Chapter II

Review of Related Literature

A researcher can take a close look at the ever expanding research field by exploring the investigative works undertaken to address the problems in particular areas. The review data related to the methods and techniques of solving problems arising in similar situations can suggest new approaches to deal with it. The investigator can find new ways or methods by accumulating necessary data which is already covered by scholars in the concerned fields. The data thus also can help in evaluating the researcher his work with that of others scholars’ research on related topic. For the purpose, before finalizing a plan for research study to be undertaken a researcher needs to carry out thorough search in the area intended for investigation. Therefore, researcher has reviewed articles, reference-books reports etc. to understand the broad study area.

The details review has been classified as follows:

1. Review related to Handball research.
2. Review related to Morphological Variables.
3. Reviews-related to Fitness and Performance.
4. Review related to Skill, Tactics and Performance.
5. Review related to Test Battery and Norms.

2.1. Review related to Handball research:

Tokumnosuke (1988) explained and made it clear that the effects of the alteration of the rules on the exercise intensities, skills and tactics in the handball game. Heart was recorded continuously throughout the game and VO2 max was determined by means of the step wised aerometry. Distance that players ran and dribbled was pursued and recorded by the investigator. In the newly modified local rules, players must be throwing off from the goalkeeper line. Therefore, the time for the next commencement of the
same was shortened. Owing to this change of the rule, it was found that the total distances that the players ran and dribbled the number of shoots and the possibility of the fast break offense were increased. The average HR of the new local rule exceeded that of the international rule through the whole game. Though the HR of the new local rule remained unchanged through the whole game, the heart of the first period was reduced by about ten beats/min in 2 period in the case of the international rule. We estimated the exercise intensities of the players at the 90-98% VO2 max in the new local rule and the 75-90 % VO2 max in the international rule. From these results, we concluded that the alteration of the rules in Japan was successful to facilitate the activations of the handball game, for example, the speed of the player; the offensive method and the number of shoot chance.

The purpose of this study Singh, J. & Raj Kumar (2008) was to prepare the 'norms profile' of specific skills of handball players with a view to compare and evaluate further planning of handball game as its not being practiced in our country at present. So, an objective was set by the researchers to prepare the norms for each important specific skill of handball game at school, university and senior level of performance. Total of five hundred eighty six (N=586) players of handball were examined during School National championship (N=200), All India Inter University championship (N=195) and Senior National championship (N=191). The tests of specific skills of Handball, standardized by Singh (2008) were used for record the specific skills of handball players. The percentile values were distributed through SPSS. These prepared norms are presented in tabular form. The research evaluation highlights that there is an increase of specific skills with participation level of handball players. Speaking specifically, the 'different levels' include the level of school to university and then from university to senior level. The implicational interpretation will result in the form of an increased competitive ability of the players.

Lidor, R., and Falk, B (2005) In the study conducted under the topic entitled ‘Measurement of talent in team Handball: The questionable use of Motor and Physical tests’, Lidor and Falk tried to identify motor, physical and skill variables that can assist the trainers with necessary information in the selection process of young players in handball team. Total 405 players ranging between 12-13 years of age were asked to go
through a battery of tests in the selection of Junior National Team. All these players were asked to undergo different phases of the program but few of them took part in each and every testing phase. The battery consisted of physical measurements viz-a-viz- height, weight, standing long jump, medicine ball throw, 4x10m running test, 20 m sprint from a standing position and a 20 m. sprint with a flying start. Slabom dribbling test was conducted to compare the performance of the players selected at Junior National Team after 2-3 years gap with non-selected players. The test proved indication of better results. Varied common characteristics were observed between the results of the selected and non-selected players in handball team. The research recommended that “upcoming studies be concerned more with utility of tests that can reflect over more specific physical abilities and perceptive features.”

Won, O.M. (1988) studied the relative contribution of physical fitness and skill domain according to different skill level of handball players. Thirty three physical fitness and handball skill measures chosen from physique (6 items), muscular strength (5 items), muscular endurance (3 items), muscular power (5 items), agility (3 items), balance (3 items), flexibility (3 items), cardio respiratory (2 items), and handball skills (4 items) domain were tested on national representative (N=21), University(N=34), high school (N=30) handball players. In order to investigate the relative contribution, communalities of 9 physical fitness and handball skill domains were evaluated for each different skill level group. The result indicated that degree of contribution of total variance were increasing tendency from 44.17% to 57.08% as the handball skill level increased. It implies that higher skill level groups are more explainable from 33 measures chosen than the lower skill level groups. In mean contribution to total variance for each 9 physical fitness and handball skill domain; physique, flexibility, cardio-respiratory, endurance and handball skill domain were relatively high (11.50% to 14.45%), agility, muscular strength and endurance domains were moderate (10.65 % to 11.50%), muscular power and balance domain were relatively low (8.88% to 9.70%). But these tendencies not always same each different skill level group.
Sporis, G., and Vuleta, D. (2005) In the year 2005 Sporis and Vuleta described the structural and functional features of sophisticated Croatian handball players. They also evaluated whether the players had different positional roles on account of different physical and physiological profiles. Accordingly “the positional roles were classified such as goalkeeper (N=13), wing players (n=26), backcourt players (N=28) and pivot players (Nx=25). The backcourt players were much younger than goalkeeper (p>0.01) and pivot players (p<0.01).” The wing players were the shortest players in the selected team whereas the pivot players tallest and heavier than backcourt and wing players (p<0.01). On the other hand backcourt players were tallest than wings (p<0.01).

Similarly the goalkeeper players had more fat that of backcourt and wing players (p<0.01) and the backcourt players had lower percentage of body-fat. On observing maximum running speed on a treadmill the backcourt players were quickest players as compared to goalkeepers whose speed was lowest (p>0.01) in the team. Similarly maximal heart rate was detected amongst the backcourt players. This showed that there were no remarkable variations between in positions as indicated in blood lactate and maximal heart rate. Hence a negative correlation was observed between body-fat and maximal running speed.

Koc, H., and Tekin, A. (2012) in their study entitled ‘The effect of acute exercises on blood hematological parameters in handball players’ to determine the effect of five-day handball competition on hematological levels of male players. Twelve handball players with more or less age between 22-23 years voluntarily took part in the study. Their physical measurements primarily- height, weight, body-mass index and fat percentage and hematological level was analyzed prior to BC i.e. ‘Before Competition’ and AC i.e. ‘After the Competition.’ The Hematological level was determined by collecting 5ml blood from forearm ante-cubital area in line with hygiene rules with EDTA i.e. Ethylenddiaminetetraacetic acid) before and after the competition. By using auto-analyzers the erythrocyte, leucocytes and blood platelet parameters were analyzed in laboratory. The results indicated an average and standard deviation in measurements.

Accordingly “T-test for dependant samples was conducted so that comparison could be made between BC and AC values. In the SPSS 13.0 package software <0.05
values were taken as standard and significant data evaluation. Consequently, the results shown decrease in BC and AC values for weight, body-mass index, body fat percentage, MCV, CH, MCH and LY and significant increase in RBC and NE values.” The erythrocyte, leucocytes and blood platelet levels displayed acute competition like exercises.

**Ingebrigtsen., Jorgen., Rodabl., Stein., Jeffrey., & lan. (2012)** This particular study initiated to examine strength, speed and jumping abilities in 29 male and female junior elite handball players, and secondly to compare Under-18 and Under-16 players in the selected parameters. Players were chosen by the Norwegian Handball Federation (NHF) and all were tested in strength (squat and bench press), speed (10 in, 30 m and 6 x 30 m repeated sprint ability) and jumping abilities (CMJ and SJ). Anthropometric qualities were also measured. Independent t-tests were applied in order to reveal possible mean differences between the U-18 and U-16 players within each sex. No significant differences in anthropometry were observed between the U-18 and U-16 players within either sex. Furthermore, researchers did not observe any significant between group differences among the male players in any of the tested performance parameters. On average, however, the U-16 male (N=14) players performed better in all the tests compared to the U-18 (N=15) male players. Similarly, researchers did not find any significant differences in test performances between U-18 female players and U-16 female players. Still, a few trends (p<=0.1) were observed as female U-18 (n=14) players, were found to sprint faster on both 10 and 30 m, and to jump higher in SJ versus female U-16 (N=15) players. The empirical findings do not confirm the hypothesis of pubertal development and muscle growth leading to taller and heavier U-18 players. Furthermore, we expected U-18 players to perform better in all tests when compared to U-16 players. Again, the data did not substantiate this, although female U-18 players tended to perform better in sprint and SJ compared to the U-16 players.

**Povoas Susna, C.A., Seabra, F.T., and Antonio, N.C.(2012),** The above researchers attempted to analyze the physical and physiological demands of elite handball team during the match. For the purpose they undertook analysis of Time-Motion (N=30) and heart rate (N=60) throughout ten official matches. The locomors categories included backwards movement, sideways high-intensity movement, walking, jogging, fast
running, standing still, and sprinting and sideways medium-intensity movement. Playing actions included jumps, stops when preceded by high-intensity activities, shots, changes of direction and one-on-one situations. As per data noted “mean distance covered was 4370 +/- 702.0 m; 80% time was spent standing (43.0 +/- 9.27%); walking (35.0 +/- 6.94% and sprinting 0.4 +/- 0.31%. As far as most frequent high-intensity actions were concerned – this included stops, changes of direction and one-on-one situations. The effective mean HF was 157 +/- 18.0 bpm (82 +/- 9.3 of HR max) and total HR was 139 +/- 31.9 bpm (2 +/- 16.7% of HR max). During the first half than during the second half (p<=0.05) the HR time spent in high intensity activities, frequency of stops, changes of direction, one-on-one situations and most intense period of the game were higher.” Reverse was found for the number of time-outs and the time between each change of activity (p=0.00). Handball, being an irregular exercise, exploits aerobic metabolism, intermingled by high-intensity actions. Exercise intensity decreases in the beginning to the second half match which warns neuromuscular fatigue in the game. Hence the training of the handball players should include exercises that enable performing specific high-intensity actions and rapidly recover during the less intense time gaps.

The researchers Ignjatovic and Aleksnadar in the year 2011 conducted research aiming at examining the effects of medicine ball training on the strength and power in your female handball athletes. For the purpose 21 young female handball players (age group 16.9= +/- 1.2 years) were indiscriminately allotted into experimental and control groups. The Experimental group took part in a 12 week medicine ball training program and controls (N=10) participated in regular training. Primarily the performance in the medicine ball throws in standing and sitting positions, one-repetition – maximum (1RM) bench and shoulder press and power test at tow different loads (30% and 50% of 1 RM) on bench and shoulder press were counted at pre and post-training. “Athletes made significant gains in all medicine ball throw tests compared to the controls (p<0.01); experimental group gained in bench and shoulder press power than control group (p<0.05). Both training groups remarkably (p<0.05) increased 1RM bench and shoulder strength. Moreover, medicine ball throw tests showed stronger correlation with power tests, than with 1RM test.” In all the data suggested that 12-week medicine ball
training if introduced in regular training session, can improve greater sport-specific training in the upper body for young female handball players.

