CHAPTER – II

REVIEW OF RELATED LITERATURE

Research scholar has made sincere efforts to gather the ideas related to the present study. The investigator has tried his level best to collect and quote the findings on the relative studies conducted in the directions on physiological and anthropometrical components of the Kabaddi and Kho-Kho players.

The research scholar also gone through the numerous studies, which have been conducted on physiological and anthropometric variables with various co-relative components in a different manner. The research scholar also attempted to review the literature available with the various libraries related to physical education, sports and education from different part of Haryana. Some of the most important studies which were found out by the researcher from the libraries like: Department of Physical Education, M.D.University, Rohtak, Ch. Devi Lal University, Sirsa and Kurukshetra University, Kurukshetra, Punjab University, Chandigarh. Along with the help of personal collection of various literatures, Books, Research Journals, Research Articles and Material etc.

The Researcher has tried to scan the available literature to selected studies, which were directly related to the present study. An attempt has been made to present a summary review of literature, which may be help in understanding and bringing out meaningful outcomes from this study. The following related references have been reviewed as under:

Clarke (1957) conducted a study to find out there relationship of Strength and Anthropometric measurements with physical Performance of 53 unselected non-disabled male students At the University of organ, involving the trunk and legs. He Concluded that correlation among some of the Anthropometric variables were especially high i.e., between standing height
and leg length (0.91) between foot-length and leg length (0.88), between body weight and both hip width and thigh girth (0.87), between height –strength test and trunk flexion and extension (0.65). Multiple correlations were found significant for leg left (0.74) with body weight, ankle dorsal flexion strength and trunk Flexion strength, back lift (0.71) with knee extension strength, Hip width, trunk flexion strength and knee flexion strength, and for standing broad jump (0.66) with adipose tissue over the abdomen (negative) and hips extension strength (positive).

Wear and Miller (1962) studied the relationship of physique and developmental level, as determined by the Wetzel Grid, to performance in fitness tests, of junior high school boys. They found that subjects who were medium in physique and normal in developments, to be the best performers and the subjects of heavy physique to be the poorest in performance.

Espens Chade (1963) investigated the relationship of age, height and weight to the performance of body between performance and height and weight when age was held constant.

Sackett (1963) compared the effects of internal and developmental training on the physiological and performance function of 46 college freshmen. Resting pulse rate was one of the variables compared. The subjects were divided into two equal groups and given separate interval and developmental training programmes for a period of 13 weeks. No significant differences were found between the results of two groups.

Margaret (1964) studied body structure and design factors in the motor performance of college women, pure speed, sergeant Jump, 600 yards run/walk, back strength, leg strength and strengths index were studied in relation to 43 measures of body structure and design. The letter measurements were secured by mean of photographic techniques, included measure of length, depth area as will as non linear expression of body built design and
experimental combinations of variables. The correlation was significant beyond 0.01 level, obtained between performance criterion and one or make variables from each group, the height relationship being consistent with experimental combination of variable

**Dill et al. (1967)** pointed out that sixteen champion runners were tested at Harvard fatigue laboratory. The aim of the study was to find physiological similarities and dissimilarities between athletes and non-athletes. Vital capacity was one of the physiological variables measured in reading and sitting positions under basal conditions. The results of the study showed that the champion runners did not possess significantly greater vital capacity as compared to the non-athletes.

**Karpovich and Sinning (1971)** were of the opinion that both systolic and diastolic pressure change during exercise. The diastolic pressure changes little and systolic pressure changes considerably, the pulse pressure tends to increase and decrease with the systolic pressure.

**Muthian and Venkateshwarlu (1973)** studied the Asian track and field athletes and noticed that the throwers to be heavier, taller and older than, other athletes. Among the runners, the age increased and the height, weight decreased with the increase in the distances they run. The jumper and the hurdles were taller and heavier than sprinters but were shorter and lighter than throwers. The decathletes were the second heaviest as they were all rounder.

**Hauston and Green (1976)** conducted a study on be Hockey pertaining Physiological and anthropometrical characteristics and concluded that there were few significant differences. Junior forwards were lean than university forwards (9.4 vs. 12.4% body fat). By position, defensemen were significantly taller (180.0 Centimeters vs. 176.2 centimeters) in all other measures no significant differences were noted.
Budet (1979) stated that Physiological parameters involved in oxygen transport were compared in men women similar aerobic capacities as assessed by maximum oxygen uptake. In parameters of cardiac output divided by body weight, hemoglobin concentration and body fat were assessed to detect differences that might exist due to sex or fitness level. The statistical analysis indicated that cardiac output increased with fitness level and was greater in men; cardiac output divided by body weight, increased with increases in fitness level but showed no differences due to rest. Hemoglobin concentration gas greater in men but did not vary due to fitness level. Percent body fat was greater in women and decreased with increased fitness level.

Bhatnagar (1980) conducted “A study on 23 rural sportsman (Athletics’ 8, Kabaddi 7 and volleyball 8) of Madhya Pradesh (India) pertaining to their weight, height and sub cutaneous tissue fold at biceps, triceps, supraliea and sub-scapular region. They have been found to be lighter, shorter with less amount of fat as compared to normal urban Punjabis. More Physiological differences pertaining to sportive activities indicates that volleyball players are lightest-shortest with maximum amount of fat compared to Kabaddi players and athletes whereas Kabaddi players are heaviest and fattest among the rural sportsman of Madhya Pradesh.

Pollock and Pate (1980), conducted this investigation to evaluate and quantity physiological difference among groups of distance runners. The subjects included 20 elite distance runners (8 marathon, 12 middle – long distance and 8 good runners.). Working capacity and cardio-respiratory functions were determined by sub-maximal and maximal treadmill tests and body composition by hydrostatic weighting machine. The variables studied were maximum oxygen uptake, VO-2 sub-maximal, lactic acid, sub max. lean body (P < 0.5) weight, fat weight, ANOVA sowed that the good runners differed from elite runner (P < 0.1) and the distance runners (P < 0.5).
Discriminate analysis showed that the both functions were significant. The first was general physiological efficiency factor that separated the good and elite runners. The second separated the elite marathon and middle long distance groups. The second function showed that the marathon runners had lower lactic acid sub maximum value. The middle-long distance runners had higher VO-2 maximum values.

