REVIEW OF LITERATURE

1. Narazaki et al. (2009) assessed physiological demands of competitive basketball by measuring oxygen consumption (VO2) and other variables during practice games. Each of 12 players (20.4 +/- 1.1 years) was monitored in a 20-min practice game, which was conducted in the same way as actual games with the presence of referees and coaches. VO2 was measured by a portable system during the game and blood lactate concentration (LA) was measured in brief breaks. Subjects were also videotaped for time-motion analysis. Female and male players demonstrated respective VO2 of 33.4 +/- 4.0 and 36.9 +/- 2.6 mL/kg/min and LA of 3.2 +/- 0.9 and 4.2 +/- 1.3 mmol/L in the practice games (P>0.05). They spent 34.1% of play time running and jumping, 56.8% walking, and 9.0% standing. Pre-obtained VO2(max) was correlated to VO2 during play (r=0.673) and to percent of duration for running and jumping (r=0.935 and 0.962 for females and males, respectively). This study demonstrated a greater oxygen uptake for competitive basketball than that estimated based on a previous compendium. The correlation between aerobic capacity and activity level suggests the potential benefit of aerobic conditioning in basketball.

2. Chomitz et al., (2009) determined relationships between physical fitness and academic achievement in diverse, urban public school children. Academic achievement was assessed as a passing score on Massachusetts Comprehensive Assessment System achievement tests in Mathematics and in English. Fitness achievement was assessed as the number of physical fitness tests passed during physical education. Results show statistically significant relationships between fitness and academic achievement, though the direction of causation is not known.

3. Morrow et al (2009) in this article reviewed 50yrs of youth fitness tests in the United States. The AAHPER Youth Fitness Test, the first U.S. national fitness test, was published 50 years ago. The seminal work of Krause and Hirschland influenced the fitness world and continues to do so today. Important youth fitness test initiatives in the last half century are summarized. Key elements leading to continued interest in youth fitness testing at the start of the 21st century include (a) concerns about children and youth fitness levels, (b) AAHPER(D)-led youth fitness battery development, (c) differentiation between performance-related and health-related fitness testing, (d) the numerous youth fitness tests developed, (e) collaborative discussions on development and adoption of a unified national youth fitness battery, (f) computerization of youth fitness test results, (g) differentiation between norm-referenced and criterion-referenced evaluation of student results, and (h) concern about youth fitness levels (again, but with a focus
on health). We have come full circle on youth fitness interests. This article summarizes the key youth fitness tests in the second half of the 20th century and projects future considerations.

4. **Singh (2007)** conducted a study on comparison of selected motor fitness, physiological and psychological variables of professional and non-professional hockey and soccer players. The result of the study shows that there was no significant difference in speed, resting pulse rate, anxiety and aggression and there was significant difference in agility between hockey and soccer players had greater cardiovascular endurance than that of soccer players and there was no difference between the professional and non-professional players.

5. **Choudhary & Singh (2005)** Conducted a study on selected physiological variable and subjects characteristics on 160 Indian National Judokar, 10 from each weight category with the purpose to characterize elite Indian Judokas by their selected subjects characteristics to standard human performance measures and to compare them in different weight categories and age groups. In physiological variables significant difference was found between seniors and juniors in relation to Anaerobic Power, Positive Breath Holding capacity and Negative Breath Holding capacity.

6. **Annesi et al., (2005)** To address reduced physical education in elementary schools tested a 12-week physical activity protocol on 5-12-year-old, primarily African American, girls and boys at 14 YMCA after-school care sites. Analyses of the eight Age x Sex subsamples indicated significant improvements on body composition, strength, and endurance, both within-groups and when predicted changes due to maturation were accounted for. Exercise barriers self-efficacy significantly increased in subsamples of 9-10- and 11-12-year-old girls only. The need for replication across ethnic groups was suggested.