**Vaara, Jani P., Kyrolainen, Heikki., Nielmi., Jaakk., and Kcjo (2011),** To assess the relationships between maximal strength and muscular endurance to that of measures of body composition and maximal aerobic capacity these researchers conducted research study under the topic, ‘Associations of maximal strength and muscular endurance test scores with cardio respiratory fitness and body composition’. The endurance test consisted of pushups, sit-ups and repeated squats by near about 846 young, men age ranging between 25.5 +/- 5.0 years on the basis of parameters such isometric bench press, leg extension and grip strength. An indirect graded cycle ergometer test to estimate maximal aerobic capacity (VO2 max) and bioelectncal impedance parameter for Body composition was used; where as Waist circumference (WC) and height were measured and body mass index (BMI) was calculated. “Maximal bench press was positively correlated with push-ups (R2=0.37, p<0.01), grip strength (R2=0.12,p<0.01), and sit-ups (R2=0.12,p<0.01), while maximal leg extension force discovered weak positive correlation with repeated squats(R2=0.5,p<0.01),. Similarly BMI and body fat correlated negatively with muscular endurance (R2=0-0.22, p<0.01), FFM and maximal isometric strength (R2=OJ3-0.20, p<0.01) shone positive relationship.” The researchers drew conclusion that push-up test is not only suggestive of body fat content and maximal aerobic capacity but also maximal strength of upper body while repeated squat test indicates only body fat content and maximal aerobic capacity and not maximal strength of lower limits.

**Vila, H., Manchado, C., Rodriguez, N., Abralde, V. P., Alcaraz and Fferraqut, C. F. (2011),** In order to describe anthropometric features throwing velocity, hand grip and muscular power of the lower limbs in female handball players and to identify differences a study was conducted by the above scholars namely by Vila, H., Manchado, C., Rodriguez, N., Abralde, V. P., Alcaraz and Fferraqut, C. F. in the year 2011. The parameters included individual playing positions: center, back, wing, pivot and goalkeeper. 130 Spanish female elite handball players between the age group more or less 25 to 30 years and 15 to 20 years of plying experience were observed during the study. The assessment was based on the International society for Advancement of
Kinnanthropometry ISAK protocols. Particularly, vertical jump test (squat Jump and Countermovement Jump, hand grip and throwing velocity in numerous conditions was observed. For the purpose One-way analysis of variance ANOVA and Tukey post hoc test was used to study differences among individual playing positions. The study found that “Wings were less heavy shorter and shone less arm span, than goalkeepers, back and pivots (p<0.01). Additionaly pivots were heavier than centers. Back and pivots exhibited higher muscular mass than wings. Total players’ somatotype was mesomorphy-endomorphy (3.89-4.28 – 20.29)”. In conclusion this research study helped in determining statistical differences between wings and other specific playing positions that can help the trainers in the selection of players for different specific positions

Pester (2011), Under the topic, ‘Injuries in Icelandic male team handball players’ Pester undertook research to examine and record incidences, nature and severity of injuries in male team handball. The observation recorded was based on the players from eight premiership and six best of eight second division teams consisting in all 159 players from seven premiership and 4 division teams. “109 players from 4 premiership and 2 division teams finished it from all 86 injuries including 53 (61.6%) acute and 33 (38.4%) overuse injuries. The injury incidence was 15.0 injuries per 1000 player hours during games and 2.2 injuries per 1000 player hours during training. Acute injuries were most common in knees (26.4%), overuse injuries were most frequent in low back/sacrum/pelvic region (33.3%)”.The study concluded that higher rate of overuse injuries in low back/sacrum/pelvic region can become problematic in training and preparation methods for Icelandic team of handball players.

Zech, A. and Steib, S in the year 2012 attempted to determine effects of whole body and localized fatigue on postural control in stable and unstable conditions in their research study entitled, ‘Effects of localized and general fatigue on static and dynamic postural control in male team handball athletes.’ To stimulate physical fatigue treadmill running and single-leg step-up exercises were used. “The main outcome measures were center of pressure (COP) sway velocity during a single-leg stance on a force plate and maximum reach distances of the star excursion balance test (SEBT). The COP sway velocity increased significantly (p<0.05 after general (+47%) and localized fatigue
(10%). The results indicated that though fatigue affects static postural control, senor motor mechanisms is accountable for retrieving energetic balance in healthy athletes. The data suggested that exclusive use of static postural sway measures might is possibly insufficient to say definite statements in case of senor motor control for the non-injured athletes.

Lenzcn., & Bcnoil. (2009) conducted a study titled, ‘Analysis of Team Handball Players Decisions: An Exploratory Study’. This exploratory study aimed to investigate elements involved in decision making in team handball live situations and to provide coaches and educators with teaching recommendations. The study was positioned within the framework of the situated-action paradigm of which two aspects were of particular interest for this project, the relationship between planning and action and the perception-action coordination. Qualitative methods used, which linked video observation of six female elite player’s actions during two championship matches and self-confrontation interviews. Player’s verbalizations reflected that their decision making included the following: (a) perception (visual, auditory, tactile and proprioceptive), (b) knowledge (concepts, teammates and opponents characteristics, experience) (c) expectations (opponents and teammates intentions) (d) contextual elements (score, power play, players on the field, match difficulty). Findings were discussed hi terms of teaching implications.

Vuleta & Dinko. (2003) established the relationship between changes of shooting for a goal and the final outcome of handball match. The data were collected from 38 games of the 2000 Men’s European Championship, played in Zagreb and Rijeka. Twelve indicators of scoring efficiency, redistricted for each national team, constituted the sample of manifest variables, whereas the criterion variable was a binary outcome of match-victory or defeat. The basic statistical procedures and regression analysis were used. Almost half of all the shots performed (44.61%) were executed from the back-court players positions (field shots). The winning teams were considerably more efficient in fields shot and in 7m throws than the defeated ones-(43.20%) and (76.53%) as compared to (32.52%) and (65.76%), respectively. The statistically significant multiple correlation of.71 means that the predictor variables share 50% of common variance with
the final results of the observed matches. The winning teams had more successful field shots, 6m-centre shots and wing shots and fewer unsuccessful 6m-centre and field shots and 7m throws. Scoring efficiency from a distance and from the 6m line differentiates the successful teams (winners) from the unsuccessful (defeated) ones.

**Chelly M. S. and Hermassi S. (2011)** conducted study in the year 2011 to observe and examine the activity profiles of adolescent player during regular games and compare their physical and motor performance of players during first and second halves of a match. They monitored activity pattern through video analysis and heart-rate (HR) responses (telemetry) in top national-division adolescent players including 18 men age covering 15-16 in six regulation games of each 25 min. halves with 10min intervals. “The total distance covered averaged 1777 +/- 264 m per game (7.4% less in the second than in the first half, p>0.05) Players ran 170 +/-24 m at high intensity and 86 +/-12 m at maximal speed, with 32 +/-6 bouts of running (duration 2.3 +/-0.3- seconds) at speeds >18 kmph (-1)... The mean HR during play was 172 +/-2 bmin (1-) (82 +/- 3% of maximal HR. Blood lactate concentrations at the end of the first and second halves were 9.7 +/-1.1 and 8.3 +/-0.9 mmolL (-1) respectively (difference p<0.05).” The data indicated that adolescent handball players cover less distance and engage in fewer technical actions in the second half of a match. In practical the trainers should seek after sustaining performance in the second period of a game by modifying playing tactics and maximizing both aerobic and anaerobic fitness during training sessions.

In their study entitled ‘Motion analysis in handball” **Lopez, C.M. and Platen (2012)** Lopez and Platen attempted to determine muscular status of a player in order to plan training and analysis competition; technical and tactical analysis of a match and determine the physiological demands like run distances, velocities and sports specific movements. With examples of combined analysis of heart rates and run distances and velocities in female top level handball team summarized the necessity and information for a trainer. Thus trainer can focus on optimizing and individualizing performance in the game.

**Fabrica and Gabriel, C. (2008)** attempted to determine speed and angle of ball throwing in handball. They studied penalty, effects of the muscular fatigue and different
tasks in filed positions. The study was based on Uruguayan national handball team. “Ball speed and output angle was analyzed taking into account the match time and the players’ positions, either back or wing, using paired sample t-test (p<0.05). Significantly higher speed (p=0.0006) during the first half of match time, compared to the second, was found. Significant difference in the speed according to the position in the filed was also warranted (p=0.00015) with backs throwing faster than wing. The throwing angle showed no differences for match time and position (p=0.43 and p=0.63) respectively”. The study shows that the variations can be due to the effect of increasing muscular fatigue and small variations in the shot angles can be interpreted as indicative of technique predominance rather than muscular fatigue.

Cherif, M. and Said, M. (2012) conducted a study under the title, ‘The effect of a combined High-Intensity Polymeric and Speed Training Program on the Running and Jumping Ability of Male Handball Players’. The aimed at investigating sprint repetitions and drop jump training session of male handball players. For the study 22 male handball players were selected on the basis of ‘axis’ and ‘lines’ have age above 20 years who were divided into two groups: experimental group (N=11) and control group (N=11). The experimental group had to go under to 2 testing periods: test and re-rest time after 12 weeks gap of an additional combined Plyometric and running speed training program. The control group was given regular training. The training comprised medical checking, anthropometric measurements and incremental exercise test termed as yo-yo intermittent recovery test. After 2 days participants performed re-test of Repeated Sprint Ability Test (RSA), Jumping Performance in Squat Jump (SJ), Countermovement Jump (CMJ) with arms (CMJA) and Drop jump (DJ). “The conventional combined program improved the explosive force ability of handball players in CMJ (p=0.01), CMJA (p=0.0s1) and DJR (p=0.03). The change was 2.78, 2.42 and2.6% respectively“. The study noted no significant differences in ‘axis’ and ‘lines’ and found that combined sprint repetition and vertical jump altogether positively affected the jumping and sprint ability of the players.

