Chapter II

REVIEW OF THE RELATED LITERATURE

An exhaustive review has been presented in this chapter. For this purpose every effort was made by the research scholar to have access to maximum literature. Some of the studies cited in this chapter do not have direct relevance to present study but are of indirect importance in understanding the significance and need of present investigation.

Upton and Hagon\(^1\) conducted a study on seventy three female volunteers aged 13 to 15 years, of height weight, percent body fat, forced vital capacity, forced expiratory volume for one second and maximum voluntary ventilation. During the treadmill test each subject was continuously monitored via a 12 lead. ECG heart rate was recorded for last fifteen seconds of each minute with a full 12 lead recording at the end each stage of the

\(^1\)S.J. Upton and R.D. Hagon, "Comparison of Physiological Profile of Middle Age Women Distance Runner and Sedentary Women," Research Quarterly 54 (March 1983): 83-84.
test. Blood Pressure was monitored at the end of each walking stage using a sphygmomanometer and pressure cuff. All subjects were similar in age and height but the untrained subject were significantly greater than the trained subject in total body weight. The sedentary women possessed a significantly greater amount of body fat, where as both groups were equivalent in lean body weight. The women runner had significantly greater maximal aerobic power.

Regression equations using physical traits and class commitment as predictors were developed by Athinkson for determining potential skill in beginning tennis, badminton, and handball. The physical traits used were: agility, power, hand eye coordination and visual acuity skill level was determined by a round robin tournament in each sports. Subjects were 140 college men enrolled in beginning classes and taught by the whole part method control. Subject included 135 students enrolled in other beginning classes and taught by part method. Another purpose of the study was to determine, if practice in the sports would significantly improve

score on physical traits. A paired 't' was used to compare experimental and control group, conclusion were; class commitments are probably an integrated part of skill attainment in sports, tennis and badminton by the whole part method experience greater gains in ability and hand eye coordination. Students taught tennis by the part method experience greater gains in shoulder girdle power.

Bult\(^3\) tested 127 high school female cross country runners on percent body fat, rating a perceived exertion and maximal oxygen consumption during a continuous running treadmill test. These young runners \(X = 15.6\) years were running approximately 25 miles per week. They had a average \(V_O_2\) max of 50.8 ml. min\(^{-1}\) and HR was of 19.8 bpm. The mean percent body fat, as determined by hydrostatic weighing was 15.4\%. The onset of metabolic acidosis was estimated to occur at 78\% \(V_O_2\) max. a stepwise multiple with 3000 meter run as the dependant variable indicated the max. treadmill run time, weight relationship \(V_O_2\) max and VE max entered the equation in that order, yielding an \(R\) of 0.67. Both HR and RPE increased with work intensity, but not of equal rates.

These high school female runner had higher VO$_2$ max. than previously reported for the age group. However, they were considerably below these values reported for national caliber distance runners.

George and Nequin\textsuperscript{4} studied two ultra marathon world record holders; Barney Kleckar, Benchick Mostow were studied immediately after a 50 mile race and in a laboratory under controlled conditions, blood samples were obtained before and after running and were analysed for lactate glucose glycerol and free fatty acid. Muscle biopsies were also performed and analysed for glycogen, enzyme activity and fiber type. Results showed that although these runner are fit, their physiological abilities are not extreme or unique and are similar to data obtained from marathoners.

Griffin\textsuperscript{5} made a study of heart rate of female in field hockey and basketball. He concluded that the


\textsuperscript{5}Norma S. Griffin, "Comparison of Heart Rate of Female College Participant in Field Hockey and Basketball," Completed Research in Health, Physical Education and Recreation 10 (1968):79.
playing field hockey was more demanding in terms of heart rates of the subjects participating than in the playing basketball.

Withere, Roberts and Davies\(^6\) compared the aerobic power, anaerobic power and body composition of South Australian male representative in athletics, basketball, field hockey and soccer. The runners and walkers exhibited the highest mean VO\(_2\) max. there was virtually no difference between the hockey and the soccer players. The lowest mean was registered by basketballers. The team game players scored much higher than runners and walkers on absolute power. The scores of hockey and soccer players were almost identical as were the lowest scores of runners and walkers. The average percentage of body fat for the runners and the walkers, basketballers, hockey players and soccer players were 13.1, 16.6, 15.7 and 15.7 respectively.