**Drinkwater and Ross (1980)** conducted a study to observe present status of sport anthropometry owing to the results of descriptive investigations new demand has appeared in sport anthropometric research. The focus of the new investigations became the analysis of the relationship between anthropometric characteristics and physical, physiological functions. Two research groups – the Central School of Sports and the Department of Health Sciences and Sports Medicine – play a definite part in this area of human biology and are supported by MYS and HOC. Their technical repertoire has developed during the past 10 years, and in addition to using traditional anthropometric methods they have the facilities to measure aerobic and anaerobic exercise performances as well as the exercise changes in cardio-respiratory function. Their traditional anthropometric repertory has increased by the four-component (bone, muscle, fat and residual volumes) estimation of body composition.

**Uppal (1980)** conducted a study to determine the interval training and two continuous load methods in cardio-respiratory and selected physiological parameters. Eighty unmarried subjects were divided into three experimental groups and the control group. One group was given interval training, the second group fartlak training and the third group slow continuous running for a period of ten weeks. The load was progressively increased, after every two weeks. He found that all the three groups had equal training effects on maximal oxygen uptake, vital capacity leg strength, positive breath holding time negative breath holding time. Slow continuous and fartlek method resulted in
significantly higher improvement in cardio-respiratory endurance when compared to interval training slow continuous and interval training were superior to fartlek in reducing resting pulse rate. However, all the three training methods did not show any significant differences in diastolic blood pressure after exercise blood hemoglobin content and red and white blood carpuseles.

**Tanaka and Matsura (1982)** studied the anthropometric and Physiological variables of 114 Japanese young middle and long distance runners and concluded that the anthropometric attributes would predict the distance running performance to about the same degree as physiological attributes. As a result of factor analysis and the multiple regression and analysis three factors i.e., Linearity of Physique, girth of Physique and subcutaneous fat, were extracted and the first two factors were nearly equally related to the 800 meters, 1500 meters and 5000 meters performances. 10000 meters, however, was best accounted of the second factor.

**Khanna et al. (1983)** study consisted of seven judo players and fourteen normal subjects of sedentary habits. On the first day their anthropometric characteristics including body fat percentage grip strength and anaerobic power were measured. On the second day, their maximum aerobic power was determined. Body fat percentage was determined by measuring the skinfold thickness over four different sites, namely biceps, tricps, suprailliac and subscapular regions with skinfold Caliper.

**Maity (1983)** conducted a study to compare physiological and physical fitness variables between tribal and non tribal High school students of Murekatha Nehru Bidya Bhawan shown in Midnapur district of West Bengal. The subjects chosen for the study were between the age of 14-17 years. It was observed that tribal students were significantly superior in peak respiratory flow rate and speed endurance and anacrobic lower than non tribals.
**Golden and Paul (1984)** investigated on untrained male college students (18 to 24 years) the effect of intensity of endurance training on AT. VO2 max, PWC, HR rest and HR max. 18 subjects composed three groups, two experimental and one control. The experimental groups trained or thirty minutes, two experimental and one control. The experimental groups trained for thirty minutes, three times per week for eight weeks on bicycle ergo meters. The low intensity group trained at the AT and the high intensity group train at a point halfway between at VO2 max. All subjects underwent an incremental bicycle exercise test before and after the training programme to identify any changes in AT, VO2 max, PWC, HR rest and HR max. The AT was determined by gas exchange method. The pretest revealed a mean AT for all groups between 65 and 66% VO2 max. The results indicated no significant changes in AT for any groups. A significant increase in PWC was found for both the high and low intensity groups as compared to the control (P < 0.05). No significant differences were found between any groups for any other variables. The results seem to indicate that a continuous cycle training programme, at either of the two intensities will produce an increase in PWC, however will not increase AT for a group of college age males with moderate initial AT levels.

**Siridhar (1984)** conducted a study on 30 college volleyball players to determine the relationship between agility, Flexibility, Muscular endurance and playing ability in volleyball. The test conducted were the sergeant Jump, side step, trunk flexion, full ups, sit ups and one minute lateral jumps. The finding showed that motor fitness components of power muscular endurance, cardio, respiratory endurance, as well as flexibility contributed to the game of volleyball. The study also showed the significant relationship between power and performance.
Brar (1985) conducted a study on the comparative effect of circuit training and interval training method on selected physiological measurements and running performance of females, age ranging between 16 to 18 years. The training methods are effective in lowering conventional resting pulse, conventional resting systolic and diastolic blood pressures. These training methods also brought about improvement in hemoglobin content. The two methods of endurance development have similar training effects with respect to running performance, cardiovascular blood pressure, hemoglobin fat percentage. The control group did not show any significant change in running performance in 800 meters, cardiovascular endurance and selected physiological measurement.

Robert (1986) The study attained skeletal maturity (TW2 RUS method), skeletal maturity relative to chronological age, and body size of national-level Belgian track and field athletes 15 to 18 years of age were considered. Among the 47 male athletes, 29 (62%) were skeletally mature, while 15 (52%) of the 29 female athletes were skeletally mature. There appeared to be a predominance of skeletally mature individuals among male sprinters and jumpers, while a majority of female sprinters were not skeletally mature. Both skeletally mature and immature individuals were rather evenly represented in the other track and field categories, with the exception of female throwers, who were skeletally mature. Mean statures and weights of skeletally mature and immature 16-, 17- and 18-year-old male athletes did not differ significantly, though the skeletally mature tended to be heavier. In contrast, the skeletally mature female athletes, on the average, were taller and heavier than the skeletally immature, although the differences among the small groups were not statistically significant.

Chauhan (1987) studied the relationship between selected anthropometric variable and endurance running performance. He concluded
that 5000m and 10000m runners are shorter in stature, lighter in body density and control groups. 1500 meters runners have better linear measurements than other endurance runner’s but they have almost similar skinfolds measurements.

**Kim, (1987)** conducted that VO$_2$ max was the strongest determinant in discriminating GDR from MDR group, and contributed most heavily to the prediction of 10 km performance. The other variables studies did not indicate a strong discriminative and predictive ability.

**Haithami et al. (1989)** studied nutritional status of school children (7-13 years) of Aden city. The result showed that all the anthropometric measurements (weight, height, mid arm circumstance, triceps and skin fold thickness) increased with age among boys and girls of the study group.

**Callister et al. (1990)** studied eighteen male and nine female nationally ranked judo athletes to construct profiles that would provide some understanding of the physiological capacities underlying successful judo programme. Body composition aerobic capacity, isokinetic elbow and knee flexion and extensor strength, and muscle fibre size and composition of the vastus lateralis were examined. Higher ranked males (except heavy weight) differed from lower ranked males in percentage of body fat (5.1 ± 0.6 vs 8.2 ± 0.8 p. 05). While more successful females tended to have greater upper body strength than less successful females. More striking, however, was that the characteristics examined varied (P 0.05) as a function of weight division for both male and female athletes. As weight division increased percentage of body fat increased ($r = 0.64, 0.72$). Among females in particular athletes in the higher weight divisions were stronger relatively of LBM than those in lower division.