8. **Kumar and Sathe (2003)** carried out studies on the relative effect of health-related fitness and skill-related fitness on sports proficiently of students of physical education. The subjects for the study were the male students of school of physical education, Devi Ahilya Bai Vishwavidyalaya, Indore who had at least participation in inter-collegiate tournament in the year 1995-96. They concluded that a high skilled sports person shows a high correlation with sports performance but the contribution of skill-related fitness and Health related fitness are equal.

9. **Markovic and Jaric (2004)** was to evaluate recently proposed classification of physical performance tests based on the role of body size in the tested performance. The obtained values of the allometric parameters proved to be closely in line with the hypothesized ones. While the
finding regarding the tests of exertion of external force (i.e., the tested force should be divided by \(m^{(0.67)}\) in order to normalize the force for body size) have been already demonstrated by some authors, the findings related to the tests of rapid movements and, particularly, tests of supporting body weight are novel. Although the normalization methods discussed need further evaluation, a more accurate and consistently applied assessment of the body size-independent indices of the evaluated groups of standard tests could improve the methodology of physical performance testing in general.

10. **Bod Davis et al., (2000)** wrote in their book that the concept of physical fitness, in general athletic terms, means the capability of the individual to meet the varied physical and physiological demands made by a sports activity, without reducing the person to an excessively fatigued state. Such a state would be one in which he/she can no longer perform the skills of the activity accurately and successfully.

11. **Hardayal Singh (1995)** speed is the ability to execute motor actions, under given conditions, in minimum possible time. Speed ability is highly movement specific. Moreover, speed unlike the other two conditional abilities, (strength and Endurance) depends much upon the nervous system and as a result is of more complex nature and is comparatively less trainable. He further states that speed appears in different forms in different sports. The most important forms in which speed appears are: reaction ability, movement speed, acceleration ability, locomotors ability and speed endurance. It is very interesting to note that these different types of speed abilities are relatively independent of each other, i.e. they do not correlate with each other. Speed of each type and of each body type is specific.

12. **Kreshmer (1995)** self image is one of the most important factors in learning motor skill. He recommended that physical activities must be presented in such a way that every child may achieve some success. As success in motor skill depends upon physical fitness as reflected through successful learning of a motor skill will enhance self-image and thus it may be hypothesized that there might be a positive correlation between self concept and physical fitness.

13. **Sushall (1989)** states that, athlete development systems and programmers are no longer adequate if they only emphasize skill and physical development. The inclusion of sound psychological principles and practices in training and competition preparations and conduct is a necessary ingredient of modern sport.
14. **Uppal (1990)** defines physical fitness as “The capacity to carry out reasonably well various forms of physical activities without being unduly tired and includes qualities important to the individual’s health and well being”.

Johnson and Nelson (1988) precisely defined evaluation as “the process of giving meaning to measurement by judging it against some standard.” Tests are instrumental and are techniques in teaching and learning processes involved, in objectively classifying heterogeneous traits of students, and in knowing the necessities and lacunae of the students, evaluation of instruction and programme and grading of pupils etc.

15. **Hebbelink (1986)** identifies factor analytic approach as a mode “to create a precise systematic order among a great number of variables, classifying certain similarities and differences according to a logical mathematical rational”. He further enunciates that “Factor analysis is the logical outgrowth of the testing method and can be applied in fields where concepts composed of many elements are used and where the experimental method cannot be readily applied because of complex nature of concept”.

16. **Rechard Besgar (1882)** also pointed out that some of the problems with speed measurement have also been encountered with agility. The strong emphasis of speed in this component has led some researches to name agility “Speed-of-change-of-diction.” Certainly, the ability to move quickly from one point to another while stopping and strongly quickly qualities are added to speed, such as in the tests of shuttle run and dodge run, separation of two components becomes difficult. Another term frequently used in place of agility to describe the qualities required to move more quickly between objects in “co-ordination”. Although co-ordination is involved in Agility, it does not emphasize, in common urge of the term, the component of speed. In addition, coordination in performance is more difficult than Agility or speed to identify from field tests of Physical powers.