In the year 2008 Granados C. in his research study entitled ‘Effects of an entire season on physical fitness in elite female handball players’, examined effects of an entire season on anthropometric features, physical fitness and throwing velocity. During
the research study one-repetition-maximum bench press (1RMBP), jumping explosive strength, power-load relationship of the leg and arm extensor muscles, 5m and 15m sprint running time, endurance running and handball throwing velocity were assessed in four phase. During the season “notable increase (p<0.05-0.01) occurred in fat-free mass (1.81.2 %), 1RMBP (11.74%), bench press (12-21%) ad half-squat (7-13%) muscle power output, vertical jumping height (12-7.2%), throwing velocity (8 5 9%%) a decrease in percent boy fat (9 8.7%)”. The study observed no changes in sprint and endurance running. Besides, time devoted to games and changes in velocity at maximal loads displayed significant relationship. Changes in maximal strength and muscle power displayed positive impact in changes in percent body fat or body mass (p<0.01). The research also concluded that the handball season had increased the anthropometric features physical fitness and throwing velocity. This implied inclusion of explosive strength exercises of knee and elbow extension. However special care must be taken mode of body fat loss and increasing endurance capacity. In addition official and training games are adequate impetus for enhancing physical fitness in female handball players.

**Chaouachi, (2009)**, a study titled, 'Anthropometric, physical and performance characteristics of elite team handball players’ conducted. The purpose of this study best international handball team, anthropometric, physiological and performance characteristics to produce. Twenty-one elite handball players playing positions (goalkeepers, backs, pivots, and wings) and were classified according to the test. Testing, height, body mass, percentage body fat and endurance (VO2max) of anthropometric and physiological measures), speed performance measures (5m, 10m and 30m), strength (bench press and squat), unilateral and bilateral horizontal jumping ability, including and 5 horizontal jump test. Some significant differences in anthropometric characteristics (height and percentage of body fat) for the physical and performance characteristics were found between the player's position. Strong correlation 5m, 10m and 30m sprint times (R = 0.51-0.80, P <0.01) were noted between a leg horizontal jumping distance. One of the best predictors of Sprint’s strong run leg horizontal jumping and combined with the conclusion, among the elite performance abilities, the ability to sprint to 72% of the variance associated with the jump to 5 test,
the measured spacing occurs's handball players great. Jumping off the horizontal distance from one elite handball players the ability to race a standardized test can be accurately predicted.

Zapartidis, I., Toganidis, T., Varesltzis, I., Christodoulides, T., Koror, P, and Skoufa, D. (2009) title package for private study, "the young woman playing the profile of handball players. Objective of the present study, a team of young woman Handball players the difference in symptoms between physical fitness and anthropometric was determined and evaluated. sampling, 12.14 ± 1.09 in, and experience, body height, body mass, body mass index, margin, and the opening of palm length, long playing standing jump with an average age of 3:41 ± 1.67 years, 181 young female handball players, including 30 million Sprint, sitting, reaching, throwing, speed and flexibility were measured and estimated VO2max was assessed with a radar gun. significant differences Height - (p <0.001), body mass (p <0.001) were detected between the individual status, BMI (p <0.001), duration (p <0.001) hands, palms opening (p <0.001), palm length (P <0.001), broad jump (p <0.00Ls), ball throwing velocity (p <0.00Ls), 30 m sprint (p <0.00Ls) and estimated VO2max (p <0.001). Players in the back of the hand, palm, and palm length opening, it was the tallest. Wing players minimum weight, BMI and the lowest among all the players, opening a small palm and palm length was short. Wings broad jump, 30 m sprint and VO2max showed better performance than all other players. Goalkeepers were lowest when the players back, throwing off speed in achieving the highest values among all players. Goalkeepers all playing positions other than in relation to all motor abilities than less.

AAA Hassan, and Rahaman, JA (2007) 'Asia Anthropometric profile of elite male handball players, "the title of a study conducted. Anthropometric Asian male handball players in the present study describes the characteristics and the current was conducted to identify any positional difference. Sixty-three players in five different countries, height, mass, skin fold thickness and to estimate body fat and muscle mass in the 12th Asian Games in Hiroshima was measured. For reference purposes, the results were compared with data for English handball team. Significant differences between the Asian teams, events, East Asia, West Asia higher and lower in fat than the
teams in the group. A relative homogeneity was observed in positional. More successful and less successful teams were higher than the team had less body fat. In Asia, the Asian Handball players involved in the implementation of internationally successful tournament players in the European study and the specific features of anthropometric anthropometric variables differ from that conclusion.

**Buchheit, M. (2009)** A 4-a-side handball (HB) and the potential of sport to reach maximum oxygen uptake (VO2 max) and heart rate (HR) is a valid index is more suitable aerobic stimulation to determine whether a handball VO2 during the game. Nine skilled players (21.0 + / -2.9 years) (VO2 max) and HR-VO2 relationship was determined, where the successive maximal aerobic test (GT) was passed. VO2, HR and blood lactate ([La] (b)) 4-a-side handball game (30s joined the rest) and 480-S were compared with those measured during exercise by running 2 X 225 A (that were recorded during ). That VO2 (93.9 + / -8.5 vs. 87.6 + / -7.4% O (2) max, P = 0.06) tended to be higher compared to the mean handball, HR was similar, while (92.3 + / -4.9 vs. 93.9 + / hour to the top of the -3.9% = 0.10 P). [La] (b) or (8.9 + / -3.5 vs. 11.6 + + / -2.1 mmol-L (-1), P = 0.04) were lower than for handball. Time VO2 max was 90% higher for depression than the money spent (336.1 + + / 139.6s vs. 216.1 + + / 124.7s; p = 0.03). HR-VO2 relationship was higher in GT (R (2) = 0.96, p <0.001), HR and VO2 measured from the lower estimate (p = 0.03) in handball, ie when there was no distinction. 4-a-side game handball handball players to increase aerobic fitness that can be used as a specific option. However, VO2 during handball HR measures for estimating the accuracy is poor.

The study **Gill, SM, and Gill, J. (2007)** according to the objective of playing an elite youth soccer players to establish anthropometric and physiological profiles and selection process to determine their relationship was. Two hundred forty-one (n = 241) of the Club Arenas Getxo (Bizkaia) were members of the male soccer players took part in the study. Players, age 17.31 (+ / - 2.64) years, range 14-21 years, were classified in the following groups: before (n = 56), midfielders (n = 79), defenders (n = 77), and goalkeepers (n = 29). Participants (height, weight, body mass index, 6 skin folds, 4 in diameter and 3 limit) of Anthropometric variables were measured. Also, their
somatotype and body composition (weight and fat, bone, and muscle percentages) were calculated. Participants absolute and relative VO2max, an endurance test, sprint tests (10 cones with a flat 30 m and 30 m) and 3 jump tests (squat jump, counter movement jump and drop jump) was performed to estimate a strand test. Next are presented the highest percentage of muscle, were quite soft. They patience, velocity, agility, and all the physical tests, including power, were the best performers. In contrast, goalkeepers were the tallest and heaviest players. They also had the most fat skin folds and the highest percentage of fat, but most of their aerobic capacity was low. In the selection process, agility, and jump ahead of the tests were for the most discriminating. In contrast, agility, height, and endurance is the key factor for the midfielders. The Defenders group was characterized by the amount of fat. The study of anthropometric and physiological differences exist between soccer players who play different positions that are done. The differences in fit with their diverse workload. Therefore, training programs should include sessions specific to each positional role

Takeuchi, (1988) compared the body and the Japanese national team of Yugoslavia (YH, n = 15 males), and (J, N = 17 males) of the national handball team players physical fitness (Los Angeles Olympics in the first place) and West Germany, Japan (d, n = 15 males) (Los Angeles, ranked second in the Olympics). . Seven bodies indices were measured: height, weight, chest girth, upper arm (extended and bent), forearm, thigh and calf. Back strength, grip strength, and functional indices of vital capacity were also measured. Height, weight, and chest girth, upper arm (extended and bent) and left-hand jack players showed significantly lower values than the YH and GH ones. To the periphery of the thigh or calf, all threes team players showed about the same values. Back to the power jack and YH players were significantly higher than wheat, which is almost the same values, are seen. Vital capacity, YH and GH players than Jack showed significantly higher values. In this study, all of the body index, Jack thigh and calf of the periphery of the players, obviously, with two exceptions, YH, and D showed lower values than the players that conclusion. Vital capacity, but apparently Jack players YH and GH values less than the players have seen it. Comparison of the ion in the YH, Jack, players must first improve by training, body size, or the handball game
performance to a great level of the players may be required to collect, players are so clear and noise.

Before the Olympic Games in Atlanta, United States Olympic team handball players tested (n = 20, age 31.73 years ranged from 22.01) and maximal oxygen uptake of the laboratory tests, computerized measures of strength, blood tests, including and assessment, including physical characteristics, and physical performance components Bergemann, (1995) B-27; Field tests (accuracy throw, dribble and jump and throwing skills, height, weight, arm’s length, hand-over-hand anthropometries) for an average vertical jump off of a battery of 54.03 cm (21.27 in), the non-dominant leg 46.72 cm (18.39 in), and for both legs 62.15 cm (24.47 in) at. The elite men’s professional soccer players, volleyball players, 53.3 cm (21) college basketball players, but less than 67.0 cm (26.4 in) to 52.8 cm In (20.8) is higher than the vertical jump. Five anthropometric, vertical jump and specialist skills to the test with Rankings correlation coefficients were very low. The relationship between T-scores and rankings with the combination with $R = 0.364$ was the highest. This is significant, but the significance was very close to $R = 0.3783$.

Zapartidis, D. (2009) to conduct a study titled, “Factors Affecting Young Women Handball Players throw the ball velocity. The purpose of this study and the young female team handball players throwing the ball to accelerate certain anthropometric and physical fitness characteristics (N = 220, mean ± SD age 13.99 ± 1.06 years and 3.66 ± 1.66 years of playing experience) to investigate the relationship between. Throwing velocity of body height, body mass, body mass index, arm length and spread out in the period, standing long jump, 30m sprint, sit and reach flexibility assessment with a radar gun and maximal oxygen uptake were measured but was estimated. The results of this study, the calculation of body mass index lesion significantly correlated with all variables ($p <0.05$) showed that. The high-performance motor abilities and anthropometric characteristics of the age group advanced to the need dictates.

The purpose of this study, the efficacy and the wound in the shoulder rotational strength in the simulated game activities (SGA) to examine the influence Zapartidis, I., Gouvali, M., Bayios, I., Boudolos, K. (2007) and the rotation of the shoulder strength
and team handball The relationship between ball speed and accuracy. Sixteen female handball players, 60 minutes (30 minute halves and 2) specific handball activities include the SGA, the following took part. Ball velocity and accuracy, checking every 10 minutes, the subjects of 7 meters distance to the target site was introduced at the 3 shots. Shoulder internal (IR) and external rotation during Isokinetic strength (ER) during half time and at the end of SGA, SGA before the 3 angular momentum (60, 180, and 300 degrees / s) was evaluated. Throwing accuracy was the goal of gradually decreased effectiveness over time effect was significant. However, mid-tempo remained stable. Correlation between velocity and drift off during the five SGA was not significant. No statistically significant differences between the size of the initial measurement (IM) and was a significant difference between the two parts A and B, where 180 degrees / A, except in the case of the ER, the maximum Isokinetic torque were found. Isokinetic significant relationship between torque and velocity of the ball, only for ER IM (180, 300 degrees / s) and IR (300 degrees / s) were found. The main findings of this study during a game simulation, time accuracy and ball velocity or rotational force that affects the shoulder, that is. In addition, IR and ER of the shoulder peak torque speed and effectiveness throwing the ball is not concerned with.