**Singh (1990)** conducted a study to compare some selected physiological variables and body composition among Badminton, Table-tennis and lawn-tennis players. Total 45 male badminton, Table-tennis and Lawn-tennis (15 from each) players were selected randomly from the state, university and
intercollegiate participants. Selected physiological variables (Hemoglobin Content, resting pulse rate, blood pressure and vital capacity) and body composition (four site skin fold) were recorded, and f-test was used to determine the mean differences among the groups. It was concluded that Badminton players had significant higher Hemoglobin content and pulse rate than that of the Table-tennis and lawn-tennis players, whereas Lawn-tennis players were significantly superior in vital capacity to their counterpart. But in Blood Pressure and composition non-Significance differences were found among the group mean.

Dwarka (1991) conducted a study to investigate the relationship of physical, physiological and Motor skill variables to Volley ball playing ability and to assess the combined contribution of physical, physiological and motor skill variables to volley ball playing ability. Physical variables includes speed, arm strength, explosive power, dynamic balance, agility, flexibility, age, height and weight are taken physiological variables including pulse rate, systolic blood pressure, diastolic blood pressure and cardio muscular endurance were measured. Motor skill Variables volleying, serving, passing and sit up. 100 women volleyball players who participated in the inter college level tournaments were taken as subjects.

Chandel (1993) conducted a comparative study on physical fitness, physiological and anthropometric variables between the tribal and non-tribal, two hundred sixty tribal and 220 non-tribal students were taken as subjects of the study AAHPER youth fitness test battery consisting of six test items sit up, pull up, standing jump, 50 yard dash shuttle run, 600 yard run-walk was used to measure physical fitness of the subject Selected physiological parameters such as pulse rate, blood pressure and hemoglobin were measured and some anthropometric measurement were taken.
1. The following conclusions were drawn - a significant difference in mean score of anthropometric variable was found in favour of the tribal. They were found heavier in weight, better in height, possessing broader shoulder, wider chest – cavity, bigger hip–thigh and calf circumference.

2. The tribal were found superior in all the physical fitness variable, as significant mean difference were found in their favour in sit up, standing broad jump, shuttle run, 50 yard dash, 600- yard run/walk. Hence it could be safely concluded that the tribal were superior in speed, agility and endurance.

3. The tribals are superior to non-tribal in physical- fitness, cardiovascular endurance and anthropometric measurements. At the national school levels, arm circumference and shoulder were significant with non of the anthropometric measurements.

**Dey, Khanna, Batra (1993)** conducted a study of twenty five national Kabaddi Players (asiad Gold Medalists 1990), mean age 27.91 years who attended a national camp at the sports Authority of India, Bangalore before the Bijing Asian Games in 1990, were investigated for their physical Characteristics assessed included back strength, maximum oxygen up take capacity and anaerobic capacity (oxygen debt) and related cardiorespiratory parameters 9oxygen pulse, breathing equivalent), maximum pulmonary ventilation, maximum heart rate). Body fat was calculated from skin fold thicknesses taken at four different sites, using Harpenden skin fold calipers. An exercise test (graded protocol) was performed on a bicycled ergometer (ER-900) using a computerized EOS Sprint (Jaeger, West Germany). The mean (S.D.) percentage body fat (17.56 (3.48) of Kabaddi player was found to be higher than normal sedentary people. Their physique was found to be Endomorphic Mesopmorph (3.8-5.2-1.7). Mean (S.D.) back strength, Vo2 max and Oxygen debt were found to be 162.6 (18.08) kg., 42.6 (4.91) mi kg-1 min-1
and 5.02 (1.29) litre respectively. Physical characteristics, body fat %, Soma to type, \( \text{Vo}_{2} \text{ max} \) and anaerobic capacity (oxygen debt) and other cardiorespiratory parameters were compared with other national counter parts. Present data are comparable with data for judo, wrestling and weight lifting. Since no such study has been conducted on international counter parts, these data could not be compared. These data may act as a guide line in the selection of future Kabaddi Players and to attain physiological status comparable to the present gold medalist

**Vaz (1994)** investigated some of the selected anthropometric characteristics and physical fitness components of predictors of performance in Judo. He found in his study that anthropometric variables namely, height, weight, calf girth, arm girth index, were related to Judo Performance in various weight categories, but by length, thigh girth and rural ratio were not seen significantly related to Judo performance.

**Choudhary (1995)** conducted a study on selected physiological variable on eighty inter-college level judokas with the purpose to sketch the profile and to compare them in different weight categories. The variables selected for the study were resting heart rate vital capacity, negative breath holding capacity, positive breath holding capacity and anaerobic activity. Mean and standard deviations on all the variables for all the weight categories were calculated and ANOVA was used to find out the significant difference in the mean scores. On the basis of results, following conclusions were drawn : (i) The training age does not depend upon the weight category; (ii) The training programme for the judokas should be according to the body weight category; (iii) The training programme for low and middle weight categories should be more strenuous than Heavy Weight Categories; (iv) In relation to positive break holding capacity, no significant difference was found in different weight categories; (v) In relation to the resting heart rate, vital capacity, significant difference was found in different weight categories.
Kumar (1995) studied the relationship between selected anthropometric variables and performance in athletics Program of high school and senior secondary school students. He concluded that performance in all running events 100 meters, 200 meters, 400 meters 800 meters 1500 meters 5000 meters And 10,000 meters events have significant relation with age.

Meckel (1995) conducted a study to compare physiological characteristics of three different levels of 100 m female sprinters. The 30 subjects in this study (20 female track athletes and 10 recreationally trained females) were assigned, according to their 100 m running time, to one of three different groups: "Fast" (11.8 +/- 0.1 sec), "Average" (12.7 +/- 0.1) and "Slow" (14.2 +/- 0.1 sec). All subjects were tested for performance in the Wingate Anaerobic Test (WAnT), strength (squat exercise), fat % (hydrostatic weighing), reaction time, flexibility (sit-and-reach test), aerobic power (peak VO2) and running skill. The data was analyzed by one-way Analysis of Variance (ANOVA) with post-hoc Turkey test, which was performed on each variable to find differences between the groups. The ANOVA indicated significant differences among all three groups for performance in the Wingate Anaerobic Test and relative strength. Significant differences in fat % and running skill were found between the fast and the slow groups and between the average and the slow groups. However, no significant difference in fat % and running skill existed between the fast and the average groups. The differences in reaction time were significant only between the fast and the average groups. No two groups were significantly different from each other for flexibility and peak VO2.