17. **Rechard Besgar (1882)** wrote that, moving quickly is a basic requirement for achieving success in many sports. A successful sprinter of offensive back requires quick movements of the legs. But, qualities other than speed are associated with these particular movements. Co-ordination of limb movements of the upper body, lower body, and trunk are essential. Running speed and body control cannot reach full fruition without good coordination. Speed, as a component of physical performance, has been difficult to isolate in research because of its relationship to other qualities of performance, such as strength, agility, coordination, and endurance. In the laboratory, speed of
the limps can be measured with high accuracy. The scores are less likely to become contaminated with other qualities than are the running time in the 40-yd. dash. But, even in the laboratory, speed of the upper limbs is not a good indicator of leg speed per/sec by field tests of running and agility.

18. **Patel (1980)** opined that the world of training methodology has crossed many milestones as a result of different types of researches in general and their application to the sports development in particular. In the modern scientific age, athletes are being trained by highly sophisticated means for better achievement in their concerned sports. They are being exposed to the exercises and training sports. They are being exposed to the exercises and training methods which have proved beneficial for achieving higher standards.

19. **Singh, Manjit, et.al. (2014)** The study was to determine the comparative analysis of motor fitness components among Sprinters, Throwers and Jumpers. To obtain data, the investigators had selected Sixty (N=60), Male Inter-College and Inter-University Level (Sprinters, Throwers and Jumpers) between the age group of 18-25 years. To conclude, it is significant to mention in relation to Motor Fitness Components that insignificant differences occur among Inter-College Sprinters, Thrower and Jumpers on the sub variable Explosive Strength. However, the significant differences occur among Inter-College Sprinters, Throwers and Jumpers on the sub variable Agility, Balance, Speed and Flexibility. To conclude, it is significant to mention in relation to Motor Fitness Components that insignificant differences occur among Inter-University Sprinters, Throwers and Jumpers on the sub variable Agility and Explosive Strength. However, the significant differences occur among Inter-University Sprinters, Throwers and Jumpers on the sub variable Balance, Speed and Flexibility.

20. **Singh Amandeep A. (2014)** Study of Selected Motor Fitness Variables between Individual and Dual Sport Athletes, The purpose of this study was to compare the motor fitness variables between individual and dual sport athletes. All the participants were informed about the aim and methodology of the study and they volunteered to participate in this study. All the participants were assessed for height, weight and selected motor fitness characteristics. The height of the subjects was measured with anthropometric rod to the nearest 0.5 cm. The weight of subjects was measured by using portable weighing machine to the nearest 0.5 kg. Sit-ups test was used to assess the muscular strength. Shuttle run test was used to monitor the agility. The vertical jump test was used to measure explosive power of the legs, speed was determined by 50 meters dash
whereas 600 yards run or walk test was used to measure cardiovascular endurance of the subjects. The independent samples t-test was applied to assess the differences between individual and dual sport athletes. The findings of present study revealed significant differences between individual and dual sport athletes with regard to the variables strength (p<0.05), agility (p<0.05), power (p<0.05), speed (p<0.05) and endurance (p<0.05). While comparing the means, individual sport athletes have been found better on strength, agility, power, speed and endurance.

21. Karkare, A. (2011) was study to compare anthropometric measurements and body composition of hockey players with respect to their playing position. Two hundred and ten junior national hockey players seventy each from half line, back line and forward line was selected different state of India. Anthropometric measurements including height, weight, diameter, breadth, girth, and skinfold thickness was taken from entire subjects. Body composition was measure with the help of Matiegka’s method (1921). To find out significant difference statistical method one way ANOWA was performed. Results found that, hockey players playing in different position found to be differ on some anthropometric measurements and body composition.