Granados, C., Izquierdo, M., Ibanez., Which Bonnabau, H & Gorostiaga, EM (2007) 16 elite and 15 amateur players in a race to check the performance. The elite players were 4% and 3% faster than amateur players 5m (1.10 [+ or -] 1.14 +03 vs. 05 seconds) and 15m (2.64 [+ or -] 09 vs 2.71 [+ or -]. 08 seconds) sprints respectively. The small difference between the achievements of elite and amateur players sprints reflect real game situations that were conducted under sterile conditions can be explained by the fact that. Players are required to prove the environment under a real game situation, expect an event, and decision-making, and only then as quickly as possible, the difference between elite and amateur players the chance to be more specific. Croatian handball team in 53 major league players, Cavala, M., Rogulj, N, Srhoj, V, Srhoj, a study similar to previous studies. L, and Katie, R.31 (2008) compared to the average players in the above average players have seen better performance, agility and speed. Between them they have a number of tests, shuttle run test, sidesteps, and 20m, 30 million and 40m sprints, agility and speed assessed using.
The study examined changes in the performance of the team sprint at the handball season. The study of 16 elite players have been tested, no differences were found in a season during the 15m sprint performance Granados, C., Izquierdo, M., Ibanez, J., Ruesta, M., and Gorostiaga, (2008). Players Sprint training for a race or just devote time to their studies. L to 3%, this conclusion is not surprising. Researchers more time to study the influence of the sprint, sprint training and leg muscle strength and power training should be devoted to the load. Including the increasing importance of high-speed sprint training players seem to be faster than the amateur players that are highlighted by the fact that; So speed is a crucial element for team handball players. 

Jensen, J., Jacobsen, ST, Hetland, S.. And similar studies by Tvcit, P. (1997) to a maximum of eight world-class team handball players stepping in to investigate. They had to fight to the acceleration of the maximum running velocity of 20 m, a stopwatch with Photocell attached to the end of the 10th was tested. No information was reported on the test validity and reliability. 25 [A - Preparation phase (7.66 [+ or] in the middle of the stage - (24 m [s.sup.-L] 7.85 [+ or]), the maximum running performance declined from the early stages of the preparation phase. Sup.-L], and only the team’s most important tournament of the year (80.2 [+ or the increase -] 22 [s.sup.-L]). During the preparation phase in a reduction in maximal running velocity during this phase as a result of heavy resistance training program or training may be related to fatigue.

The most important tournaments at the beginning of the gradual increase to a maximum running speed up the training program can be beneficial to increase performance on the stage of the competition, which suggests that, despite the decline in physical training

Strangulation study Ronglan, LT, Raastad, T., and Borgescn, A. (2006) 20m sprint was to evaluate the impact of fatigue on performance. Photocells on the 10m and 20m marks using the measured time, and mark the differences of five 10m 20m mark during a training camp in the same general changes, as well as observed during the international tournament. During the three-day tournament played in three games, 20m sprint performance decreased by 3.7 [+ or -] 4%. The minor was found to be significantly reduced, however, the authors of team handball, observed during a real game, so only one aspect of the race, in a small reduction in the physical aspects are
affected, and argued that the woman would not necessarily affects the overall performance of players. Only one study compared between elite players agility and speed (N = 53) were playing different positions.

In this study, Rogulj, N, Srhoj, V, Nazor, M., Srhoj, L, and Cavala, M. (2005) pivots wing players and goal keepers were faster and more agile. However, the wing players in speed and agility, and reported no significant difference between the back-court players. Speed was assessed using the 30-meter run, and agility tests such as tests using different velocities were assessed. Team handball wing players usually taster and more agile than the other players in the field are required. Wing back court players performance was similar to that of the players, because the qualities of the wing players only partially, as demonstrated in this study. No plausible explanation was offered for this lack of differences. However, the speed and agility tests as tools for faster and more agile wing players in the back court players were tended to. The lack of statistical difference was due to a lack of statistical power that is possible. Unfortunately, the effect sizes were not reported because the standard deviation values, calculated from data presented in this study could not be.

2.2. Review related to morphological variables:

In a comparative study of handball and volleyball players conducted by Noutsos, K., Koskolou, M., Barzouka, K., Bergeles, N., and Bayios, I., (2008) observed that “Handball players are shorter (166.9[+-] 4.7 cm) than volleyball players (175.2[+ or -] 6.3 cm)” as compared to “body mass and FFM” the study noted. Another researcher Hoffman, J.,22 (2006) found that “the average height for17-year old American females was 163-2 cm. Therefore, adolescent team handball players were slightly taller than the average American female.”

In the year 2000, Silva L.R. undertook study of “Kmanthropometry profile viz-a-viz weight, stature, sum of six skin folds, muscularity and vertical jump of Brazilian (BCN Osasco female) volleyball athletes” in 3 age groups: A - 13 to 14 years, B- 15 to
17 years, C – below 17. He used One-way ANOVA and post Hoc (Turkey) tests. The study concluded extensive differences in the above variables.

Can F. (2004) ascertained morphological peculiarities of women soccer players and examined aspects of training and performance thereof. For the purpose he used 22 anthropometric sites to measure somatotype 48 and body composition; flexibility, agility, anaerobic power, leg muscle power and dynamic pulmonary functions. In the study 17 professional athletes and 17 age-matched inactive women acted upon as controls. Can F. noted that “women players had less fat content and less lean body mass than did the sedentary women. The mean somatotype for the soccer players was 3.07-3.55-2.43 and for the non athletes was 3.57-3.35-2.90. Anaerobic power, leg muscle power, and agility in the athletes were higher than in the non-athletes, whereas no differences were found in flexibility and pulmonary functions (p>0.05)” and the women soccer players demonstrated “more significantly mesomorphic, less endomorphic, least ectomorphic components and higher performance level than did the sedentary women.”

The researchers Anthony F., and Plotz in the year 2006 conducted a comparative study of South African and English rugby players having age up to 18 years to observe game specific, anthropometric, physical and motor variables. Three groups of rugby players from each of the countries were tested on 13 anthropometric, six physical and motor and eight game-specific tests. The researchers concluded that “there are no big differences as far as anthropometric variables are concerned. The English players, however, significantly demonstrated the worst results in all the physical and motor abilities”. On the contrary, the researchers’ noted, South African players performed better game-specific skills.

Padopopulou S. D. in the year 2000 comparatively examined anthropometrical characteristics and body composition of Greek women volleyball players in the age group of more or less 23 to 28 years from national team (NT) and AI Division. He recorded measurements pertaining to height, weight, segment lengths, diameters, circumferences and body fat percentage. “The mean height was 179 +/-62 cm and the mean weight 70.7+/- 7.8 kg. The NT players had significant longer upper limb, forearm, bitrochanteric diameter and wrist and calf circumferences (p<0.05). There were no
significant differences in body fat percentage between NT (22.4+/-4.7%) and AD (21.3+/-5.5%) players, as well as fat free mass (56.1+/- 5.7 kg and 54.6+/- 4.7kg for NT and AD respectively). The researcher pointed out that NT and Ad players had relatively high body fat percentage which can affect negatively performance of the players, thus must be decreased at any cost.

Yuichi, H. in the year 1988 immediately after competition season took measurements of body and limb of 43 Japanese professional baseball players whose weight was 79.6+/- 6.0 kg and mean percent of fat was 13.8+/-4.2 %. With the help of densitometry he calculated body composition. And 20 out of 43 baseball players’ limb composition was determined by an ultrasonic method. The researcher noted that “All tissue cross-sectional areas (bone, fat, and muscle of each segment in both upper and lower limbs were significantly greater for the baseball players than for the male college students. When estimating each cross-sectional area as a tissue/whole limb cross-sectional area ratio, flexor muscles in the forearm and in the thigh were observed to be highly developed in the baseball layers than in the male college student.” The conclusions drawn suggested training for baseball players should include an anerobic working capacity and limb composition is affected due to instruments used during the training of the baseball.

D. Matsumoto (2000) conducted a study to examine relationship between performance and lean body mass (LBM), Muscle mass (MM), and total body fat (TBF) as negative factor. Apart from this he also assessed differences between selected competitive athletes and club members. 136 players from All Japan University team Championship and All Japan elite Judo athletes were isolated for the study. The results indicated that: “competitive athletes differed from club members on back strength, vertical jump, and push ups with claps; competitive athletes had significantly higher scores than the club members on LBM and MM; club members had significantly higher scores than the club members on TBF and TBW.” These results were helpful in Judo as also in Handball to recognize importance of body composition in a competitive sport as well as reduction of fat, increasing muscle mass and improving basic physical fitness.
The investigators Ashok., & Babu. (2000) undertaken this study at the south west intervarsity men tennis tournament held at Ayya Nadar Janki Animal College (Autonomous), Sivakashi, Tamilnadu. Fifteen players were randomly selected and their anthropometric variables such as height and arm length were measured with the help of standardized devices. The accuracy was founded by seeing the percentage of getting success in the first serve during the competition. The collected data was statistically analyzed by using Pearson’s product moment correlation. The findings drawn after the statistical treatment revealed that there was - 1) very low negative correlation between the height and accuracy in the first serve. 2) Very low negative correlation between the arm length and accuracy in the first serve. 3) Very less positive correlation between the height and arm length of university Tennis players.

Bose, K. (1987) Selected forty one (N=41) high school champion footballers between 14 - 17 yrs old by using purposive sampling technique. A among these, 13 were from Pannalal School, Kalyani, Nadia (District level players), 16 from lake view high school, Madhya gram, 24-Parganas (state & national champion & winner of Subrato Mukerjee cup in 1985). Thirty six below par school footballers were randomly selected from Nadia district & from these only 12 were again randomly selected as control group. Morphological characteristics viz., standing height, weight, length of lower extremities, chest, thigh & calf circumference were considered and standard procedures were adopted for the purpose. Reliability of data was assessed which is statistically accepted. The score of all 6 morphological profiles were analyzed by multivariate one-way system & for testing significance differences (non-parametric) chi-square test was conducted. From the result, it appears that all the 6 variables jointly responsible for the difference in morphological profile between state and district level footballers. Thus, morphological profiles probably play a vital role for achieving high-performance level along with skill status being a vital factor.