Khanna et al. (1996) stated that Kabaddi is an intermittent game. During raid the main source of energy is anaerobic. The rest pause during the game is sufficient for recovery. To meet the demand of the match Kabaddi players should have an endomorphic –mesomorphic-physique with body fat below 13%. They justified the conclusion made by Dey and others in their
study on Kabaddi players and further state that a Vo2 max of 48 ml/kg/min and oxygen debt of 70.4 ml/kg will be satisfactory for Kabaddi players.

Toor (1996) conducted a study to investigate physical, physiological and anthropometric determinants of performance in female inter-college level sprinters and 100 throwers. Ten physical, Ten physiological and twenty anthropometric measurements were taken. The finding of the study: (i) The sprinters performance was significantly related to physical variable namely sit up, sergeant jump, standing broad jump, back lift and 50-years dash, physiological variables namely relating age and calf circumference; (ii) Performance of jumpers was found significantly related to physical variable namely sit ups, sergeant jump and standing board jump. Anthropometric variable namely age and bicep skin fold; (iii) The performance of throwers was found significantly related to chest, normal chest, expanded variable, elbow width, shoulder width, chest width, knee width and hip width, weight variables.

Brandon (1997) the study involves Middle distance running popular race distances with performance dependent on a number of physiological factors. The physiological characteristics of successful runners are different from those of sprinters and long distance runners. Maximal oxygen uptake (VO2max), running economy and the anaerobic threshold are variables that have been shown to limit performance during long distance running, and rapid velocity and anaerobic variables have been shown to limit performance during sprinting. Success with middle distance running is dependent on an integrative contribution from aerobic and anaerobic variables which allows a runner to maintain a rapid velocity during a race. The relative contributions of the 2 energy systems are functions of distance, intensity and the physiological abilities of the runner. Middle distance runners can be successful with physiological profiles that include a variety of aerobic and anaerobic capabilities, and this characteristic separates them from long distance runners.
Kala (1999) conducted a study on Kabaddi and Kho-Kho players of Kurukshetra University. He compared physical fitness, physiological and coordinative ability variables of these games players. The physical fitness variables such as agility, speed, power and endurance strength of Kabaddi players were found significantly better in the strength components than the Kho-Kho players. However, Kho-Kho players were significantly better than the Kabaddi players in physical fitness variables such as agility and speed, power and endurance. Kho-Kho players were found better in rhythmic ability in the coordinative ability but in other coordinative ability there is no significant difference in the Kabaddi and Kho-Kho players such as Balance, flexibility, differentiation ability and lateral jumping ability. Kabaddi players were significantly better than the Kho-Kho players in physiological variables such as PEF (Peak Expiratory Flow Rate) but Kho-Kho player were significantly better than the kabaddi players in pulse rate.

Neeraj (1999) compared the co-ordinative Ability variables of Hand Ball and Basket Ball female players of Haryana state,” She conduct survey study of 40 female players 20 players from Hand Ball and 20 players from Basket Ball) She found that Basket Ball players had significantly better rhythmic ability, lateral movement ability and agility component of co-ordinative ability as compared to the Hand Ball players.

Christine and Jacob (2000) conducted a study, “Physiological and anthropometric determinants of sport climbing performance” to identify the physiological and anthropometric determinants of sport climbing performance. Methods—Forty four climbers (24 men, 20 women) of various skill levels (self reported rating 5.6–5.13c on the Yosemite decimal scale) and years of experience (0.10–44 years) served as subjects. The results indicated that these were labelled training, anthropometric, and flexibility on the basis of the measured variables that were the most influential in forming each component.
The results of the multiple regression procedure indicated that the training component uniquely explained 58.9% of the total variance in climbing performance. The anthropometric and flexibility components explained 0.3% and 1.8% of the total variance in climbing performance respectively. The variance in climbing performance can be explained by a component consisting of trainable variables. More importantly, the findings do not support the belief that a climber must necessarily possess specific anthropometric characteristics to excel in sport rock climbing.

**Pande et al. (2000)** conducted study on health status of school children (n=776) aged 5-16 years of Ludhiana revealed that girls of all ages except the 14 years had lower mean weight for age compared to ICMR standard. The height for age was also less in both boys and girls than the standard. The prevalence of wasting and stunting was high (52.2% and 26.3%) in boys and girls respectively indicating equal suffering. The children between 11-15 years (72.4%) were suffering from some sickness at the time of examination. The problem of anemia was more in girls (30.5%) than boys (22.9%).

**Williams et al. (2000)** conducted a study of 23 sprinters with 100m personal bests of 10.0-10.9 seconds were compared with 24 distance runners with 5km PBs of 13.5-14.5 minutes, and 24 non-athletic controls. Muscle size, distribution and architecture were determined by ultrasound imaging. The key findings were as follows: (i) Sprinters' muscles were thicker than those of distance runners and controls in all groups except the forearm and lower front of thigh; (ii) Sprinters had longer fibres in their vastus lateralis and gastrocnemius muscles than distance runners, with a smaller pennation angle in both muscles; (iii) Sprinters had longer muscle fibres than distance runners in relation to limb length. Both the longer fibres and smaller pennation angle give the sprinters a physiological advantage for high speed muscle contractions over the distance runners.
Kaur et al. (2001) in their study measured the anthropometric attributes of 17 junior basketball male players attending national camp for the preparations of an international championship. It was important to observe that out of 17 players, only 6 have fallen in the required Olympic Somato type circle. On the whole, it was observed that Indians were still smaller in height and lighter in their body mass and required somato type development to be the best successful basketball players, they also mentioned that certain anthropometric attributes were used in predicting excellence in junior elite basketball players.

Paramanik (2001) predicted an equation of physical and physiological variables of playing ability of badminton players out of 22 variables. 25 men badminton players of Maharashtra state were selected to act as subjects. Forward regression was applied to draw out the regression. The equation consisted of four items namely reaction time, height arm length and endurance which accounted for 87% of the variance where as reaction time alone contributed 55% of the variance.