Zhdanova and Parzhizkova\(^7\) conducted a study for proper estimation of physical development. It was found that there was considerable variations in each group. The most worth while changes in weight are those in which there is an increase in general weight accompanied by significant raising of the non fat and lessening of stored fat.

Morrow, Hoster and Nelson\(^8\) made a comparative study on women intercollegiate basketball players, volleyball players and non athletes. They took 300 women college students as the subject for this study. The subjects were 110 women from each of above listed groups. Various anthropometric and performance characteristics were obtained on each subjects. Athletes were found to differ significantly from non athletes on all variables while the contrast between the athletes indicated that the basketball player had longer arm wider billiac, slower sprit time and greater upper and lower body strength than the volleyball players.


Goon⁹ conducted a study on comparison of cardio-vascular endurance of a football players and endurance runners. He selected twenty men students of Lakshmibai National College of Physical Education, Gwalior at age 17 to 19 years. He administered 12 minute run-walk test to the football players and endurance runners 't' ratio was calculated and it was concluded that there was no significant difference in cardio-vascular endurance between football players and endurance runners.

Chandrashekar¹⁰ studied on comparison of selected physical fitness components of football and basketball players. To compare selected physical fitness components i.e. speed, extend flexibility, dynamic flexibility, leg explosive strength, arm explosive strength, agility, abdominal strength, gross body coordination and cardio-respiratory endurance of

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football and basketball players. All the tests were statistically compared by using 't' ratio. The level of significance chosen was .05. Statistical analysis showed that the mean differences between the performance of football and basketball players is extent flexibility, dynamic flexibility, leg explosive strength, abdominal strength, and gross body coordination were significant at .05 level of confidence.

There was no significant difference between the mean performance of football and basketball players in speed, arm explosive strength, agility, and cardio respiratory endurance.

Sodhi\textsuperscript{11} concluded in his study skinfold pattern of top Indian athletes and sports persons on 289 male sportsmen and 59 normal persons collected from N.I.S., Patiala. From 1978 to 1983 skinfold measurements were taken for each individual at biceps, triceps, subscapular, supra-iliac, thigh and calf regions. The sportsmen studied belong to athletic, aquatic sports, gymnastic and wrestling. The athletes and aquatic

sportsmen have been further classified according to their weight categories. The study has been conducted to understand the distribution of fat pattern in Indian athletes and sportsman specialising in different sports.

Generally speaking, the fat fold are found to be of greater thickness at trunk region and thinner at limbs. In most sports the minimum value of the fat fold noticed at biceps and the maximum at the supra-iliac sites. The degree of homogeneity in average value between the different groups is found to be at the level of biceps. It seem that in the field conditions the assessment of only the supra-iliac skinfold may help in understnding the degree of muscular fitness in case of sportsmen. The middle and long distance running gymnastic exercise and swimming seem to be more suitable for reducing subcutaneous body fat.

Matize\textsuperscript{12} in his study constructed special apparatus to record response time for hand, leg and combined hand and leg movements. Two analysis of

variance and Duncan's multiple range test showed that non athletes and the tennis players were faster than football playerson all three tasks.

Grimmelt\textsuperscript{13} measured 21 physiological and 18 psychological components of 12 members from each basketball and volleyball teams of California state university along with 12 non athletes from physical education service class. ANOVA of data, recorded significant difference in following psychological traits between volleyball and basketball players capacity status, sociability and tolerance. The only physiological difference noted between volleyball and basketball players was weight.

Brar\textsuperscript{14} concluded in her study "Development of model for Talent Search in Selected Sports Based on Motor Physiological and Structural Factors."

\textsuperscript{13} Grimmelt and Anne Dixit, "Physiological and Psychological Comparison Between Female Athletes and Non-athletes," Dissertation Abstracts International 39 (March 1979):38-A.

\textsuperscript{14} Dalvinder Kaur Brar, "Development of a Model for Talent Search In Selected Sports Based on Motor Physiological and Structural Factors," (Unpublished doctoral Thesis, Jiwaji University, 1992)
1. Sports of hockey, football, volleyball and basketball would not result in making different performance among players belonging to these sports.

2. Football and hockey group had lowest pulse rate recorded and highest performance recorded in bicepscondylar femur width.

3. Speed and agility were important factors for football players and basketball players as compared to hockey and volleyball players.