Sodhi H. (1991) conduct a study titled, 'Kinanthropometric trends in selected Indian ball game players'. Anthropometric measurements taken on 116 athletes during the national games held in New Delhi, in November 1985. Anthropometries measurements taken on each subject were those used by Heath and Carter for evaluating a somototype of an individual. The data of the present sample have been
compared with previous studies and also with those hockey players who participated in
at Montreal (N=47), in basketball at Mexico (N=63) and volleyball at Montreal (N=130)
Olympic Games. In each group, the players have been compared with the Olympians as
well as the Indian players reported already. In about a decade the results of the study
showed a trend of improvement in the body size of Indian players were still shorter in
size, relatively lighter in weight and power in the development of mesomorphic comment
of somatotype. Further, greater predominance of ectomorphic component was still
persistent in these Indian sports.
2.3. Reviews related to Fitness and Performance:

Calderia., & Mastucio (1988) both have made an analysis about the changes on the physical fitness variables in elite volleyball players. The athletes from the 1987 national Brazilian team were submitted to a battery of tests. Data from each athlete included: weight, height, skin fold thickness, arm and calf circumference, predicted VO$_2$ max 1 (min)l and ml (kg min)-l (ml), 40 sec run test, 50 m run test, vertical jump with and without the help of arms, long jump and shuttle run. Data were compared to the national volleyball team who had participated in the 1980 Olympic Games in Moscow. The results showed a better situation of the 1984 Brazilian Olympic team in muscle mass; velocity (50m), aerobic (VO$_2$) and anaerobic (40 sec) power.

Shergili. (1992) established the importance of a set of specific physical fitness components as contributors in hockey playing ability. On the basis of available literature, 22 relevant test items were selected to measure fitness components. The sample consisted of 100 female hockey players, from 4 universities of Punjab. The age of player’s ranged between 18 to 24 years. The stepwise regression was applied to assess the importance of different variables in predicting hockey playing ability. The result of ‘t’ ratio suggested that endurance run test, standing broad jump, grip strength (LH), vertical jump, wrist flexion, age, height, and weight were significantly important in evaluating the hockey performance. Also, the results failed to find support for speed as an important predictor of hockey playing ability. The result of this analysis again stresses the positive role of physical fitness components in hockey playing ability.

Cicirko, L., Scott, D., Bennett, P., and Hodson, A. (2007) conducted the study to define level of general and special physical fitness of football players in the training stages, transition from learning training, under the topic ‘The General and special physical fitness level in young football players.’ They also attempted an investigation the correlation between general and special fitness of football players’ positions. For the purpose 20 football players were selected who had undergone 6 years of training. An international test was used to evaluate general physical fitness and football abilities test to evaluate special fitness. The research noted that “the players were placed in the 320-480 points bracket, that’s defined their general physical fitness. In the special fitness
test the strikers definitely dominated, whereas the defensive players gained the poorest results, spearman’s rate correlation indicated statistical significance (p<0.05) in some tests."

**Singh. (1997)** assessed the performance and fitness of 11-14 years old swimmers according to German standards. Data was collected on 160 swimmers (80 boys and 80 girls) by conducting a battery of tests (50m free style, 50m back stroke, 50m breast stroke, 50m butter fly, 60sec chin up, 60sec sit up, 30sec jumping sideways over the bench, 60sec push up, 60sec upper body lift, 60m dash, and 2000m run) used in Gennany. The results revealed that Indian swimmers are much inferior to their German counterparts and swimming performance of Indian girls is very poor. On the whole the study indicates that the training and competition system for young swimmers needs comprehensive revaluation and change.

**Stanley (1999)** in his study of examining profile of competitive junior female tennis player and fitness difference existed in between state and district players pertaining to age group of 16.23 years in 13 states (n=13) and 17.10 years in 10 districts respectively. The fitness components such as maximal aerobic capacity, strength, power, speed, muscular endurance, agility and body composition taken into account for measurement. The researcher observed “a series of unpaired t-tests found no significant differences between the groups on any of the body composition or fitness variables. The only significant difference occurred with the subjects playing age where the state group had been playing tennis for a significantly longer time (8.46 years) than the district group (6.55 years).” The researcher concluded that the fitness of the girls was of lower standard; most of girls spend more time in fitness training in a week. To succeed at the highest level a tennis player should be proficient in all three areas: skill, psychology and fitness.

**Graetzer., & Shultz. (1995)** assessed aerobic and anaerobic power and capacity, muscular strength, flexibility, balance, and blood chemistry status on ten male, competitive, open-class handball players (40.22+/-5.85 yr, 182.19+/-6.95kg, 1.0654+/- .0147gm.mL-l, and 14.70+/-6.48 percent body fat). Peak treadmill oxygen uptake and heart rate averaged 44.69+/-6.47 (range, 57.30-33.69) ml.kg-1 m-1 and 177.50+/-8.26
(193-168) bpm with the ventilator threshold occurring at 87.45+/−6.34 (97.01-76.03) percent of aerobic max. Leg Wingate peak anaerobic power was 728.24+/−94.87 (847.1-582.4) w, 9.22+/−0.95 (10.7-7.8) w.kg-1, and 10.87-1.43 (12.9-9.0) w.kgFFW-1 and power decline was 34.25+/−8.24 (50.0-22.2) %. Arm Wingate peak anaerobic power was 450.59+/−56.03 (517.7-376.5) w, 5.48+/−0.52 (6.2-4.8) w.kg-1, and 6.45+/−0.74 (7.5-5.3) w.kgFFW-1 Arm Wingate mean anaerobic power was 368.24+/−26.82 (400.0-329.4) w, 4.49+/−0.32 (4.6-4.1) w.kg-1, and 5.28+/−0.40 (5.8-4.7) w.kgFFW-1, and power decline was 34.49+/−7.27 (58.4-33.0) %.

Standing vertical jump height was 50.93+/−7.27 (58.4-33.0) cm and right and left grip strength was 52.90+/−4.95 (62-47) kg and 52.70 17-4.72 (60-46) kg, respectively. Flexibility measures included: sit and reach, 29.95+/−9.95 (43-13) cm; shoulder rotation, 89.15+/−11.36 (106.7-71.1) cm; and bridge up trunk extension, 47.69+/−13.78 (73.7-29.2) cm. Sagittal stabilometer time in balance (average six 20 second trails at 3 degree error setting) was 7.41+/−2.16 (10.53-4.94) sec where as time out of balance right and left were 7.11+/−1.58 sec (9.58-3.66) and 5.48+/−1.30 sec (7.11-2.93), respectively. Blood lipids were: total cholesterol, 197.80+/−26.78 (234.161) mg.dL-1; HDL-C, 47/ICH -10.64 (72-31) mg.dL-1; LDL-C, 128.90+/−16.74 (155-111) mg.dL-1; VLDL-C 21.50+/−12.12 (25-11) mg.dL-1; and total cholesterol / HDL-C RATIO, 4.29+/−0.77 (5.78-3.25). red blood cell and iron status revealed: hemoglobin, 16.00+/−0.60 (16.9-14.9) g.dL-1; scrum iron, 173.00+/−37.85 (.192-70) mcg.dL-1; TIBC 347.40+/−46.32 (429-279) mcg.dL-1; transferring saturation, 32.50+/−10.12 (58-22) %, serum ferrit in, 147.50+/−55.28 (219-27) ng.ml-1; hematocnt, 47.33+/−1.71 (50.1-44.2)%; total RBC count, 5.25+/−0.29 (5.80-4.81) k.mcl-l; MVC, 90.28+/−2.01 (92.4-85.6)ft., MPV, 8.96+/−0.58 (9.6-7.8) ft.MCH, 30.52+/−0.66 (31.2-29. lpg; MCHC, 33.79+/−0.41 (34.4-33.1) g.dl-1; and ROW, 12.67+/−0.47 (13.8-12.2) %. Sports profiling, an important recent development in sports physiology, had not previously been reported for handball players although has been rated as the top fitness developing activity by the President's Council for physical fitness. Sports specific physiological data is useful to predict performance success, compare athletic groups, assess improvement throughout phases of conditioning, provide baseline measures to monitor rehabilitation following injury, prevent over training, as a pathological screening tool.
Guner., Kunduracioglu., Ulka., and Ergen (2005) observed endurance performance of elite soccer players on the basis of age and playing positions. For the purpose he conducted tests including exercise tests on the treadmill that lasted for 3 min. running and 30 second blood sampling intervals. The running speeds at the beginning stage and next stage were 10km/hr-1 and 12 km/hr-1, respectively. The researchers noted that “when the tests were completed running speed was increased by 1 km/hr every 3 minutes until the runner reached exhaustion. Blood samples were analyzed immediately by means of an automated lactate analyzer. Heart rate was monitored continuously at 5 second intervals. Running velocities and heart rates at 3 mmol/L-1, 2.5 mmol/L-1, 3mmol/L-1 and 4 mmol/L-1 blood lactate concentrations were calculated with use of the spline function.” As concluded by the researchers the goalkeeper displayed lower endurance than players in other playing positions. Heart rate showed in cocker players older than 30 years of age. In all as stated by the researchers the endurance level of players was similar for players in all positions except for goalkeeper and it was not adversely affected with a person’s age increases beyond 30 years of age.

Mohr., Krustrupl., and Bangsbo (2003) evaluated physical fitness, performance and development of fatigue during competitive professional matches. For the purpose computerized time-motion analyses was performed 2-7 times meanwhile competitive season on 18 top-classes and 24 medium professional soccer players. The study noted that “the top-class players performed 28 and 58% more (p<0.05) high-intensity running and sprinting, respectively, than the moderate players (2.43+/-.14vs 1.90+/-.12 km and 0.65+/-.06vs 0.41+/-0.03km respectively. The top-class players were better (11%; p<0.05) on the Yo-Yo intermittent recovery test than the moderate players (2.26+/.08vs 2.04 +/-0.06km respectively.” Based on these observations results were drawn: “Top-class soccer players performed more high-intensity running during a game and were better at the Yo-Yo test than moderate professional players; fatigue occurred towards the end of matches as well as temporarily during the game, independently of competitive standard and of term position; defenders covered a shorter distance in high-intensity running than players in other playing positions; defenders and attackers had a poorer Yo-Yo intermittent recovery test performance than midfielders
and mil-backs and; large seasonal changes were observed in physical performance during matches.”

