CHAPTER II

REVIEW OF RELATED LITERATURE

Ahmed and Hashem [19] conducted a study to analyze the impact of fartlek training on the levels of physical and physiological performances on players of soccer and volleyball. The training program included fartlek exercises with 30 units as three units a week lasting 10 weeks on a sample of 30 players under 16 years from a club named El-Nasr in Egypt. A pilot study was conducted on 8 players of soccer and 7 players of Volleyball out of the 30 total players. After the pre and post tests on the experimental groups, the researchers observed the positive effect of fartlek training program promoting physical and physiological performances while it had no significant on blood pressure.

Arul [20] examined the impact of sand running on speed and cardio respiratory endurance. Thirty men whose age ranged from 18-24 years were selected randomly as subjects from the physical education department of Annamalai University in Annamalai Nagar. The students were grouped into two such as sand running and control group with 15 each. Group –I endured sand running for 3days per week up to 12weeks. Group–II which was controlled hadn’t undergone any practice programme in physical education activities. Everyone in the three groups were tested on speed and cardio respiratory endurance, the chosen measure factors before and after the practice through 50mmts dash and Cooper’s 12 min run/walk trial respectively. The researcher used ANCOVA to test the significant dissimilarity where the “F” ratio obtained was analyzed at 0.05 confidence level. There was significant different between the two groups on selected parameters.

Babu and Kumar [21] conducted a study on the effectiveness of training such as continuous running, fartlek and interval methods on chosen variables such as coordination and speed. A total of 60 male footballers of age group from 18 to 23 years were chosen from the Guntur District in Andhra Pradesh. The subjects were grouped into 3 experimental groups and 1 control group which underwent training like continuous
running, Fartlek, Interval and regular activities respectively. After the training period, the
data was collected through pre and posttests. Analysis of Covariance (ANCOVA) was
carried out for the statistical analysis of the raw data obtained. To evaluate the significant
differences between the adjusted means of the pairs, test of Scheffe’s post hoc was applied
with 0.05 confidence level. Speed and coordination among the experimental groups were
found to be higher compared to the control group.

**Babu and Vallimurugan** [22] investigated the impact of interval training and
cardio respiratory endurance among the thirty football players with age ranging from 18
to 25 years randomly chosen from Malapuram, Kerala. They were divided into two groups
each with 15 players. Group I involved in interval training for 8 weeks on alternative three
days in a week and post-tests were conducted. Group II acted as the control group.
Cooper’s 12 minutes run was applied for measuring the cardio respiratory endurance and
paired ‘t’ value determined the contrast between the two groups. The findings showed the
significant influence of eight weeks of interval training on cardio respiratory endurance
of the soccers.

**Borremans, Rintala and McCubbin** [23] compared the motor fitness and
physical health based physical fitness and the levels of physical activity in adolescents
with and without Asperger syndrome. The study involved thirty adolescents with AS and
30 peers of neuro typical of matched with age and gender. EUROFIT test was used to
evaluate the physical fitness. Also a questionnaire was administered to all the participants
to test their physical activity during the free period. For the purpose of determining the
existence of differences between the AS vs. control groups and gender on fitness a 2*2
multivariate analysis of variance, and the differences among the groups average scores
from the administered Baccke questionnaire were assessed with the usage of the test of
the independent groups. The results indicated that the scores of AS adolescents were
significantly less than the group of comparison on the subsets based on the motor skill;
health based physical fitness in the EUROFIT.

**Brandon** [24] expressed that different physiological components have impact
on the middle distance runners and such characteristics of successful runners vary with
those of the quick and long distance runners. The variables restrict running for long
distances and rapid velocity and anaerobic variables that restrict performance during
sprinting. The two energy systems are necessary for the distance intensity and
physiological capabilities of the runner. The physiological profiles of the distance runners make it different from the long distance runners.

Chahal and Chahal [25] attempted to explore the role of chosen biochemical factors by means of aerobic and anaerobic capacity of throwers in national level. He examined 17 male athletes who were under the practice period for taking part in competition at national level. Various test methods of Jafffes, Biuret, Glucose Oxidase, Sahli were used to estimate the biochemical variables such as creatinine, glucose, protein and haemoglobin test blood samples respectively. The physiological variables were measured using trial of 3 min step for aerobic capacity and trial of Sargent jump for anaerobic power. It also studied individually at the period of rest using standard rules and scientific instruments. The test was analyzed among logical equipment. There was no major association in the bio-chemical samples of AC and AP.