Snoeckx et al. (2002) In this study cardiac dimensions of long-distance runners (LDR), cycle racers (CR), and weight lifters (WL) were determined echo-cardio-graphically and were compared with those of control subjects (CS). Left ventricular hypertrophy (LVH) was also assessed from the electrocardiogram. Training information was obtained through a questionnaire. The maximal aerobic performance was assessed on a cycle ergo meter. The comparison of the cardiac dimensions revealed that left ventricular mass (LV mass) was significantly increased in LDR and CR as compared to CS. This resulted from thickening of the inter-ventricular septum and left ventricular posterior wall as well as from enlargement of the left ventricular internal diameter. The existence of LVH was confirmed by electro-cardio-graphic investigation. Although the left ventricular wall was enlarged in WL, their LV
mass was not significantly increased as compared with CS. These results are in agreement with the training program followed. Weight lifters almost exclusively performed strength training, while LDR and CR were mainly involved in endurance training. The LDR and CR reached significantly higher maximal aerobic performance levels than WL. The present results suggest a close relationship between the type of cardiac enlargement and the training program followed by the athletes.

Kaur (2004) conducted a study on comparison of anthropometric components between forwards and defenders in female soccer players. The researcher had collected data on 40 soccer players (20 offensive and 20 defensive) of inter college level, from various colleges affiliated with Punjab University Chandigarh The researcher selected 10 anthropometric variables namely weight, height, sitting height, leg length, arm length, hip width, ankle width, foot length and calf circumference. The data was collected on play field of Gurusar Sudhar college campus. It was found that defensive players were superior to offensive player in maximum all variables.

Nataraj (2004) undertook a study on 61 junior level Kabaddi players with a view to find out the relationship of selected motor ability variables to the game performance of Kabaddi players. Tests of muscular endurance, muscular power, speed, agility, aerobic endurance and coordinative ability were administered and data was obtained Three specialists did the subjective rating of performance of Kabaddi players. Pearson’s product correlation was applied to find out the correlation. A Significant relationship was found at p< 0.01 between performance and arm strength(r=0.54) and arm power(r=0.55), abdominal strength(r=0.51), leg power(r=0.38) and kinesthetic differentiation ability of upper limb(r=0.40) and negative relationship to lower limb(r=32).

Naresh (2004) conducted a comparative study on Kabaddi and Kho-Kho players of Kurukshetra University. He compared selected
anthropometric variables these games players. The skinfold measurement such as biceps, triceps, sub scapular, mid auxiliary thigh and calf Kabaddi players were found significantly better than compare to Kho-Kho players. Kabaddi players were significantly better than the Kho-Kho players in body composition variables such as Fat%, Fat weight. However Kho-Kho players were significantly better than the Kabaddi players in body composition variables such as body density. Kabaddi players were significantly better than the Kho-Kho players in linear measurement such as height, thigh length, for arm length and foot length. Kabaddi player were significantly better than Kho-Kho players in body circumferences such as shoulder, chest, abdomen, hip, thigh and calf. Kabaddi players were significantly better than the Kho-Kho players in Bonn diameters such as bitrochantric femur by condylor and ankle.

Kumari (2005) conducted a study to assess the nutritional status of school children from Bihar. The findings reported a high incidence of malnutrition as revealed by anthropometry. Increment in height and weight were more in girls than in boys although not much variation in intake of food and nutrients.

Jawis MN, Singh R, Singh HJ, Yassin MN (2005) : Anthropometric and Physiological profiles of national speak takraw players were determined. Thirty nine players, specializing in the three playing positions (tekong/server, feeder and killer/spiker) were divided into three age categories of under 15 (U15), under 18 (U18), and under 23 (U23) years of age. Height, weight, percent body fat (%bf), maximum oxygen consumption (Vo2 max), range of motion (ROM), back and leg strength, and heart rate, for the estimation of oxygen consumption during matches were recorded. Statistical analysis was performed using one way ANOVA for independent measurements and data are presented as mean +/-standard deviation. The U23 players were significantly taller and heavier with significantly better Rom of the neck, trunk, and ankle joints and back and leg strength than the U15 group when compared to the U18
and U23 groups (p<0.05). Mean Vo2 max was similar between the three groups. Estimated oxygen consumption during matches was 69.1%, 68.5%, and 56.4% of Vo2 max in the killer, tekong, and the feeder groups, respectively. The mean height, body weight, and cardiopulmonary capacities of the players were within the Malaysian population norms, but were somewhat lower than those of players of other court games from other countries. %bf was also lower in these players. This study provides the much needed anthropometric and physiological data of sepak takraw players for further development of this sports.

**Monsma and Malina (2005)** conducted a study on anthropometrics and somatotype of competitive female figure skates (11-22 year) by level of competition and discipline. The results suggest that figure skating favours lightness, high mesomorphy and lower endomorphy as elitic levels.

**Kamada and Tokuda (2005)** observed that erythrocyte membrane fluidity was measured in male sprinters and long-distance runners by a spin-label method. The membrane fluidity was higher in long-distance runners than in sedentary subjects for both measurements by use of two stearic acid spin labels (SAL), 12- and 16-SAL, which represent the fluidity at two different depths of lipid bilayer. In the 12-SAL measurement, higher levels were also evident in sprinters than in sedentary subjects. Increases in the C20:5, C22:5, and total polyunsaturated acyl chains were evident in membrane phospholipids, whereas the C18 and total saturated acyl chains were decreased in long-distance runners compared with sedentary subjects. Only levels of C22:5 were higher in the sprinters than the sedentary subjects. Membrane cholesterol and phospholipid classes did not differ among the three groups. A higher level of erythrocyte membrane fluidity was observed in the athletes, more obviously in the long-distance runners, which was related to the altered phospholipid acyl
chain composition. The change may contribute to the beneficial effects on erythrocyte functions related to microcirculation in athletes.

Bayios, Bareles, Apostolidis, Noutsos and Koskolou (2006) conducted a study. The aims of the present study were: a) to determine the anthropometric profile, body composition and somatotype of elite Greek female basketball (B) volleyball (V) and handball (H) players, b) to compare the mean scores among sports and c) to detect possible difference in relation to competition level. A total of 518 female athletes, all members of the Greek first National league (A1 and A2 division) in B,V, and H sport teams participated in the present study. Twelve anthropometric measures required for the calculation of body composition indexes and somatotype components were obtained according to the established literature. Five athletes were the tallest (p<0.001) among the three groups of athletes, had the lowest value of body fat (p<0.001) and their somatotype was characterized as balanced endomorph (3.4-2.7-2.9). B athletes were taller (p<0.01) and leaner (p<0.001) and their somatotype was mesomorph-endomorph (4.2-4.7-1.8). In comparison with their A2 counterparts the A1 division players were taller (p<0.001) and heavier (p<0.01), but at the same time leaner (p<0.001), had exhibited higher homogeneity in somatotype characteristics (p<0.05). Anthropometric, body composition and somatotype variable of Greek female elite teamball players varied among sports; selection criteria hours of training and sport-specific physiological demands during the game could explain the observed differences.