Dey\textsuperscript{15} conducted a study with purpose to find out whether at certain level of achievements sportsmen participating in different games are characterized by distinct muscular strength and to find out proportionate ratio of segmental and total body strength required for sportsmen for particular sports. For this, 12 players from each sport viz. swimming, basketball, handball and

table tennis were selected. The 'F' ratio obtained by one way analysis of variance was tested for significance at .05 level. The study reveals that (a) basketball players were found more in leg strength, (b) handball players have more grip strength, (c) swimmers possess more in arm curl strength, shoulder and abdominal strength and (d) table tennis players were found comparatively weak in their muscular strength.

Puhl and others 16 conducted a study to examine the absolute and relative physical and physiological characteristics of elite men and women volleyball players. They tested eight members of U.S. men national team and 14 members of women university world game volleyball team. The parameter measured indicated percent body fat, VO₂ max, post exercise blood lactic acid measures of vertical jumping ability and peak isokinetic torque for knee flexion and extension, shoulder extension and planter flexion at 80, 180, 240 and 300 degrees per second. And they established

following findings (1) As expected, the men were taller, heavier had a higher body density and lean body weight and lower body fat, (2) for gross measures of jumping ability the men achieved greater absolute higher for the jump and reach and a greater jump distance above the standing reach.

Clarena\textsuperscript{17} studied the relationship of certain factors with success in volleyball, subjects were 28 members of women's extramural volleyball team at Illinois State University. Two experimental volleyball coaches established criterion by rating each players on her playing. The following variables were measured height, weight, leg extension strength, using dynamometer skinfold, using the large caliper, jumping ability, using the jump and reach test. Reaction time and movement time were measured by apparatus constructed by the investigators. Through 't' test and correlation it was founded that jumping ability and reaction time were significantly related to success in volleyball.

Malhotra et al.\textsuperscript{18} conducted a study for physiological assessment of Indian hockey olympic players. They reported a mean resting pulse rate of 58.7 beat/minute and ranging from 54.6 to 66.7 beats/minute.

Wilmore and Haskell\textsuperscript{19} conducted study on body composition and endurance capacity of professional football players. The body composition was assessed on 44 professional football players using hydrostatic weight technique. Residual volumes were measured by the nitrogen dilution technique, and FVC was measured using a collins 9-1 spirometer. In addition, 17 of these athletes were given work capacity test on either a bicycle ergometer or treadmill during which time measurements were made to heart rate $V_E$ and $VO_2$. Relative body fat ranged between 4.0 and 29.2% weight between 80.6 and 143.4 kg and lean weight between 73.1


and 106.6 kg. RV ranged between 0.966 and 2.457 Vc between 4.315 and 7.551 lit and TLC between 5.281 and 9.374 lit. VO₂ max and VE ranged between 33.0 and 60.0 ml/kg min and 105.7 and 208.5 L/min (BTPS) respectively. Several of these values are the highest reported in literature and are related to large body size of selected players.

Ellena²⁰ studied the relation of physiological factor to football performance. Minute played during the 1958 football season was used as the criterion. Players were measured in the 50 yard dash, right grip, left grip, arm push and pull strength. Speed correlation .60 and total strength .40 with the criterion. Both correlations were significant but the predictive value for minutes played WGS slight.

Christian²¹ identified the contribution of selected variables of football game performance. Thirty members of the 1973 South-eastern state college football


team were chosen as the subjects. Each subject was tested on 12 variables and a stepwise multiple regression was used to determine the weight of each of these variables to the ultimate criterion. The percentage of player executed correctly as determined by grading the film of the ten 1973 regular season football games. It was found that the best predictor of game percentage score for the backs was lateral movement with a correlation of .67. When the back and line group combined, the best predictor of the game percentage score was the vertical jump with a correlation of .50. It was concluded that for total group the vertical jump and twelve minute run were the two best predictors.

Football potential of 67 football players was predicted by David from their scores on a football potential test. The test battery consisted of motor ability items as well as football skill item. (McCloy's classification Index, Strength, Power, Time to Hit, Audio Visual, Agility, Speed, Work output). Substantial correlations were obtained between most test item and the test criterion, the sum of T scores size as depicted

by McCloy's Classification Index (C.I.) had a negative, non-significant correlation with the criterion. The discriminative power of the battery was evidenced by the highly significant correlation between the test criterion and coaching staff's ranking of individual players (rho = .840). It was concluded that athletic potential in football can be predictated by testing.