Chidambaraj [26] studied cardio respiratory and muscular endurance, speed, agility through continuous and interval training. Coopers 12 minute trial of running or walking, 50 m running, 4*10 shuttle run, sit ups in a minute are used to measure cardiorespiratory endurance, speed, agility, muscular endurance respectively. The cardiorespiratory endurance and muscular endurance for both the training groups were improved. But on the performance aspect the interval running group showed a wide difference when compared to continuous running and controlled group.

The study of Deol [27] was based on the effectiveness of continuous and interval training on endurance ability of the soccers. It also showed the comparison between the chosen training methods in terms of effectiveness. All 45 players of JCT Academy at Phagwara, were grouped into 3 with 15 each and were named A B and C respectively. Group A involved in Continuous training, B in interval training, C did usual training (Control Group). The twelve minute run walk test of Cooper (1968) was utilized for testing the endurance ability of soccers. The pre and post tests were carried out after the training period of eight weeks. SPSS software helped in the application of ANCOVA and LSD post-hoc test. The adjustment of the F-value to 15.88 in the outcome was found to be at the significant level of 0.05. The result of LSD Post –hoc measure exposed the effect of continuous and interval training in improving the endurance ability of the soccers. It also showed the highest impact of interval training over continuous running in terms of improvement of the endurance ability of the players.
Elamaran [28] carried out the research to explore the effectiveness of fartlek method on a measurement that how well the heart, lungs and muscles coordinate to maintain the body of a person energetic over a prolonged time i.e., cardio respiratory endurance. The measuring technique of cardio respiratory endurance involved the air that an individual breathe in holding duration and by determining the heart beat rate. To prove this reason successfully, thirty male substitutes of SMSS GN Boys HSS, Shengottai were randomly selected with 14 to 16 years of age for investigation. The chosen students were divided into two groups. Group I went through the fartlek method for 12 weeks and it acted as the experimental group. Group II, the control group showed no participation in any type of training program in the study. The research was restricted to the estimation of cardio respiratory endurance, breathe in air holding time and resting beat rate and at the end of the research procedure. Later on the test details of two groups were significantly checked by analyzing the research statistics of covariance. The result of the test showed that it was accurately worthy of mention change on cardio respiratory endurance during breathe-in air holding time and heart beat rate were not elaborated. It concluded that research of fartlek adequately have control to experience cardio respiratory endurance, not based on breathe in air holding time and heart beat rate at rest.

Gentry and Roy [29] chose fifteen male college players of age from 18 to 22 to evaluate the impact of jogging on cardio vascular function. The training involved jogging at a predefined distance of 200mts to 1500mts five times per week which lasted for nine weeks. The fitness level and the adaption rate of each subject helped them in move forward at own speed during the training. The analysis of the data showed no significant difference in the resting pulse rate of the subject.

Golda and Margaret [30] conducted a study to determine the combined effectiveness of different training on the selected dependent physical fitness variables namely speed and muscular strength among the athletes. For the purpose of the study 40 male athletes who played for their college in Inter Collegiate athletic event, Bharathiar University, Coimbatore. Their age differed from 18 to 22 years and a random division of two groups with 20 each were formed. Experimental group I underwent combined training inclusive of cardio respiratory endurance, resistance and core strength method and group II as controlled hadn’t undergone any particular training. The obtained data was analyzed using ANCOVA. The significance level was maintained at 0.05 in all cases.
The result concluded with the significant improvement of combined training on the dependent variables of speed and muscular strength.

The research by Gregory [31] was based on an examination on the growth of aerobic capacity, in view with a comparison between continuous running and interval training. The college males were grouped into experimental and control group. The control interval running had four subjects and the continuous running group had seven subjects. Continuous running practice was given on a quarter mile track for 2 miles, 5 days a week for six weeks. The pulse count was maintained at 162 beats per minute in continuous running group and 174 beats per minute for the control of running intensity in interval training group. It was revealed that the two methods had equal influence in enhancing the aerobic capacity during the performance of the similar work.

Heerden [32] investigated the physiological determinants on 20 Elite men runners of middle distance of 800 metres. Testing techniques suggested by the South African sports Commission inclusive of body composition, joint flexibility, strength, power and endurance of muscles along with Wingate test for evaluating anaerobic capacity and isokinetic analysis were carried out. The maximum running speed and acceleration covering 300 metres on a standard tartan track were measured. Also VO2 max, running economy, initial accumulation of blood lactate, the deficit of maximal accumulated oxygen were found out. The correlation of the values evaluated with performance times using Pearson product was applied with the multiple comparisons of Bonferroni. The significant correlated to performance was determined using Wingate mean and power at the minimum level along with the running times at 40, 60, 70, 80, 90, 150 and 300 metres. The strongest predictor of performance of 300m trial time was determined using the stepwise multiple regression. The sport specific track tests on high speed running capacity and specific Wingate cycle ergometer test to measure and aerobic capacity were applied to determine 800m running performance.