Duncan, Woodfied, al-Nakeeb (2006) conducted a study to investigate the anthropometric and physiological characteristics of junior elite volleyball players. Twenty five national level volleyball players (mean (SD) age 17.5 (0.5) years) were assessed on a number of physiological and anthropometric variables. Somatotype was assessed using the Heath-Carter method, body composition (% body fat % muscle mass) was assessed using surface anthropometry, leg strength was assessed using a leg and back dynamometer,
low back and hamstring flexibility was assessed using the sit and reach test, and the vertical jump was used as a measure of lower body power. Maximal oxygen uptake was predicted using the 20m multistage fitness test. Setters were more ectomorphic (p<0.05) and less mesomorphic, ectomorphy) for setter and centers was 2.6 (0.9), 1.9 (1.1), 5.3 (1.2) and 2.2 (0.8), 3.9 (1.1), 3.6 (0.7) respectively. Hitters had significantly greater low back and hamstring flexibility than opposites. Mean (SD) for sit and reach was 19.3 (8.3) cm for opposites and 37 (10.7) cm for hitter. There were no other significant differences in physiological and anthropometric variables across playing positions (all p>0.05). Setters tend to be endomorphic ectomorphs, hitters and opposites tend to be balanced ectomorphs, whereas centers tend to be ectomorphic mesomorphs. These results indicate the need for sports scientists and conditioning professional to take the body type of volleyball players into account when designing individualized position training.

Ohkuwa et al., (2006) conducted a study to analyze the Lactate, glycerol, and catecholamine in the venous blood after 400-m and 3,000-m runs were determined in eight sprint runners, eight long distance runners, and seven untrained students. In 400-m sprinting, average values of velocity, peak blood lactate, and adrenaline were significantly higher in the sprint group than in the long distance and untrained groups. The mean velocity of 400-m sprinting was significantly correlated with peak blood lactate in the untrained (r=0.76, P<0.05) and long distance (r=0.71, P<0.05) groups, but not in the sprint group. In the 3,000-m run, on the other hand, average values of velocity and glycerol were significantly higher in the long distance group than in the sprint and untrained groups, but there are no significant differences in lactate levels between the three groups. These results suggest that: (A) performance in 400-m sprinting may depend mainly upon an energy supply from glycolysis in the long distance and untrained group, but in the sprinters is influenced not only by glycolysis, but also by other factors such as content of ATP or force per unit
muscle cross-sectional area; (B) peak blood lactate obtained after 400-m sprinting may be used as a useful indication of anaerobic work capacity in the long distance and untrained groups, but not in the sprinters. (C) high speed in the 3,000-m run could be maintained in the long distance runners by means of a greater energy supply from lipid metabolism as compared with sprinters or untrained subjects.

Bandyopadhyay (2007) undertook a project to compare anthropometric and body composition variables of volleyball and soccer players. For this he selected 50 sedentary males and 128 sports persons (volleyball=82, soccer=46) between 20-24 year from west Bengal, India. He conducted skinfolds girth measurements, body fat percentage (%fat, and endomorphy were significantly higher among sedentary individuals, but lean body mass(LBM) and mesomorphy were significantly (p<0.001) higher among the sports persons. Soccer and volleyball players were found to be ectomorphic-mesomorph, whereas sedentary subjects were endomorphic mesomorph. The soccer and volleyball players had higher % fat with lower body height and body mass than their overseas counterparts % fat exhibited a significant correlation with body mass index (BMI) and thus prediction equations for % fat from BMI were computed in each group.

Hasan, Rahaman1 and Cable and Reilly (2007) conducted a study, Anthropometric Profile of Elite Male Handball Players in Asia. They observed that anthropometric profiles of elite athletes provide insights into the requirements for competing at top level in particular sports. Due to the comparative lack of data for contemporary handball players, the present study was conducted to describe the anthropometric characteristics of international male Asian handball players and identify any positional differences existing. Sixty three players from five different countries were measured in the 12th Asian Games in Hiroshima for height, mass, skinfold thicknesses and estimates of body fat and muscle mass. Results were compared with data for the English
handball squad for reference purposes. Significant differences were evident among the Asian teams, the group from East Asia being taller and lower in adiposity than the teams from West Asia. A relative homogeneity was observed among positional roles. The more successful teams were taller and had lower body fat than the less successful teams. It is concluded that Asian handball players differ in anthropometric characteristics from European players previously studied and that specific anthropometric variables are associated with successful tournament performance at international level in Asia.

**Dhilllo (2007)** conducted a study on Kabaddi and Kho-Kho players of Maharshi Dayanand University team. He compared skinfolds measurement and body composition variables these games players. The skinfold measurement such as biceps, triceps, suprailiac, thigh and calf Kabaddi players were found significantly better than compare to Kho-Kho players. Kabaddi players were significantly better than the Kho-Kho players in body composition variables such as Fat%, Fat weight and lean body mass. Kho-Kho players were significantly better than the Kabaddi players in body composition variables such as body density.

**Rainoldi (2008)** conducted a study to determine whether the rate of change of surface EMG variables during a constant force isometric fatiguing contraction (80% MVC, 30 s of duration) of vastus medialis obliquis (VMO) and vastus lateralis (VL) muscles is able to distinguish between nine sprinters and nine long distance runners. Signals were recorded with linear arrays of eight electrodes. Muscle fiber conduction velocity (CV), mean frequency (MNF) of EMG signal power spectrum and average rectified value (ARV) of the EMG signal were calculated both from the whole signal (global approach) and from motor unit action potentials (MUAP distribution approach) extracted from the signal. Results showed significant differences only in the MUAP distribution approach. For this approach, the rates of change of conduction velocity (CV) (both absolute and normalized with respect to the initial value)
were found to be always greater in the sprinter (VMO: $-0.012 \pm 0.011 \text{ m s}^{-2}$ and $-0.25 \pm 0.21\%/\text{s}$; VL: $-0.014 \pm 0.009 \text{ m s}^{-2}$ and $-0.27 \pm 0.17\%/\text{s}$) than in the long distance runner group (VMO: $-0.004 \pm 0.006 \text{ m s}^{-2}$ and $-0.08 \pm 0.14\%/\text{s}$; VL: $0.003 \pm 0.012 \text{ m s}^{-2}$ and $0.08 \pm 0.26\%/\text{s}$) ($\text{VL: } p = 0.016, \text{ VMO: } p = 0.034$). No differences were observed in the CV initial values and in rates of change of MNF, while MNF initial values recorded from the VMO were found to be greater ($119.6 \pm 25.1 \text{ Hz}$) in the sprinter group than in the long distance runner group ($99.2 \pm 12.1 \text{ Hz}, p = 0.016$). A correlation was found between initial values and rates of change of CV in the VMO ($r = 0.61, p < 0.01, N = 18$, Spearman correlation coefficient). The consistency of these findings with the expected fiber type composition between sprinters and long distance runners and the identification of a set of candidate variables for the assessment of muscle adaptation during training and/or rehabilitation programs represent the main results of the study.