Mcitei. (1996) attempted to explore the area of physical fitness and technical skill as possible reasons of the poor performance of Indian women shot-putters. The study was conducted on 25 women shot-putters of national, university and state level. The performance of the Indian women shot-putters was compared with the equivalent norms and found that the athletes are poor in technical efficiency, specific strength, specific and general speed and explosive strength. It was also found that maximum strength level is above the norms. But its conversion to explosive strength is poor. The following tests were conducted to collect the data. Bench press, clean, squat, shot put standing (5 kg), shot put pull action (3 kg), 30m dash, shot-put standing and shot-put pull action (4kg) techniques, standing long jump, triple jump, and hops were suggested.

Mood. (1971) organized a particular study of two forms of the test of physical strength, knowledge of senior physical education for major students. One hundred and eighty four experimental test items, the contents of which were based on 60 physical fitness facts Secured from recent physical education literature and on the opinions of 73 members of the Research Council of AAHPER, were administered to 1,360 physical education major students enrolled in 35 collegiate institutions in the United States. As a result of item analysis data, two parallel forms of the tests were constructed. For the purpose of obtaining validity and reliability of data and establishing national norms the two final test forms were administered to 4,167 students enrolled in 150 collegiate institutions in the United States. Two forms of the test of physical fitness knowledge were constructed so that growth in comparison of physical fitness can be analyzed.

Richardson in the year 1977 conducted study to find out relationship between grip strength wrist flexion, arm length and the speed of a thrown baseball in male baseball players. He wanted to define whether grip strength can affect the speed of throw in baseball. According to his results, “grip strength had a significant positive relation to baseball throwing velocity.”
Muzumdaar & Edwin. (2000) selected male basketball players (N=180) in mini, youth, and junior category of Bombay region. Standard tests for testing the variables viz., vertical jump for leg power, 30m dash for running speed, agility, 12min run and walk for C.V. endurance were administered in the players. The basketball playing ability was graded (out of 10 points) by a panel of three qualified judges during the competition and the average of three judges was considered as the subjects playing ability. The result reveals that - 1) There was positive relationship between 30m dash and under basket shooting for the junior group. 2) Relationships between other physical fitness variables and basketball playing ability for the three groups were not significant 3) Mini group has a significant higher relationship between playing ability and 30m dash than the youth group. 4) The youth group has a significant higher relationship playing ability and endurance than the mini group.

Bayios, I.A., Bcrgclc,N.K., Apostolidis, N.G., K.S., and Koskolou, M. D. (2006) This group of research attempted to illustrate disparity between handball (222), basketball (133) and volleyball (163) team players in Greece Divisional AI and A2. Most of the handball players were shorter and had a lower body mass, higher percent fat and lower FFM than the basketball and volleyball players. This groups of researchers suggested that in “handball team height was probably not a criterion nor selection of athletes, as their mean height was not different from the norms of Greek women.”

Manchado., Navarro., Pers., and Platen in the year 2008 analyzed time-motion on elite team of handball players whose mean HR was 86% of HR max throughout the game. In their observation Heart rate was higher than 85% of HR max in 90% of the playing time. As it can be observed the HR values during first half were higher than those in the second half. This suggested the anaerobic metabolism supplied much of the energy requirements during the game. The research noted that “players covered a distance of 4614 m during one game with large variations ranging from 2066 m in goalkeepers to 5251 m in field players. The running distance per minute was low in goalkeeper… with no significant differences among players in filed position. In addition the running distance per minute was lower in the second half (65.11[+ or- 18.0 m] compared to the first half (71.5[+ or- 7.2 m]). Players with a higher endurance capacity were able to perform more intense activities compared to that of lesser endurance
capacity, although they maintained similar HR and HR max. Pinpointed observation of the researchers was that “the female team handball players with higher V (O.sub.2) max were able to use more aerobic metabolism.” (Manchado et. al. 2008). Hence it is fruitful that the trainers emphasis more on aerobic training.

L. Michalsik (2008) recorded 24 Danish players’ physiological activities in the game for 4 years from 2002 to 2006. Based on eight movement categories he observed, in all, 700 changes of activity in an average distance of 4.0 km covered by players. The researcher found that “Wing players also engaged in more high intensity work (3.65% of total distance covered) than back-court players (1.35%) and pivots (2.32%). On offense, wing players received less tackles (7.5 per match) than back-court players (15.9) and pivots (25.4). On defense, wing players performed fewer tackles (11.8 per match) than back-court players (24.6) and pivots (27.4). Wing players also engaged in more quick runs (4.4 per game compared to back-court players (1.35) and pivots (2.47)”. As can be observed the wing players played with higher intensity covering longer distance and engaging few tackles than other player positions on the field.

2.4. Review related to Skill, Tactics and Performance:

Battles, J. (1980) attempted to explore the prediction equation used for the choice of intercollegiate basketball team players. His investigation was focused on 33 female players at three colleges in Florida. Each female member was asked to fill data about the AMI, the Knox basketball test, Sargent jump test, and the field goal speed test besides anthropometric measurements. The conclusions drawn indicated “players ranked high by head coaches tended to score high on a combination of physical and psychological variables.”

K.H. Cox (1974) in his study attempted to define relation between selected volleyball skill components with that of team performance of North West “AA” teams. For the purpose a purposive sample of about 107 games between “AA” men’s teams from each 9 northwest volleyball tournaments was gathered. The conclusions drawn:
“The volleyball skills studied were significantly related to team performance; order of the volleyball skills most influential in predicting team success.”

**Brown. (1989)** investigated relationship of physical characteristics, physiological capabilities, and nutritional habits to female basketball team selection. 27 female from the University of Wisconsin-La Crosse participated in this study. Nutritionally, diets were analyzed. Physiological parameters examined were body fat, lean body mass, VO$_2$ max, anaerobic power, and vertical jumping distance. Physical parameters including age, height, weight was measure. It was concluded that, at the University of Wisconsin-La Crosse, physiological capabilities, and nutritional habits were not a major factor in team member selection.

**Shohei, K., Takahiko, N., Seji, O., & Yoshiyuki, M. (1988)** determined the performance probability curve of some skill in athletics. In this study large sample (N=295) have been collected on athlete on short distance run, jumping and throwing events. Data were arranged by time series in each athlete and measure of central tendencies and variability were calculated with every successive data based upon normal-distribution. Probability of records around mean was calculated with given SD. These probabilities were collected in each record and tried to fit logistic function to them. Standard error of estimate was evaluated for each compared between the athlete pf some even. The study calculated that 1) Proper application of logistic function was of 35 cases among 152 athletes who had enough data to apply logistic function. These curves did not cross each other and the intervals between the curves were almost same. 2) Standard error of estimate for proper application was about 0.05. 3) Error was greater in record which had only low probability. 4) Development constant, Denominator involved in logistic function was different significantly among the athlete to the same event. 5) It was supported that the maximal slope of the curve was one of the indices representing one’s own athletic ability of each athlete.

Through a quasi-applied research model **Hoarc, D. G. and Warr, C. R. (2000)** attempted to identify and evolve talented female soccer players. For the purpose they summoned athletes aged 15-19 years from sport or athletics background. To recruit team members a combination of factors was used in the final selection of 17 athletes to
take part in a 12 month talent development programmed. Accordingly prior to the season programmed of five training sessions every week were conducted for 2 moths that focused on enabling the players to acquire the necessary ball and game skills. “At the end of 25 game seasons, 10 players were taken to zonal team. The project illustrated a practical solution as how to train players based on anthropometric, physiological and skill attributes.” Such programmers, as can be expected, will provide new carrier launching pad for players by recruitment process.

Rudi, M., and Robert, N. (2001) In their study entitled ‘physical Fitness Qualities of Professional Rugby league Football Players: Determination of Positional differences’ focused on series of physical fitness performance tests. For the purpose total 146 professional rugby league football players participated in this study. To analyze the variance a criterion a level of p<0.05 was used to determine. The physical fitness series comprised: “1 repetition maximum squat and bench press, 15m and 40m sprint, agility run, 5 m run for distance, 60 second sit-up, 30 second plyometric push-up and measurement of body weight and subcutaneous skinfold (4 sites).” On the basis of the conclusions drawn it was suggested that for more efficient structure of physical fitness training of players, “the players should be grouped either according to the 2 broad positional categories of forwards or backs or according to the 4 categories of forwards, distributors, adjustable and outside backs.”

Uppal, A. K. & Datta, A. K. (1988) identified motor fitness components, which can help in prediction of performance in hockey. Male hockey players (N=74) studying in different universities of India was exposed to motor fitness components: Speed (50 yard dash), strength (right and left hand grip), Power (standing broad jump), Agility (dodge run), Dynamic balance (Johnson modification of Bass test), Flexibility (trunk and shoulder) and kinesthetic perception (a test of horizontal distance). The criterion measures were playing ability in hockey, which was based on the Strait field hockey rating scale. The analysis of data using zero order and multiple correlations revealed that playing ability in hockey is significantly related to speed (r=-0.29), right grip strength (r=0.29), left grip strength (r=0.47), agility (r=0.30), balance (r=0.27), and kinesthetic perception (r=0.29). Playing ability in hockey is not found to be significantly related, to power (r=-0.19), flexibility (r=-0.10) and shoulder flexibility (r=-0.16). The analysis of
data further revealed that the combined contribution of left grip strength, balance and speed to playing ability in hockey is significant at 0.05 level of confidence. Conclusion: 1) The motor components, namely speed, grip strength, agility, balance, and kinesthetic perception contribute to playing ability in hockey where as power and flexibility do not underlie performance in this game. 2) Speed, left grip strength and balance taken together, contribute most to the playing ability in hockey. 3) It is possible to predict playing ability in hockey based on performance in selected motor fitness components. Motor abilities required for football players (N=97; age: 16-19 years) of age with the aim of assessing their motor abilities required for football players. The following tests were conducted; 300 yards run, forward bending, bridge, throw-in, agility run without bail, sit up, 3 consecutive, hops and 2.4km run. The results show that there are no significant differences in the motor abilities among the football players of various age groups. On the whole football players were found to be wanting in speed endurance and agility, but were found to be good in endurance. In the test of speed endurance they took 50.15 seconds to complete 300 yards. For agility run they took 25.34 seconds to cover the distance of 56 meters in different specified manners. In endurance test the time taken was 587.39 sec (+/-43.39 sec) while referring the norm laid down for national level players the values obtained in endurance tests are considered in the satisfactory category. Performance in the test of trunk flexibility was also above average. In the test of leg strength the left leg is found too stronger than the right leg. Forward players show superiority in the tests for agility without ball and speed endurance. Goalkeepers are equally good in a basic endurance and also possess high degree of trunk flexibility. Defenders did not show superiority in any test but are not considered to be poor in any test.
2.5. Review related to Test Battery and Norms:

Singh, (1986), Punjab University students’ physical fitness is a causal study conducted in men. He Feishmans test battery, or to collect data associated with different colleges affiliated with Punjab University students apply to four thousand men. The students ranged in age from 17 to 22 years. He is the linearity of the physical fitness status. The students in rural areas than urban students were the best of all test items. He developed and subjective standards of their reliability and validity were established. Singh (1986) 70 Punjab state high school boys study conducted for the development of physical fitness standards. The state of Punjab is randomly selected five thousand school children. The sample for the data collection to include equal numbers of rural and urban subjects. He (1), standing broad jump (2) (3) agility run (4) bent knee sit-up (5) 50-meter dash (6) push-ups (chair), (7) the following items are included in the test to the test in mid- Throwing (8) 600 meters to run. Between the urban and rural school children to observe a significant difference in the number of test items. Significant difference between the performance of the subjects was found to be in a relationship. Test items from the Punjab state between ages 12 to 15 years of high school boys who had found that physical fitness is suitable for use in the development of standards was certified by.