Iaia and Bangsbo [33] studied the physiological terms and performance speed endurance training of activity sessions at near maximal and close maximal forces on desired trained subjects. In various games there would be a decrease in training volume, speed endurance among endurance training competitors. They could keep up the oxidative limit and expired severe elaborated term or rehashed high power practice performance lasting for 30 seconds to 4 minutes. As it happens in several games, an
essential training includes aerobic and high intensity at a particular point. Similarly the speed endurance, intense exercise are important in developing execution in the middle of longer periods for example 40km of riding bicycle and 10 km of road race. Extraordinary exercise activities and continuance angles could enhance speed endurance. Extreme oxygen intake, glycol tic and action of oxidative chemicals and membrane circulate proteins related with pH direction are the changes which don’t rely upon the upgrades. The inclusion of speed endurance session in their training program could be beneficial.

The study by Jones and Carter [34] showed that the training of endurance exercise could result in the intense adaptation of heart beat rate and the large amount of air released from the lungs after the deepest possible breath and the ability of a muscle to repeatedly exert force against resistance organize the ox2 in the muscular endurance carries. Those alterations results a variation in persistence implementation which could be executed as a rightward directed in the “speed time bend”. This move could permit sports people to get trained for more how at a specific major exercise strength for a given time. The velocity time curve could be measured in sports people with the help of 4 criteria. Those are highest intake of oxygen (vo2 max), artificial respiration approach and oxygen breathe in dynamics. The rest criteria might help to know the endurance performance and those were linked to various terms were the velocity of vo2 max (v-vo2 max) and the highest lactate steady power. This significance of upgrades in the fitness parameters of oxygen consumption for the betterment of non-stoppable execution was established, in similar to the preparation techniques that might be established as favorable for encouraging developments.

Kaleemulla et al., [35] examined the effects of training of interval, circuit, combined methods on chosen variables of physical fitness and performance among 60 football players selected randomly as subjects from the junior colleges of Andhra Pradesh. The three experimental groups I, II and III with 15 players each underwent interval training, circuit training, combined training respectively and group IV with 15 players as controlled hadn’t undergone any specific training for three days a week on alternative days lasting twelve days along with their regular activities of physical education. The data were collected on chosen dependent variables using pre and post tests before and after the training respectively. The significance of ‘F’ ratio for the adjusted posttest was identified using the statistical techniques. The test named Scheffe’s post hoc was utilized to evaluate the difference that existed significantly, and the criterion was
The study concluded with the difference of significance between the soccers of experimental groups such as interval training, circuit training, combined and circuit training, and control group on variables of physical fitness namely speed, agility, explosive power, balance, co-ordination, endurance and performance variables of cardio respiration namely dribbling, kicking and passing.

**Kamalavathi and Shunmuganathan** [36] investigated the effect of physical exercise on muscular endurance among men who were inactive. The study was performed with the independent variables as physical activities, and the dependent variables as muscular endurance which was measured through sit-ups. The study resulted in the significant improvement take place on muscular endurance with six weeks training of physical exercise. The researcher emphatically suggested that ailments such as asthma, heart problems, cholesterol controlling etc., could be prevented through physical exercise for keeping up great body stance, muscle mass, bone density.

**Karthikeyan** [37] studied the effect of interval and continuous running on the criterion variable called cardio respiratory endurance which was tested on the chosen dependent variable before and after the training period. It was clear from results that the training groups of interval training, continuous running and control on cardio respiratory endurance could differ significantly. Furthermore, there was a significant improvement on the criterion variable due to the two trainings whereas the improvement was in support of the continuous running group.