Nataraj et al. (2008) conducted a study on “Motor ability variables as predictors of performance in Kabaddi” and concluded that: (i) significant correlation was found between the selected motor ability variables of muscular strength of arms; muscular endurance of abdomen; explosive power of arms; explosive power of legs; running speed; stretch ability of legs ability; with performance rating in kabaddi; (ii) Significant correlation was not found between the selected motor ability variables of cardiovascular endurance and extent flexibility of trunk and shoulder; with performance rating in Kabaddi; (iii) For better performance in kabaddi, all the selected motor ability variables are essential and must be considered, for better performance; (iv) Muscular endurance of arms, and explosive power of legs and arms, are the dominant predictor of performance in junior national kabaddi players can be predictor by using the equation.
Singh (2008) conducted a study on body composition of university level athletes sprinters, jumpers, and throwers. He concluded that a significant difference observed between long triple and high jumpers in their biceps, triceps and sub scapular skin folds. The long jumpers were found to be having more skin folds in these areas than triple and high jumpers.

Fahiminezhad (2010) conducted a study, “The study of anthropometric sizes and physical fitness factors of boy students aged 12–14 in Shahrood city.” The aim of this study was to study of anthropometric sizes and physical fitness factors of boy students aged 12–14 in Shahrood City. This cross-sectional study was performed on 368 boy students aged 12–14 years in Shahrood (2010). Subjects were selected via random sampling. Anthropometric measurements included: height, weight, sitting height, arms span, body mass index (BMI), waist circumference (WC), waist to hip ratio (WHR), and percentage body fat (BF%) and physical fitness components included: cardiorespiratory fitness (20-m shuttle run test), general strength (dynamometer back and leg), leg power (vertical jump test), flexibility (sit and reach test) and agility (Illinois test). The mean of height (cm), weight (kg), sitting height (cm), arms span (cm), BMI (h/w2), WC (cm), WHR and BF% subjects were 154.1, 43.4, 77.1, 155, 18, 67.6, 84 and 22, respectively. The mean of VO2max (ml/kg/min), general strength (kg), leg power (kg/m), flexibility (cm) and agility (s) were 49.6, 92.1, 56.9, 30.5 and 18.97, respectively. There was significant negative correlation between VO2max and anthropometric measurements, agility with height, flexibility and leg power, while a significant positive correlation was found between general strength and leg power with anthropometric measurements subjects. Survey results showed that 12–14-year-old boy students in Shahrood were of thought height, weight, BMI, general strength and leg power lower from adolescents of other countries and height, weight, BMI almost equal and general strength and leg power higher from adolescents of our country. Also 12–14-year-old adolescent boys in Shahrood on base BMI 30.5%, BF% 26.9%,
WHR 16.8% and VO2max 10% may provide insight into the prediction of future risk chronic disease

**Gill, Deol and Kaur (2010)** conducted a comparative Study of Physical Fitness Components of Rural and Urban Female Students of Punjabi University. In the present study, an attempt has been made to compare physical fitness components namely speed, strength, endurance, agility and flexibility between female students belonging to rural and urban set-ups. The study was carried out on 100 female students, 50 rural and 50 urban of Punjabi University, Patiala. The data was collected by use of measurements of height and weight as well as by application of tests like jumping, stepping, running, flexibility test, etc. The data was analyzed and compared with the help of statistical procedures in which arithmetic mean, standard deviation (S.D.), standard error of mean (SEM), t-test were employed. Rural female students were found to be superior in strength, endurance, speed and agility. Urban female students on the other hand, were found to be heavier and superior in tasks like flexibility.

**Hassan (2010)** conducted a study to find out the relationship between anthropometric and physiological variables elite distance and middle distance runners of Iranian national team. The purpose of this research is to define the relationship between anthropometric and physiological variables in elite distance and middle distance runners of Iranian national athletics team for the 3000 m performance. To do this, a sample of 30 elite runners with the mean age of 21.10±0.63 and mean height of 177.8±5.82 and mean weight of 64.26±7.07 were used. Characteristics of anthropometric and physiological and their relationship for the athletes were measured. The Pearson regression with (p≤0.05) was used for this analysis. From 41 variables 8 of them had a meaningful relationship with the performance of athletes which from these body fat mass (kg) and percentage of fat (%) had a positive and meaningful relationship with the performance and a negative and meaningful relationship
between distribution of fat and performance. Between VO2max (ml/min/kg), anaerobic power, VO2max LT (ml/min) and the performance there was a negative and meaningful relationship. Between rest heart rate, breath rate and the performance there was a positive and meaningful relationship.

Pilli (2010) conducted a study, “Comparison of anthropometric and physical variables among kho-kho and handball players of Andhra Pradesh School Games teams.” The purpose of the study was to compare the anthropometric and physical variables among kho-kho and hand ball players of Andhra Pradesh School Games teams. To achieve this purpose of the study, 40 male players of kho-kho and hand ball were selected as subjects from Andhra Pradesh State School Games teams. The players who were selected as subjects for the studies have participated at national level competition. The age of the subjects were ranged between 16 and 20 years. The following variables such as speed, endurance, explosive strength, muscular endurance, height, weight, sitting height, body fat and somatotype were selected as criterion variables. The analysis of ‘t’ ratio was used to analyse the significant differences if any between the groups. The level of significance was fixed at 0.05 level of confidence, which was considered to be appropriate. The result of the study shows that hand ball players were better in six variables such as explosive strength, muscular endurance, height, weight, body fat, somatotype, further the study indicates that kho-kho players were better in speed and endurance.