22. Cormery, B. Marcill M. & Bouvard, M. (2008) To evaluate, by examining data collected on professional basketball players during a 10-year period, the differences in aerobic capacity in function of the playing position and the impact on these parameters of the change in time regulation of 2000, which shortened the time allowed to attempt a field goal by 6 s and divided the duration of play in four quarters. Twice a year between 1994 and 2004, professional basketball players (n=68) were studied for anthropometric characteristics and were submitted to an incremental exercise test on a cycle ergometer. Statistical analyses were carried out to determine the interaction between the playing position and the effect of the change in time regulation on the physiological characteristics of the players. Anthropometric measurements were different in function of the playing position, the centers being taller and heavier than the forwards and the guards. Guards exhibited the highest V_o2max (54.0 (SE 1.6) ml/min/kg) and were the most affected by the change in time regulation of 2000 with a 19.5% increase. Significant main effects of “before” versus “after” rule changes were found for maximal and submaximal O2 consumption, which were increased by 12.8% at ventilatory threshold, 7.3% at respiratory compensation point and 7.8% at V_o2max. While anthropometric characteristics remained constant during the last decade, the change in rule of 2000 may have contributed in
modifying the physiological profile of basketball players, by generally increasing their level of fitness.

23. **Bester, M. et. al. (2007)** was study conducted to assess the gluteus maximums and hamstring strength in asymptomatic elite female field hockey players in order to obtain baseline data. Twenty elite female field hockey players participated in the study. Isometric force, eccentric and concentric torque of the left and right gluteus maximums and hamstring were measured in standing through 30-0 hip flexion using a Kin-Com Dynamometer set at 30 / second. Measurements were taken over six days. The mean over the 20 subjects for each test was used for calculations. The Analysis of variance demonstrated that the right gluteus maximums had a significantly higher isometric peak force, concentric and eccentric torque (p < 0.01) compared to the left gluteus maximums. The asymmetry found in hip extensor muscle strength in asymptomatic hockey players could be due to normal adaptation to the sport.

24. **Clark, H. H. & Clark, D. H. (1987)** states that physical fitness is the capacity to do prolonged based work and recover to the same state of health in short duration of times. This is the result of the degree of strength, speed, endurance, agility, power and flexibility one possesses. Since physical fitness covers motor fitness, so the programme of physical fitness should involve development of certain basis elements like strength, speed, agility, power, flexibility and endurance. Those physical fitness elements are useful for different games and sports. Strength is important in wrestling and boxing, where as endurance is important, for distance runners, degree of demands, differs in different games as strength is different for a long distance runner than a hockey, football players.

25. **Mathews, D.K. (1978)** states that physical fitness is a part of total fitness. It could be defined as the capacity of an individual to perform given physical task involving muscular efforts. As the terms physical fitness is somewhat exact units meaning, indicating thus specific components we height measure to reflect a person’s fitness status. The sensible organic ingredients of physical fitness include muscular power, muscular flexibility and neuro-muscular co-ordination.

26. **B. Chittibabu and N. Akilan. (2013)** The purpose of the study was to evaluate the effectiveness of a basketball specific endurance circuit training on aerobic capacity and heart rate of high school male basketball players. To achieve the purpose of the study twenty four (24) male high school basketball players were selected from Neyveli Lignite Corporation Sports School, Neyveli and St. Joseph Higher Secondary School, Manjakuppam, Cuddalore. The result of the
study showed that aerobic capacity, resting heart rate and peak heart rate between the groups was significant, it indicate that after adjusting pre-test scores, there was a significant difference between the two groups on post-test scores. The findings of the study show that significant increase in aerobic capacity and decrease in resting and peak heart rate. It can be concluded that basketball specific endurance circuit training is effective in improving aerobic capacity and increases the cardiovascular fitness of male high school boys during competitive phase.