The research by **Karthikeyan** [38] discovered the effect of aerobic training with various intensities on resting heart rate. To accomplish this motivation behind the investigation, 45 male players were selected from Annamalai University. Division into three such as low intensity aerobic training group, alternative pace run group and control group was done. Group I, II experienced low intensity aerobic training, alternative pace training respectively thrice a week for 12 weeks. Group III was controlled with regular training based on their curriculum. The subjects were tested on resting heart rate, the criterion variable before and after the training. ‘F’ test was done using ANCOVA at p value lesser than 0.05. The findings revealed the significant difference between the low and high intensity aerobic training and control groups on the chosen variable. It also showed the significant reduction on the variable with the aerobic training at high intensity.
Klaenhammer [39] investigated about the Bacteriocins Acer Tom where lactic acid bacteria produce various antagonist factors which include antibiotic substances and bactericidal proteins. They have a wide range of inhibiting activity. Some of them include inhibiting the stains of producer organisms or inhibiting group of Gram Positive microorganisms. Lactic acid bacteria's biochemical and genetic aspects of bacteriocins are reviewed.

Krishnaleela and Gopinath [40] examined at the impact of various powers of alternative pace run, interval training and detraining on cardio respiratory endurance. Sixty subjects were chosen and they were partitioned into four groups of fifteen each. i) low intensity interval training, ii) medium intensity interval group, iii) alternative pace run and 4th control group. After the completion of interval training period the subjects of group I, II and III were physically detrained for thirty days. The pre and posttest information on cardio respiratory endurance was measurably examined using analysis of ANCOVA. Significant improvement in cardio respiratory endurance, significant alternative pace run and decline during detraining period was observed.

The research by Kumar [41] was to explore the impact of continuous method on cardio respiratory endurance among thirty collegiate athletes whose age ranged from 18-25 years in Alagappa University. The students were grouped into experimental group and control group each with 15. Cardio respiratory endurance was tested using 12min run/walk test. Pre-test was taken before the activity time frame and post-test was estimated after the six weeks of training. The data obtained from the experimental period was analysed with ‘t’ ratio. 0.05 certainty level was fixed in all the cases. Continuous training led to the significant difference in the experimental group on cardio respiratory endurance.

The purpose of the study by Louis and Vallimurugan [42] was to find out fartlek training on indispensable capability among hockey players. Thirty hockey players with an age range of 18-25 years were randomly chosen from Ernakulam, Kerala and grouped into two each of 15. Group I was trained with fartlek method on alternative three days a week up to eight weeks whereas Group II represented the control group. Post tests were conducted and the vital capacity was evaluated using spirometer. 't’ ratio discovered the contrast among the two groups. Findings were in line with the hypothesis on the positive effect of fartlek training on the vital capacity of hockey players.
Makhlouf et al. [43] investigated the influence of training sequence of strength and endurance on the variables of appropriate fitness in the players of soccer. 57 young elite male soccer players were selected and a control group with 14 players, trivial training groups of experiment two times a week lasting 12 weeks based on strength before (SE) with 15 players, strength after (ES) with 14 players or on alternating days (ASE) with 14 players of training of endurance. The occurrence of significance with p=0.001 was identified. The difference of the trivial sequence training among the groups of ES and SE with p>0.05 for each variable were observed. The control group expressed maximum of one repetition of large squat and intermediate sprint, transformation of direction capacity and improvements in jumping. ASE exhibited an insignificant difference due to performance of endurance along with ES and SE with p>0.05. SE and ES performed from the level of large to medium than the ASE intended for 10 and 30 m sprint with p < 0.02. One repetition maximum squat of SE was greater compared to ASE with p < 0.02. The differences of the post-intervention study among the training of ES and SE among the fitness variables of the control group ranged from the level of small to medium with p ≤ 0.05 with an exclusion of a large SE advantage by means of the intermittent recovery test of Yo-Yo with p < 0.001. There was no influence of intra session training sequence on the fitness relevant variables of soccer. But, the session of single training with combined strength and endurance showed higher results compared to the training on alternate days. The study revealed the effectiveness of concurrent training for the development of soccer players.

Mande [44] investigated the effect of training namely continuous running, fartlek and interval method on skill based performance, criterion variables such as throw in for distance of male soccer players. 60 Inter Collegiate players with an age range of 18 to 25 years were chosen randomly. They were grouped equally into 4 namely experimental A, B, C and a control group D with 12 week training of continuous, fartlek, interval and control techniques respectively. Statistical analysis of the collected data using ANCOVA with the fixation of significance level at 0.05 in prior and immediately after training was carried out. Schaeffer’s post test was applied to discover the level of significance among the paired main differences at the significant occurrence of ‘F’ ratio. The results of the study revealed the significant improvement of the continuous, fartlek and interval training methods than the control group, and also of the throw in performance in comparison with control on the effect of selected training methods.
The study by **Manna, Khanna and Dhara** [45] aimed to find out the training induced changes on various parameters of physiological and biochemical among Indian field hockey players with an age range of 14 to 16 years. The practice session consisted of aerobic and anaerobic related exercises which lasted for 6 to 12 weeks. The results showed a decrease significantly with p value lesser than 0.05 in body fat and increase in LBM, in the muscles of back and hand grip following the training period. It also observed a major improvement in aerobic and anaerobic power, reduction in the rate of heart beat during sub maximal, maximal exercises, recoveries and, in hemoglobin, total amount cholesterol, triglyceride and LDLC, increase in the hand plasma levels of urea, uric acid and HDLC and decrease in body fat, the plasma levels of cholesterol, LDLC, HDLC for the improvement of health and performance. This study might assist the coaches to enhance the training programme of the field hockey players.