Singh (2010) conducted a study of anthropometric, physical and physiological parameter as predictors of volleyball performance. The subject for the study were fifty male and fifty female volleyball players selected randomly, from a population of all the volleyball players who participated at university level. In this study the coefficient of correlation between selected variables of age, weight, standing height, sitting height, Arm length, leg length, shoulder width, elbow width, hip width, knee width, chest circumferences, upper arm circumference, arm circumference, and calf circumference were
0.106, 0.227, 0.510, 0.337, 0.257, 0.276, 0.259, 0.092, -0.174, 0.002, -0.079, 0.152, 0.129, 0.276 fore respectively. Only standing height (0.510) and sitting height (0.337) showed a positively significant correlation with volleyball playing ability as assessed by a panel of experts.

**Talwar (2010)** conducted a study, “Kinanthropometric backup to core group probable of 2010. Kinanthropometry is the basic sports science, knowledge of which is extremely important to find out the performance excellence in the competitions. Requirement of body structure with regard to suitability of the sport is pre-requisite for being an athlete. In the present article, complete kin-anthropometric backup provided to various core group probable of 2010, in the sport disciplines of track and field, boxing, cycling and wrestling will be discussed and efforts will be made to present the normative values of various anthropometric parameters pertaining to these elite level Indian athletes.

**Kalard and Wahid (2011)** conducted a study, “Personality Characteristics of Kabaddi and Kho-Kho Players”, The aim of the present study was to find out the differences in the Personality traits between Kabaddi and Kho-Kho players; with regard to neuroticism psychosticism and extraversions. In this study 50 Kabaddi and 50 Kho-Kho players selected as subjects. Their age ranged between 17-25 years, who were participating in Dr. Babasaheb Ambedkar Marathwada University inter-collegiate Kabaddi and Kho-Kho tournaments. held at Vaidyanath College Parli-Vaidyanath and M.I.T. College, Aurangabad 2010 The Esyenck Personality Inventory (E.P.I.) was administered to find out the Personality traits of the Kho-Kho and Kabaddi players, with regards to neuroticism extraversion, psychosticism and Lie-Scale. Means Scores for neuroticism, psychotisticism extraversion and Lie-Scale for these two types of players were computed. t-test was used to compare the significance difference between Kabaddi and Kho-Kho players, t-ratios for extraversions,
psychoficism are (3.17, P < .01), (t=2.63, P<.05) respectively indicating that Kabaddi players are less extrovert and more psychotic than Kho-Kho players.

**Singh and Kaur (2011)** conducted a study, “Lung Capacity and Body Mass Index between Physical Education and Non-Physical Education Students-A Comparative Study. The purpose of the study was to compare the lung capacity and body mass index between female physical education and non-physical education students. To achieve the objective of the study, twenty five (N=25) female physical education students and twenty five (N=25) female non-physical education students were selected randomly as subjects. The age of the subjects ranged between 20 to 26 years. To determine the significant difference between the mean scores of female physical education and non-physical education students on lung capacity and body mass index (BMI), ‘t’ test was employed with the help of SPSS software. The level of significance was set at 0.05. There was significant difference obtained on lung capacity between female physical education and non-physical education students. There were no significant differences obtained on body mass index (BMI) between female physical education and non-physical education students. The finding reveals that female physical education students have significantly better in lung capacity as compare to female non-physical education students.

**Nezhad1 and Farhadi (2012)** conducted a comparison of anthropometric and physiological characteristics of Elite cycling and karate athletes. The purpose of the present study was to comparison anthropometric and physiological characteristics of elite cycling and karate athletes. 23 elite male athletes (Thirteen cyclists with average and standard deviation age of 26.76 ± 2.52 yr, height 174.84 ± 4.21 cm, body mass 69.03 ± 2.82 kg) and ten karateka (age 24.7 ± 2.35 yr, height 180.3 ± 5.65 cm, body mass 79.05 ± 10.16 kg) were tested at the beginning of the season. cormic index (The ratio sitting height / height), fat percentage (sum of three skin-folds), anaerobic power (Wingate test) and VO2max (Bruce test) were measured. The results were
compared between two groups using U Mann-Whitney Test. There were significant difference in VO2max(cyclists 64.69 ml.kg.min, karateka 51.6 ml.kg.min), cormic index(cyclists 53.5%, karateka 52.7%), fat percentage (cyclists 8.48%, karateka 12.87%) and There was no significant difference in anaerobic power(cyclists 844 watt, karateka 939.3 watt) between two groups (p<0.05). We conclude that should be consider training specific for different sports The purpose of the present study was to comparison anthropometric and physiological characteristics of elite cycling and karate athletes. 23 elite male athletes (Thirteen cyclists with average and standard deviation age of 26.76 ± 2.52 yr, height 174.84 ± 4.21 cm, body mass 69.03 ± 2.82 kg) and ten karateka (age 24.7 ± 2.35 yr, height 180.3 ± 5.65 cm, body mass 79.05 ± 10.16 kg) were tested at the beginning of the season. Cormic index (The ratio sitting height / height), fat percentage (sum of three skin-folds), anaerobic power (Wingate test) and VO2max (Bruce test) were measured. The results were compared between two groups using U Mann-Whitney Test. There were significant difference in VO2max(cyclists 64.69 ml.kg.min, karateka 51.6 ml.kg.min), cormic index(cyclists 53.5%, karateka 52.7%), fat percentage(cyclists 8.48%, karateka 12.87%) and There was no significant difference in anaerobic power(cyclists 844 watt, karateka 939.3 watt) between two groups (p<0.05). We conclude that should be considered training specific for different sports.

Kamble, Daulatabad and Baji (2012) conducted a study, “Study of anthropological parameters, body composition, strength & endurance in Basketball players.” The investigators observed that as compared to the age matched controls the basketball players had significantly more height, height of upper segments of body. Strength of shoulder as well as leg muscles endurance was significantly more in basketball players than controls. We also found that there was a significant decrease in weight, fat percent, and fat mass of basketball players than controls. There was no significant change in height of lower body segment, static strength of leg and back muscles. Summary &
conclusion: Basketball players in our study group still lag far behind in different study variables like weight, lean body mass, strength (static as well as dynamic), flexibility and agility when compared with national and Olympic basketball players. Hence there is a need to improve the physical fitness parameters so as enhance the player’s performance. Suggestions: Exercise and games should be mandatory at all levels of education. Talent identification programs should be implemented at various levels such as schools, colleges, universities and state.