Kumar, D. (1998) The main purpose of this study, high and higher secondary school for boys in Himachal Himachal Pradesh and also for the evaluation of secondary school, male physical fitness level, physical fitness standards Fleishman fitness battery on a variety of things to develop Himachal Pradesh students. To complete the study of 3,840 students between 13 to 16 years age group were selected at random in both urban and rural areas. Almost all the components of fitness for sixteen years, Himachal Pradesh, male subjects showed a significant difference in the age of fifteen. Boys aged 16 to 13 years for boys and 15 years were found to be significantly superior. The fifteen boys 14 and 13 years were better than the boys. The 14-year-old boys Fleishman all 75 components of the test battery was the best after the 13-year-old boys. The results of the study subjects was also in rural areas Fleishman Fitness Test Battery for six of the ten components of the urban subjects showed significant were the best.
Morrison, LL (1965) by a score of twenty items, t-test items in each category (for a substance in the body to promote and encourage the use of an execution was a four-week period, the Madison at the College of a material incentive for 120 collegiate criteria’s battery of is) and the battery is twenty items. Data BIMD 34 were treated by means of the program. A three-item and not the battery’s ability to predict the basic game skills were selected. The coefficient of validity, reliability and objectivity and ability coefficient was calculated for five groups of standards were developed for both tests. Fitness tests were made by the North.

Singh P. (1988) 13 19 years in the state of Jammu and Kashmir during the period of five male teenagers that physical fitness is a causal study was carried out. The variables considered were (arm and shoulder girdle strength), bent-knee sit-ups (abdominal strength), shuttle run (agility), and pull ups 600m. Run-walk test (cardio vascular endurance). The 19-year age group of 16 subjects belonging to another age group 13 to 15 years, all variables showed a good performance that conclusion.

Sreedevi, R. (1984) for secondary school girl AAPHER Fitness Test was prepared using the standards. VIIIth his subjects and Kendriya Vidyalaya, Gwalior, eight girl students were studying at the IXth standard.

Delhi: Monga, R. (1984) girls for student physical fitness test battery (10 to 14 years of age) was prepared. Standards of different socio-economic groups, age range, combined with the physical standards were established on a sample of 5,000 girls. Both the scale and the percentage of T-established standards. Recognition (face validity, criterion-related validity, and factorial validity) and reliability test revealed acceptable values. The battery test reports available features and tools that can be used easily found that the school suggests.

Das, TK Classes IXth, Xth and XIth Delhi Union Territory Government Higher Secondary School in the performance evaluation for physical fitness (1980), prepared standards. Twenty percent of schools in rural and urban areas of the same population for the study was taken. Ten percent of students in each school and NPFP AAPHER Youth Fitness Test Battery "A" of the items tested. Central Board of Secondary
Education of the items included in the inn NPFP course was similar. Youth fitness test performance of all the things a student of class IX and pull up on the shoulder girdle, measuring the strength of the United States of America through the classes X and XI of the students still had a remarkable game.

Singh R.M. (1986), a high school boys Punjab worn out and ready for the physical fitness standards. Data were collected on the subject in 5000 in various schools. The test was administered in the test, agility run-up, knees bent, 50-meter dash, sit-ups, standing broad jump of eight items, such as inclusion on, push-ups (chair), cricket ball throw and 600 meter run and walk. Recognized standards for physical fitness test, and 15 percent of high school boys in the age group of 12 years to assess the physical fitness levels were found to be suitable.

Eio, I. (1988) The study of physical fitness Korean and Japanese college judoists factorial structure of clear and effective notification methods, including finding a physical fitness test is conducted to install the battery. Fitness fifteen to twenty-one morphological and 1985, May 60 was operated on Korean and Japanese judoists. Principal component analysis and varimax commonly mentioned is the 36 test variables were calculated with the correlation matrix, are applied. Factor contributing to the variance showed a significant degree of factors was taken as the degree of contribution of each factor to consider, the ability to express space. The results were obtained: 1) factor analysis, six factors were obtained; Body, static strength, foot, grip, and explosive power. 2) Japanese Korean judoists judoists physique and superior strength, was stable. 3) Korean judoists judoists and grip strength was superior to the Japanese leg. 4) Although the above analysis, however, a great deal of overlapping groups of Korean and Japanese college judoists was found.

Haraprita (1988) of the Indian hockey teams in international competitions, falling standard to formulate specific physical fitness test. General physical fitness test, physical fitness measure is not specific to a particular sport or general physical fitness, however, is useful in support of the players have been selected. Hockey subordinate purpose was to review the performance of each in relation to the physical fitness test. The subjects in the university, state and national level inter-university together 50
female hockey players in India. The dependent variable was evaluated by a panel of experts, which was influenced by hockey. The independent variable was assessed by the investigator was built by a certain fitness tests. The statistical validity of the test battery, which was adopted for the calculation of reliability and objectivity. Data analysis and the ability to play hockey for the test revealed a significant relationship developed by the investigator. Primary school children of West Bengal in 4000 where he studied Biswas, A K (2005) was done by. The speed, agility and explosive power delivery tested. Available on raw data standards for the group was created.

Kangane S.E. Maharashtra Junior Handball Player of the selection test battery (2005), Development and Standardization, Maharashtra in the study, 600 male student is taken as a subject. The purpose of this study, the test battery developed for Maharashtra junior handball player and has been certified. Selected test items 12min / R sit ups, W., Rich, height, weight, fat%, BMI, BP, PPER, RR, sit Skill Test, Handgrip, vertical jump, 50m dash up the pressure and is used for the study of depression.

Lord, AD (2011) aged 17 to 40 years to prepare for the mountaineers standards of Title 17 to 40 year old male mountaineers were on. The purpose of the study of physical fitness and mental condition and ready to standards did not mountaineers. Nehru Institute of Mountaineering five mountaineers enhancement courses at the age of 17 years for the next 40 years, the fund has been selected. 270 subjects were chosen for the study. Physical fitness tests carried out to know the status of height, weight, Body Mass Index, said. Bioelectrical impedance, Handgrip strength test (right and left), V-sit the test, wall sits, leg strength test, the scale of the catch, standing stork test and push-up test. Sixteen Personality Factor Test to five mountaineers mental condition. Descriptive analysis of the mean, median, and standard deviation was done by testing. Percentile method was used to prepare standards. The physical fitness test (selected variables) that increase the impact of mountaineers mountaineers deteriorate with physical fitness is seen to be concluded.

Waghchoure M.T. and Bera T. K. (2000) attempted to form and standardize a innovated battery of kho-kho skill test. For the purpose the undertook study of about 2000 school boys having age between 11-14 years from Pune city. These school boys
were tested by the ten items of elementary form of the skill tests. Then the test-items were arranged on the basis of the analysis of item difficulty. As mentioned by the researchers “the scoring principles of each item were also established scientifically. The test-retest reliability co-efficient of this test was found statistically significant (r=0.85, p>0.01),” this battery also assured its content validity. And both the percentile and t-scale norms were established on Liker’s five-point scale.” Therefore this test can help in assessing kho-kho skills and foretell potentiality of the players with sufficient reliability and validity.

In a doctoral research Wangwad V.S. (2001) assessing and evaluating the morphological variables (i.e. height and weight), physical fitness (i.e. speed, leg power and agility) and skills of volleyball, establish a standardized norms for selection of junior volleyball team of state level. The male volleyball players (N= 272) below the age of 18 years participated in Maharashtra state volleyball championship in 1998 were the subjects of this doctoral study. Standing body height (cm), body weight (kg), fifty-meter dash (speed), 4x10m shuttle run (agility), jump and reach (leg power) and volleyball skills (i.e. under hand pass, upper hand pass, serving, reception and service, set for spike and smash) were measured by using standard tests. The selection criteria as developed and standardized in this investigation is a reliable and valid, tests that can be objectively assess the efficiency of volleyball players to get entry in state level junior volleyball team. The norms of the selection criteria were easy to grade that can discriminate talented volleyball players with optimum accuracy so as to constitute a standard junior volleyball team.

D’souza S. in the year 1993 ascertained to standardize norms for physical fitness tests for the age group of 13 to 16 years in the state of Goa. Strength (vertical and standing broad jump), muscular endurance (flexed and arm hang) were considered the basic physical fitness components. For the purpose the researcher proposed to test 4000 girls in the age groups of 13,14,1,5 and 16 years from 75 schools of all the 11 talukas in Goa. The data gathered in respect of different physical fitness items was used to construct percentile scale, sigma scale and Hull scale. As noted by the researcher, “the level of significance was set at 0.5 level of confidence and there is no significant difference in the physical fitness of the girls (13 to 16 yrs.) .”
De, S. K., & Dcbray, P. (1998) organized a study on Eastern (ER) and North-East (NER) region children to compare and see the changes and variations of these norms with the Indian norms, which are being used for talent identification throughout the country. In the present investigation percentile norms of various anthropometric and motor quality variables were made from the sample of children of ER and NER of India. These norms were compared with the existing national norms for Indian children sports performance of the children of ER and NER in the national context. The percentile norms thus formed for ER and NER children are of great importance particular in talent spotting in these regions. These norms also provide relative chance of getting talented children in sports from the regions. It was observed that ER children’s arc relatively more talented than their NER counter parts. The children of NER may reveal better scores in the specific skill test exploiting their mesomorphic qualities.

Dr. P. Purashwami (2010) To arrange the norms for evaluating performance of players in Table Tennis skill Test for Junior and Senior Table Tennis players in the wanting situation of standardized evaluating criterion for ability, grading and predicting the performance was Purashwami’s intention to undertake an extensive research study. P. Purashwani along with Dr. A. K. Datta worked on the construction of standardized performance test criterion by taking into account four test items namely Alternate Push test, Target Service Test, Alternate Counter Test and Fore Hand Drive on Target Test with foot movement after playing backhand push. In this endeavor two normative scales- percentile scale and 7 sigma scale were constructed for tennis players at state and nation levels.