**Ozkaya et al.** [46] examined the training effect of moderate strength and endurance on cognition measured by Event related potentials in elderly individuals. Thirty-six matured individuals with 60-85 years of age was arbitrarily divided into control, strength training and endurance training groups. Practical fitness tests and ERP information were recorded before and after nine weeks of training which involve 3 sessions per week where a significant improvement was observed in the two groups. The latencies of the components such as N1, N2, and P2 and the amplitudes of the N1P2, P2N2, and N2P3 parts varied altogether between groups with p value lesser than 0.05. At the end of the training the latencies of the parts of P2 and N2 at Fz and Cz showed a major reduction and the amplitudes of the parts of N1P2, P2N2 and N2P3 at Fz site, and N1P2 and N2P3 at Cz site showed major increase in strength training group.

**Porcari et al.** [47] researched the high altitude and respiratory muscle training to enhance the performance of the athletes. The high altitude training had increased aerobic endurance and lung function. The study involved 24 well trained athletes to the training of 6 weeks. The players were divided into two groups such as mask and control groups. Pre and posttest with variables such as VO\textsubscript{2}max, pulmonary function, Inspiration pressure at the maximum, haemoglobin and hematocrit were conducted. There is no difference between PF and hematological. The significant improvement in respiratory muscles and endurance were measured.
Prabhakari [48] considered the vital role of physical fitness with the advancement of modern technology that has empowered the existence. Regular participation in physical exercises develops the physical fitness of a person. The paradigm factors chosen specifically were speed, muscular and cardio respiratory and aerobic endurance, agility and physiological factors were breath holding time and resting heart rate. The results of the investigation inferred the significant impact of the physical activity on selected criterion variables.

Rai [49] compared the selected physiological and hematological variables such as the maximum intake of oxygen, vital capacity, resting pulse rate, arterial pressure mean, haemoglobin range, bilirubin, glucose and urea of blood among the soccer players. A sum of 30 players at the level of district, state and university were selected for the study. ANOVA with ‘F’ ratio at a significance level of 0.05 was applied to determine the significant difference of the selected variables. The result showed the level of significant difference of VO2 max of the district players compared to the state and the university players however the latter should more or less similar level of VO2.

Rao [50] examined the influence of isolated and combined training of strength and endurance on players of Kabaddi. 60 male players with an age group of 18 to 22 years from various affiliated colleges of Sri Krishnadevaraya University in Andhra Pradesh were selected randomly as subjects with 15 in 4 groups. Experimental groups of I, II, III and control group IV underwent strength training, endurance training, combined strength and endurance training, and control training respectively. Paired ‘t’ test was used to determine the significant difference among the pre and post tests using the data obtained from the groups of experiment and control on chosen dependent variables of speed endurance. With the influence of the treatment through experiment, percentage of change was assessed for the changes in the chosen variable. ANCOVA was applied to invalidate the primary mean difference of the four groups in prior and after the training. Scheffe's test was applied at the significant occurrence of a ‘F’ ratio in the mean of the adjusted post test to evaluate the paired mean differences. The results revealed the significant improvement of the isolated and combined training of strength and endurance of the players. The percentage of improvement of the training of strength, endurance and combined methods were 11.91%, 20.76%, 25.79%, respectively.
The reason for the investigation by Sankar and Suthakar [51] was to discover the impact of combined circuit and fartlek trainings on the chose quality parameters among the school 45 school men whose age ranged from 19 to 25 years considering Bachelor of Law in the Central Law College, Salem. The three trial groups of circuit training, fartlek training and combined training practiced 3 sessions a week for 12 weeks. The underlying test scores are known as the Pre-test scores of the subjects. Forty five players were measured on their strength parameters at the end of the training. The pre-post statistical analysis of ‘t’ ratio and covariance analysis were used to determine the significance amidst mean values. ‘F’ ratio was measured with 0.05 certainty level through Scheffe’s post hoc trial. The circuit training group performed better in arm, leg and explosive strength.