James and Stephen\textsuperscript{23} investigated to assess possible physical differences between black and caucasian inter-scholastic football players rated as either successful or unsuccessful by their respective coaches on predetermined objective criteria of success. The subject were 104 caucasian and 206 black football athletes enrolled in class 4A school of Shreveport, Louisiana. Each subject was administrated following test items: standing height, body weight, arm girth, calf girth, right grip strength, left grip strength, back lift, leg lift, Roger's strength Idex, Roger arm strength score, bar dips, pull ups, Roger's Physical

Fitness Index and standing broad jump. The data were analyzed by application of a double classification analysis of variance to the \(2 \times 2\) factorial design utilizing rate at the columns and success as the rows, for F ratio found significant at the .05 level. The Scheffe's method of multiple comparison was employed to test mean differences. Significant race difference in favour of the Caucasian athletes were observed for body weight, arm girth, calf girth, back lift, leg lift, Roger's Strength Index, Roger Physical Fitness Index and the standing broad jump. The black athletes were non-significantly superior to the Caucasian athletes on any of the variables under investigation. Mean comparison between the athlete rated as successful athletes scoring significantly higher in standing height, body weight arm girth, calf girth, back lift, pull ups and roger's Physical Fitness Index. The interaction comparisons were not significant.

The purpose of Ramaden's\(^{24}\) investigation was to examine the maximal oxygen consumption (\(\text{VO}_2\text{ max}\)),

\(^{24}\)Jasem Mohammad Ramaden, "Selected Physiological Psychological and Anthropometric Characteristic of the Kuwaititi World Cup Soccer Team," Dissertation Abstracts International 46(October 1985):924-A.
maximal anaerobic power (A.P.) both body composition (B.C.) somatotype (ST), and the Profile of Mood Status (POMS) and the State Trait Anxiety (STA) characteristics of Kuwaiti world cup soccer players.

The Kuwaiti team exhibited moderately high aerobic (51.9 ml/kg min.) and anaerobic (119.6 kg.m. sec.) power, both value being significantly higher than college norm, but in mid ranges for world class athletes in general. Relative Body fitness (8.9%) and a balanced mesomorphic somatotype (2.1-4, 5-2.1) were comparable to those athletes in other high level team sports, the world cup soccer players revealed a significantly higher value in anger factor.

Tattersfield compared 15 players from one top flight team in England in each of the following games: amateur rugby, professional rugby, amateur soccer and professional soccer. Team members were compared on the U.S. Navy Standard Physical Fitness test, the Oregon simplifications of Roger's Strength Index and Physical Fitness Index and individual items. Mean superiority by

team were: amateur rugby players in muscular endurance and grass strength; professional rugby players in weight and vertical jump; amateur soccer players in push up, pull-ups and muscular endurance and professional soccer players in back strength and sit-ups. The offensive amateur and professional rugby players were superior to the defensive players in physical fitness index and some muscular endurance test. The defensive soccer players were superior to the forwards in body weight and standard height and the amateur defensive players were superior in strength index, leg strength and leg power.

Michale\textsuperscript{26} explored the possibility of developing a regression equation whereby football ability could be predicted from an analysis of selected anthropometric measures strength test, power measures, balance, standing height and body weight. Subjects were 56 football players at University of Arkansas, six assistant football coaches, Three offensive and three defensive rated each offensive and defensive player respectively.

\textsuperscript{26}Ralph P. Michale, "Development of a Battery of Test to Predict Football Ability at College Level," Completed Research in Health, Physical Education and Recreation 20 (1978): 239.
This rating on football ability was used as criterion measure. Stepwise multiple regression and polynomial regression were utilized to form predictive equations. The equation by polynomial regression was football ability \(-786.65 + 7.33\ \text{bowleg} - 143.22\ \text{(standing height)} - 2.60\ \text{(tibial\ torision}) - 33.40\ \text{(horse\ power}) - 0.408\ \text{body\ weight}\ R^2 = .573\) and percentage standard error of the estimate was 15.7 percent.

Farrar\(^27\) investigated selected motor/physical performance variable for a sample population of professional baseball players. Eight motor/physical performance variables were selected through a review of related literature as valid measures of components of professional baseball playing ability and were indicated as 1) running speed, 2) muscular power, 3) depth perception, 4) shoulder flexion, 5) throwing speed, 6) agility, 7) eye hand coordination and 8) reaction time. The subject for this investigation were an incidental

sample of 103 professional baseball players who trained in Florida during 1974 baseball season. Statistical procedure used for analysing data were percentile rank, oneway analysis of variance, Duncan's method of comparison and a correlation ration. It was concluded that a test battery of vertical jump, eye hand coordination, Illinois ability run, shoulder flexion, strength, glance and bat test, medicine ball put, 60 yard dash, and throwing speed will successfully differentiate between players classified as low minor leagues and those who are either high minor or major league players with the significant difference in performance favouring the latter two groups.