Zuti, W. B. (1977) prepared physical fitness norms for college freshmen. The age group selected for this was from 17.6, 18.5 to 19.5 years from freshmen of Kansas State University. The total subjects were 3000. The test was conducted for strength test, flexibility body composition and cardiovascular fitness. The result shows that the college freshmen at Kansas State University were above average and standards were appropriate for their use at National level.

To estimate fitness levels Yadav B. S. in the year 1986 conducted an extensive study to design a physical fitness rules for school children between 13 to 16 years of
age in Haryana state. Accordingly he had selected “3600 school boys from 87 schools in 12 districts. To record performance he used 50m dash, shot put, standing broad jump, zigzag run, sit-ups and step test.” Thus percentile ranking system was evolved for the school children.

**Watson, R.E. (1978)** established norms for Nebraska boys and girls. The tests selected for Neb Eel physical fitness test were standing long jump or vertical jump, 50 yard dash, sit-ups, stick jump and 300 yards distance run. The tests for secondary test were pull-ups or flexed arm hang, 50 yard dash, standing long jump, sit-ups, side step and mile or 9 minute run or 12 minute run. The sample was selected randomly. One-percent sample was selected from Neb schools to establishment of norms. The norms were established for each test for girls, boys and groups according to chronological age. Percentile statistic was used. According to result the following recommendations were suggested.

**Sittmann, L. E. (1981)** prepared norms for Northeast Missouri State University students of health and physical fitness concept classes. In which 372 male and 648 female subjects were tested. The test conducted was the sum of 6 skin folds, predicted percent fat, predicted VO$_2$ max, grip strength; leg strength, back strength, vertical jump distance and vertical jump power. Statistic used was mean, standard deviations and range of all variables. Classification 85 was based on sex. Percentiles in increments of 5 were constructed for each variable in each classification.

**Roche, D. P. (1971)** examined the performance of 12811 boys and girls aged 7 to 17 m 9 minute run/walk test for students aged 7 to 10 and a 12 minute run/walk test for students aged 11 to 17; scores from this test were percentile ranked according to age and sex and were presented for was as a field test of running endurance.

**Rasmussen, G. L. (1970)** observed and he found that the median scores of south Dakota boys at all ages were higher than of the National sample in entire tests except pull-ups and shuttle ran. After extensive experimentation involving 35 different test items, **Piscopo, J. (1962)** conducted a study to establish norms and to compare skin fold and other anthropometric measurements of pre-adolescent boys from three ethnic groups. The subjects were 647 halian, Jewish and Negro pre-adolescent boys.
The skin fold was measured at five sites. Other measurements included height, weight, bi-iliac dimensions and selected girths. Co-relations were determined between skin folds and selected body build components. Skin folds ranged from moderate to high values. The largest percentile scores were found in Jewish groups. Analysis of variance was employed to compare body fat, height and weight of each group. Significant differences between ethnic groups were found in certain skin folds and weight at 0.01 levels.

Mistknwi, J.J. (1966) in his study prepared the national norms for the one minute basketball throw for goal, pull-ups, potato race, standing hop-step and jump, push-ups, standing broad jump and softball target throw items of the YMCA national athletic achievement programmer. YMCA throughout the United States tested 2000 boys in each group, and the author obtained five percent of the scores at the Salem YMCA Oregon.

Keogh J. W. (2003) Keogh was interested to develop an effective testing battery for female hockey on the basis of anthropometric, physiological and skill-related tests so that he could identify regional representatives rather than local club level female field hockey players. He recorded that Representative players were essentially leaner and scored faster timings for 10m and 40m sprints as well as the illionois Agility Run. They also had more aerobic and lower body muscular power. As per the research the results indicated that “% BF, sprinting speed, agility, dribbling control, aerobic and muscular power and shooting accuracy can distinguish between female field hockey players of varying standards.” Hence it became clear that a talent hunt programme should consist assessment of above physical parameters.

Kumar S. P. (2007) attempted to develop norms for the selection procedure for Volleyball players in Nagarjuna University in which total 13 teams of different colleges had participated. The target group was age group of students below 25 years. For the purpose “ test item: 4x10m shuttle run, standing Broad jump, vertical jump, 50m Dash, Height, weight and volleyball skill tests were conducted.
Viljoen, A. (2004) carried out a study to determine how 12 to 15 year old boys from the Northwest province (NW) compare to Australian (AUS) and South African (SA) boys of similar age with regard to the Talent Search-program developed in Australia. A total of 402 boys between the ages of 12 and 15 years were tested. The Australian Talent Search model and norms were used for testing purposes and comparisons of children from AUS, SA (Du Randt, 2000) and from the NW. The Statistica computer processing package was used to process all data. Descriptive statistics was used to determine the means (M) and standard deviations (SD) for each age group in the NW province. Analyses of variance (ANOVA) was used to determine differences between groups (NW-SA, NW-AUS, SA-AUS) and the Bonferroni technique (Thomas and Nelson, 1996) was used to determine statistical significance (p < 0.05) of differences between groups. The Australian boys generally achieved statistically significant better values than the NW and SA boys with regard to their anthropometrical characteristics, physical and motor abilities. The motor and physical performance of boys from the NW, when compared to SA boys of the same age was generally significantly poorer although the differences were smaller. The vast majority of boys in the NW province are not exposed to physical activity or sport and come from low socio-economic (SES) conditions which might have contributed to the below average performance of the group. Due to the differences in compared results, it is recommended that the NW province should develop their own set of norms for talent identification purposes. It is further suggested that norms be compiled for each, racial group as well as for the entire group when the general sport talent (TID) of boys in the NW province are analyzed and that both sets of norms should be applied.

D. C. Henson (1989) Talent identification of the payers occurs through mass participation and process of natural selection. Track and field does not enjoy such widespread participation. This research work was aimed at improving the means by which “youngsters with potential for high level performance can be identified; develop normative tables for scores on various tests know to be indicators of track and field performance; develop statistically based equations for prediction future performance from test scores established by male and female players at different levels.” Further it
was expected that this “scientifically rigorous [would] method of predicting athlete and create a database that could be used for comparison in future”.

**Carolina State (1961)** The test items were thirty second bent-knee sit-ups, thirty second side stepping, standing broad jump and thirty second squat, thrusts for boys and girls, in addition, boys of ages twelve to seventeen performed full push-ups and all girls and boys of ages nine to eleven were designated as follows: inferior, poor, average, good and excellent. Performed a modified form of pull-ups. Percentile norms were available separately for boys and girls at each age nine through seventeen years. Levels of Achievement.

The AAPHER youth fitness tests project represented the first attempt by the physical education profession to establish national norms. The test battery was originally developed in 1957 by a special Committee of the AAPHER Recreational Council. The youth fitness test now consists of six items for boys and girls of age groups 10 to 17 and college men and women. The norms were revised to up to date it and make more scientific after comparing the achievements of the youth of Great Britain, Japan, etc., with the American norms. The youth fitness test consists if the following:

1. Pull- tips (modified pull-ups for girls).
2. Sit-ups,
3. Shuttle run,
4. Standing broad jump,
5. 50 yards run,
6. 60 foot ball throw, and
7. 600 yards run walk.

After comparing the American norms with the achievement of the youth of Great Britain, the norms were revised to update it and make it more scientific.

The Canadian Association of Health, Physical Education and Recreation Youth Fitness Programmed started in 1964. The norms as developed were hearing sufficient reliability and validity. The battery consists of the following items for boys and girls age group 7 to 17.
a. One minute speed sits up,
b. Standing broad jump,
c. Shuttle run,
d. The fixed arm hangs,
e. 50m yard run, and
f. 300 yard run.

An International research programmed for the standardization of physical fitness tests was undertaken by the International Council of Health, Physical Education And Recreation i.e. ICHPER Larson. (1967). A committee on the standardization of physical fitness test ICHPER was appointed to set standards and to construct instruments for the measurements of physical fitness in 1964 at Tokyo.

A survey was conducted and a report on the tentative standard was distributed to all members of the committee for review. The comments and recommendations received were discussed at the meeting held in Maaglingen, Switzerland in August, 1967. The performance tests items were developed in two parts. The basic combination of tests items includes endurance run (100 meters run-walk, 800 meters run- walk), 50 m sprint, pull-ups (pull ups and the fixed arm hang), standing broad jump and grip strength.

The following additional items for application under special circumstances are also involved: 50 meters sprint (2 mins), sit-ups (25-20), repetition bench presses (15 kg press), one min trunk curl, vertical jump, 50 meters shuttle run, back strength, leg strength with belt and arm flexion strength.

The Union Ministry of Education launched National Physical Efficiency Drive in the country, in 1956-60, in order to arouse consciousness towards physical fitness.

The scheme is to award recognition by awarding star pins and certificates to those who score in all the items of the tests battery, the prescribed minimum for many three levels of achievement envisaged, namely one-star, two-star, three-star. Twenty national awards are also made to those who are adjudged the top twenty in the National Physical Efficiency test or a National Award competition each year.

The "A" battery of the test consists of the following items:
1. 100 meters run,
2. 800 meters run (men and women),
3. 200 meters run (women),
4. Long Jump,
5. High jump,
6. Putting the shot.

In the "B" battery some of the athletic field items were replaced by items like Dands Baithaks, Carrying weights, etc.

After organizing it two years on an experimental basis, the scheme has been continuously evaluated every year by organizing a seminar for state liaison officers the National Physical Efficiency Drive. The norms have been changed a number of items as a result of the deliberation at those seminars.

However, the "A" battery consisting of purely athletic items has been more or less constant and the adhoc norms prescribed for three levels of recognition remains unchanged.

Attempts to evolve norms on scientific basis have not yet borne fruit. The NPED is intended to promote skills in track and field events well. Hence these items are in the "A" battery. However it should be noted that the testing of physical fitness should eschew skilled items such as high jump and long jump.

This is the basis of the items included in the American Association of health, Physical Education and Recreation youth fitness test of USA, which is perhaps the first National Battery adopted by any country in the world. Modification of this has been attempted in other countries such as Canada, Japan, and West Germany.

It can be firmly said that this research reveals that the morphological factors, physical fitness and skill are important aspects for the players in the game of handball. Above reviews also show that evaluation and assessment of player’s tor selection and training purpose is important. Above reviews indicate non availability of norms and selection criteria for senior handball players which is necessary for the progress of the game hence the study. The review has helped the researcher in giving direction for the current study "Reforms in the Norms of Selection procedure for Maharashtra State
Senior Level Male Players in Handball Game”.
Suitable tests fulfilling the activity the handball players perform and the authentic requirements were selected and are presented in the chapter III.