and read about them and spend time and money on sports activities and equipments.

For many years it was believed that the performance in games and sports depend on skill and performance, technique, physiological variables, anthropometric measurements, and physical fitness components. Besides all these it is also believed that proper environment condition required for every game for higher level achievement.

References

- [1]. **Barry, L. and Jack K. Nelson, Practical Measurements for Evaluation in Physical Education, 3rd Ed., (Delhi: Surjeet Publication, 1982).**
- [2]. **Basco. James S. and William F. Gustafson. Measurement and Evaluation in Physical Education, Fitness and Sports, (Englewood Cliffs: Prentice Hall mc, 1983).**
- [3]. **Beet, Getnell, Physical Fitness: A Way Of Life, (New York: John Willey Sons., 1976).**
- [4]. **Berger, R. A., Applied Exercise Physiology, (Phildaphia: Lea and Febiger, 1982).**
- [5]. **Best, J.W., Research in Education, (New Delhi: Prentice Hall of India, 1983).**
- [6]. **Bruck, Roberat Kan, Introduction to Human Anatomy, (New York: Haper and Row Publisher, 1979),**
- [7]. **Bucher, Charles A, and William E, Prentice, Fitness for College and Life, (Toronto: Mosby College Publishing, 1988).**
- [8]. **Bucher, Charles A., Foundations of Physical Education and Sports, (Saini**
- [9]. **Louis: The C.V. Mosby Company, 1983).**
- [10]. **Bullen, B.A., Encyclopedia of Sports Science and Medicine, S.A. Over Weight, (1971).**

- [11]. Burnet, John, Greek Philosophy Thales to Plato, (New York: St. Martin's Press), (1962).
 - [12]. Carter, J. E. L., Physical Structure of Olympic Athletes. (London: S. Karger, 1982).
 - [13]. Chatterjee, C. C. Human Physiology, (Calcutta: Chintamani Publication, 1963).
 - [14]. Chatterjee, C. C., Human Physiology. (Calcutta: Books & Allied Private Limited, 1963).
 - [15]. Clarke, H. Harison, Application of Measurement to Health and Physical Education, 5th ed., (Eaglewood cliffs: N.J. Prentice Hall Inc., 1976)
 - [16]. Cureton, Thomas H. Jr., Physical Fitness of Champion Athletes, (Urbana, The University of Illinois press, 1951).
 - [17]. Dhetrich, Harri, Principles of Sports Training, (Berlin : Sport Verlag, 1982).
 - [18]. Dirix, A., H. P. Knuttgen and K. Title, The Olympic Book of Sports Medicine, Vol. 1 of the Encyclopedia of Sports, an
 - [19]. IOC Publication in Collaboration with the International Alteration of Sports Medicine, (1988).
 - [20]. Doneash, S., Physical Education Handbook, (New Jersey, Englewood Encyclopedia), Cliffs; Prentice Hall Inc., 1982).
 - [21]. Fox, E. L. and D.K. Mathew, The Physiological Bases of Physical Education and Athletics, 3RD ed., (London: Saunders College Publishing, (1976).
 - [22]. Freeman, William H., Physical Education and Sports in a Changing Society, (Delhi: Surjeet Publications, 1982).
 - [23]. Garrett, J. and Kennedy, "Collection of Anthropometr\.. Aeroace Medical Research Laboratory". U.S.A., (1971).
 - [24]. Glucose, S.V. Concise Medical Dictionary.
 - [25]. Harcourt Roy, Physical Fitness for School, (London Pelham Books Limited, 1965)
 - [26]. Have, Principles of Spos Training.
 - [27]. Hockey, Robert V., Physical Fitness: The Path Way to Healthful Living, (Toronto: Mosby Publications, 1993).
 - [28]. James, Hornak, E, and Philips D. Alien Measurement and Evaluation in Physical Education, (New York: John Willey and Sons, 1979).
 - [29]. John, Low W., D. Mc Phersan Barry and Kenyan Gerald, Sports and Social Systems, (California: Addition Wesley Publishing Co., 1978).
 - [30]. Johnson, Barry L. and Jack K. Nelson, Practical Measurements for Evaluation in Physical Education, 3" ed. (Delhi: Subject publications, 1982).
 - [31]. Johnson, H. M. B. Barrow and R. Mcgee, A Practical Approach to Measurements in Physical Education, 3rd Ed., (Philadelphia: Lea and Febiger, 1979).
 - [32]. Johnson, Warren R., Science and Medicine of Exercise and Sports. (New York: Harper and Raw Publisher, 1960).
 - [33]. Karpovich, Poter V and waynes E Sennig, Physiology of Muscular activity, (Philadelphia: w.b. saunders co. 1974)
 - [34]. Kella, G.A and E.N. Somson, Applied Physiology,(New Delhi: Oxford University Press, 1987)
 - [35]. Korpovich, P.V., Physiology of Muscular activity, (london: W.B. Saunders co. 1973)
 - [36]. Mathew, Donald K., Measurement In Physical Education, (Philadelphia: W.B. Saunders Co. 1974)
-

- [37]. Mathews, D.K. and E.L. Fox, "Physiological Basis Of Physical Education And Athletes", 2nd ed.... (London: W.B. Saunders Co. 1976)
- [38]. Matveyev, I., Fundamental Of Sports Training. Moscow: Progress Publishers, 1981)
- [39]. Meyers, C.K, Measurement In Physical Education, (New Jersey: Roland Press Company, 1974)
- [40]. Morel, Lurance E. House and Augustus, T. Miller, Physiology Of Exercise, (Saint Louise, the C.V. Mos By Co. 1976)
- [41]. Pearse, E.C., Anatomy And Physiology For Nurses, (New Delhi: Oxford University Press, 1980)
- [42]. Philip, D. Allen and James E. Hornak, Measurement And Evaluation In Physical Education, (New York: John Wiley And Sons, 1979)
- [43]. Reel, H.M. and A.K. Uppal, Foundation Of Physical Education, (Barod: Friends Publication, 1994)