27. **J. Muthusubramanian (2013)** The aim of the present study was to find out the effect of elastic strength training on selected physical fitness variables of novice college men high jumpers. To achieve the purpose of the study, thirty novice male high jumpers were selected randomly from Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram. The selected subjects were classified into two groups of fifteen each. Group I underwent eight weeks of elastic strength training programme, so as to be an experimental group. Group II acted as control group to find out the influence of elastic strength training programme. The criterion variables selected for the present study are speed – 50 meters dash, leg strength – leg dynamometer and explosive power – vertical jump. The elastic strength training group underwent training 3 days per week for eight weeks. They performed 50 to 80 foot contacts per session. The training resulted in significant improvement in speed (F = 35.24, p < 0.05), leg strength (F = 47.47, p < 0.05) and explosive power (F = 19.62, p < 0.05). It is concluded that novice high jumpers experience significant improvement in lower extremities strength and power.

28. **R. Muthu Eleckuvan (2013)** The underlying principle of this study was to assess the effect of eight weeks concurrent strength and plyometric training in enhancing the capability on selected motor fitness components. For the purpose of study, thirty male students of Annamalai University, aged 20 to 22 years took part in the study. Subjects were randomly assigned to either concurrent training (n=15) or control (n=15) group. The training regimen lasted for eight weeks. The selected criterion variables were assessed using standard tests and procedures, prior to and immediately after the training programme. Analysis of covariance was employed to establish degree of significant modification on chosen criterion variables. The findings of the study revealed that eight weeks of concurrent training had an effectiveness of 4.13% on leg strength, 11.81% on strength endurance, 0.40% on speed, and 7.53% on anaerobic power. These findings
suggest that the concurrent strength and plyometric training programme has a statistically significant influence in developing the selected criterion variables.

29. **N. Anil kumar (2013)** Most of the skill performances and execution of techniques in the sports such as boxing, wrestling and judo were based on the basic fitness components. The purpose of the study was to determine the existence of statistically significant difference on selected fitness components (speed, agility, power, flexibility and endurance) among boxers wrestlers and judokas. For this purpose, ninety sportsmen (30 boxers, 30 wrestlers, and 30 judokas) were selected. Their age ranged between 18 to 23 years. The selected variables were assessed using 50 metres dash, shuttle run, jump and reach, sit and reach, and Harward step test. The data was analyzed by applying ANOVA and Scheffe S post hoc test. The result showed that there were significant difference in all the selected physical fitness components among boxers, wrestlers and judokas. The boxers showed a better capability in speed, agility and power, while the wrestlers were better in endurance and the judokas with greater flexibility.

30. **P. Johnson, and P.S. Raja Marsion Babu (2013)** This investigation was purported to evaluate the Physical Fitness Status of Schoolboys adapted by RDT Hockey Academy in the Rayalasema District of Andhra Pradesh, India. For this reason, 916 schoolboys from thirty-two (32) schools in four (4) different districts adapted by RDT hockey academy in the Rayalasema District of Andhra Pradesh, India were considered as subjects. These subjects were in the age group of 11 to 16 years, and they were assessed for their physical fitness status. The fitness parameters were restrained to height, weight, speed, explosive power, flexibility, agility and cardiorespiratory endurance using standardized tests and procedures. The data collected were subjected to statistical analysis by means of One-way ANOVA, and Bonferroni corrections post hoc test. The confidence interval was fixed at P<0.05 in all cases. The research findings ensure statistically considerable age difference on selected variables, and it implies that age differences influence almost all fitness parameters.

31. **M.Atul and Najeeb A.M (2013)** Forty five boys in the age group of 13 to 14 years of Alagappa Model school, Karaikudi were selected at random and were divided randomly into three groups namely mud circuit training group, concrete circuit training group and control group. The experimental groups participated in the training programme for a period of 6 weeks. During this period, the control group was let off without any training. The data were collected on selected physical and physiological variables of speed, agility, leg explosive power, pulse rate, blood
pressure, aerobic capacity respectively before training (pre-test) as well as after 6 weeks of training (post-test). Analysis of covariance was used to analyse the data. The result of the study clearly indicated that the mud circuit training group had improved the speed, agility, leg explosive power, pulse rate, blood pressure, aerobic capacity to a greater degree than concrete circuit training group.