Holland\textsuperscript{28} conducted a study on predictive value of selected variables in determining the ability to play basketball in small high schools, measures included speed, agility, reaction time, shooting ability, pulling

ability, height, weight, age and previous experience. The criterion was the rating of the basketball playing ability of each squad member by his coach. The most important variables were experience, ball handling agility, pulling ability and shooting ability. The weighted index with $R = .76$ was basketball ability score $(1.54)$ number of years experience + $(.28)$ score on speed dribble + $(.26)$ score on wall volley + $(.15)$ score on shooting test.$^{10}$

Ellenberg$^{29}$ conducted this study in order to predict selected physical variables in determining competitive performance in high school basketball on 110 selected high school varsity player in 1969. The performance data was collected by use of a performance rating chart designed by the writer. Product moment correlation, multiple correlation and multi regression equation was formulated. The study revealed following

conclusions: 1) the 30 seconds shooting test and vertical jump are the most reliable predictor for performance variables used in this study, 2) Height, hand grip, verticle jump, wall volley and 30 second shooting test are the most important variables contributing to a player's performance in this study, 3) the five item battery consisting of height, hand grip, verticle jump, wall volley and 30 second shooting test can be a practical and useful instrument in predicting game performance for high school basketball players.

In this study Childress tried to identify and determine the effectiveness of selected physical variable in predicting a successful basketball performer through a factor and discriminant analysis. Twenty four test item were selected through a review of the related literature as valid measures of the components of high school basketball ability. The test item were

administered to 106 high school basketball players and resultant data were analyzed through factor analysis. Seven factors were isolated and six were identified as agility, speed, relative muscular strength, total body movement time, manual dexterity. Two test batteries were constructed the first consisting of seven test items, second was composed of ten test items. The result of this study indicated that the components of basketball ability could be isolated, measure and utilize to construct an evaluative tool for classifying players into two population identified as successful and unsuccessful.

Jeannine\textsuperscript{31} investigated effect of shoulder and arm strength on accuracy of distance shooting in basketball. Forty five college women were equated into three groups on the basis of the knox basketball test. A test of shooting accuracy one group participated in shoulder strength development program, another group

had a general strength development program. Third serve as a control. Both experimental groups improved their accuracy while control group regressed slightly. But mean differences were not significant.

Arrighi\textsuperscript{32} studied the effect of competitive basketball on motor efficiency of college women. Fifteen subjects were selected randomly from 45 varsity players and an equal control group was selected by the experiments. The experimental group had basketball practice 1.5 hours 3 days a week for 3.5 months and played 10 interscholastic game. Pre and post season test were given to both group in sit up, hand grip, 600 yard run-walk, 50 yard sprint and squat reach ability. The basketball group improved significantly on all tests except arm and grip strength, but similar improvement by the control group nullified the significance of these gains.

Parchman\textsuperscript{33} compared the leg strength and cardio-respiratory endurance of college women during a semester's class participation in basketball and swimming. Leg strength was tested with a dynamometer, endurance was determined from the time. A bicycle ergometer ride could be continued at a set number of revolution per minute and constant load. The basketball participants show a significant increase in leg strength but not on endurance test. The swimmers did not improve significantly on either test.

Coleman et al.\textsuperscript{34} studied nine college basketball athletes to determine the effect of a season of competition on the aerobic and anaerobic energy sources. Pre and post season variable of resting and recovery heart rate, performance of the treadmill test (time) maximal oxygen intake and the scores of Margaria Anaerobic Capacity Test (vertical velocity) were studied.


Analysis of data yielded no significant decrease in recovery heart rate, treadmill performance time and VO2 max. A non significant increase in resting heart rate and anaerobic power and a significant increase in vertical velocity from pre to post test. The result of this investigation suggested that training in basketball was of sufficient intensity to maintain cardio-respiratory function and improve anaerobic performance.

Rajni35 conducted study on the aerobic capacity and body composition profile of the female All India Intervarsity Basketball Players. The selected variables were body composition, total body weight, fat percentage, lean body mass, body density and to measure to aerobic capacity Cooper's twelve minute run/walk test was administrated. The analysis of data for relationship between fat percentage and lean body mass (percentage) \( r = - .997 \). Fat percentage and body

density ($r = -.845$) fat percentage and aerobic capacity ($r = .649$) lean body mass (percent) and body density ($r = .848$) lean body mass (percent) and aerobic capacity ($r = .648$) aerobic capacity and body density ($r = .651$) revealed that there is a significant correlation in lean body mass (percentage) and body density. Lean body mass (percentage) and aerobic capacity and anaerobic and body density as the $r$ obtained is much higher than the $r_{05} (48) = .379$ required for significant at 0.5 level of confidence. The conclusion of study: 1) there is negative relationship between the percentage of fat and lean body mass (percentage), 2) the percentage of fat is negatively related with body density, 3) there is negative significant relationship between the fat percentage and aerobic capacity, 4) lean body mass (percentage) is positively related to performance in Cooper's 12 minute run/walk test, 5) there is a significant positive relationship between lean body mass (percent) and body density, 6) body density is positively related with the performance in Cooper's twelve minute run/walk test.
Diehl's investigation was to assess the anatomical, physiological and haematological responses of a sample of highly skilled female intercollegiate basketball players to the demands incurred during the pre season training programme and competitive season. He concluded that intensity of training and competition significantly improved cardio-respiratory responses to a submaximal work effort as related to heart rate, oxygen consumption and did not result in adverse physiological effects as reflected by peripheral blood level of haemoglobin.

Campbell conducted a study on heart rates of male college freshman during a season of basketball. Using seven boys who opted for basketball at the beginning of the season as subjects and Balke's maximum work capacity test a treatment, he concluded that a season of basketball does not produce significant

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37 Donald E. Campbell, "Heart Rate of Selected Male College Freshman during a Season of Basketball," Research Quarterly 39 (December 1968): 880.
changes in resting heart rate. However, it does produce a significant reduction in the time required for heart rate to return to 90 beats per minute.

Dahl\(^{38}\) conducted a study on college basketball players \((N = 24)\) were tested on 11 independent variables and 3 criterion variables, accuracy from 10 ft, from 21 ft and total accuracy. Wrist strength and flexibility correlated significantly with 10 ft. accuracy, wrist strength and flexibility correlated significantly with 10 ft. accuracy, wrist strength, hand size and hand reaction correlation significantly with 21 ft. accuracy. Jump shooting ability from both 10 and 21 ft. can be predicted from the developed regression equations.

Battles\(^{39}\) conducted this investigation to develop a prediction equation for selection of women inter-


collegiate basketball team members. Thirty three female from three college in Florida acted as subjects. Each subject completed a personal data from the Knox Basketball Test, Sargent jump test, and the field goal speed test. Selected anthropometric measurements were also obtained from each subject. Each head coach and each assistant was asked to rank each member of the team in order of how each contributed to team success. Three different ranking such as head coach's rankings, the assistant coach ranking and the average ranking of the head and assistant coaches were included in statistical analysis significant correlation (.05 level) were found to exist between the head coaches' ranking and the age and college basketball experience and between the average of the head and assistant coaches ranking and college basketball experience. Results of stepwise multiple regression indicated that player ranked high by head coaches tended to score high on a combination of physical and psychological variables such as college basketball experience height, vertical jump, and the AMI total score. Assistant coaches tended to select players with high score on psychological variables.
Gordon predicted basketball playing ability from cardio-vascular capacity, leg power, upper body strength and endurance, body composition and height. Subjects were 20 women varsity basketball players from two colleges 10 from each college. Separate prediction equation were developed for five criterion measures. An ability rating consisting of four offensive, defensive descriptive term. The Tutko Richards general personality rating scale which utilized game statistics a ranking of the players by the coach. The data were analyzed by the stepwise multiple regression programme. The 1.364 (12 minute Run) -0.113 height.

Gibert demonstrated that a battery of 4 independent variables selected from total of 10 best reflect composite basketball ability and performance at college level. These 4 variables are ability, criterion, arm strength, Penny cup test and speed pass.


However, since the desired multiple r at .95 was not reached this limits the utilisation of this battery as a predictive measures of basketball ability.

A review of research reports revealed that only some studies on physical fitness and physiological profiles of basketball players are available but no study on the physical fitness and physiologically potential of handball players seem to have been conducted.