Selvaganesh, Manikandan and Jesudoss [52] explored the impact of aerobic training on selected physical and physiological factors of college male students from The Ramco Institute of Technology, Rajapalayam. 30 subjects with age ranging from 18 to 20 years were arbitrarily chosen as subjects for the examination and divided into two equal groups. Day by day routine exercises were given to control group and no extraordinary training was given to them under the supervision of specialist. Test group experienced aerobic training for a month with Well-being related physical fitness factors such as cardiorespiratory endurance, flexibility and psychological factors such as vital capacity and resting pulse rate after the preparation time frame (a month and a half). Covariance analysis was utilized to discover the important contrast assuming any amongst control and trial groups. At 0.05 significant levels was fixed to test the criticalness. It was inferred to a critical contrast in CRP from the consequence of the examination that there was no noteworthy distinction in flexibility, vital capacity and resting pulse rate among groups.

Sethu [53] examined the impact of twelve weeks endurance training over hill and sand surfaces on elastic leg strength and aerobic endurance (VO2 Max) among school soccers. It examined 36 football players of age 14 – 17 years, height of 49 - 168 cm, weight of 50 – 65 kg. A random equal division of three groups namely Hill surface group, Sand surface group and control group with 12 of each was done. The pretest and posttests were estimated by Leg Strength test, Blake vo2 max Test. The impact of the training was measured by Paired t-test, ANCOVA and Scheffe’s test with 0.05 level of certainty. The pre and posttest means of HSG and SSG, and the tested groups differed significantly. It
also discovered that HSG was superior to SSG and SSG was superior to HSG on elastic leg strength.

*Shaver* [54] directed an examination on greatest anaerobic power and aerobic power limit determination from different running execution on untrained college male students. A gathering of thirty untrained college matured of age 18 to 20 years took part in the tests on 100, 200, 400 and 800 yards running and also with 1,2,3 miles runs. No track running sessions were provided. The subjects attempted for the most extreme aerobic power on a treadmill and oxygen consuming work limit was estimated by the method of margaria. Oxygen consuming capacity could be identified with distance past half mile and anaerobic work capacity could be identified with distance up to and including quarter mile.

*Singh and Singh* [55] aimed at examining the impact of a program of 12 week training of speed, agility and quickness drills on selected physiological variables among the hockey players. A sample of 200 hockey male players with the age range of 17 to 19 years were chosen from Amritsar district taking part at the junior level in inter district, national and school national championship. The obtained data was analyzed with the application of a statistical analysis named ANCOVA. The study showed the effectiveness of SAQ drills training in developing the physiological variables of the players of hockey. A gradual improvement in physiological variables such as vital capacity and rate of resting pulse and pulmonary ventilation of the experimental group of the hockey players after a period of twelve weeks was observed.

*Uppal and Tunidan* [56] investigated the comparative impact of various frequencies such as twice, thrice, five and seven days of endurance training on cardio respiratory endurance. The results indicated that the cardio respiratory endurance of the students of secondary school could be viably enhanced by deploying this method. It showed that cardio vascular endurance could be developed through the interval training for 3 or 5 days per week than workouts for twice a week.

*Vaithianathan* [57] studied psychological and physical changes due to training. The criteria included were muscular strength, its endurance, cardio respiratory endurance blood pressure, energy capacity and rate of respiration all these are measured by pull ups, sit ups, Cooper's 12 min run or walk test, stethoscope, spirometer and
stethoscope respectively at the end all the physical fitness variables were found to be improved in training individuals.

Vorup et al. [58] examined the impacts of the trainings of combine strength and speed endurance together with reduced training volume maintaining performance, energy demand for running and adjustment of the muscles among well trained sprinters. 16 men endurance runners were randomly grouped either into control group or the other two experimental groups. It was also combined with the moderate and strength training. The maximum uptake of oxygen and running economy were not affected. A significant improvement in the strength and speed endurance of the players had a significant difference. It was inferred that the combination of the trainings could develop the capacity of short term exercise, adaptations of the muscles to the capacity of the anaerobic among endurance-trained runners.

Wasserman and McIlroy [59] the failure of cardiovascular system to supply the required oxygen to the tissues are measured by respiratory gas exchange ratio(R). It can be carried out during the onset of an anaerobic metabolism i.e., during exercises show the end tidal gas concentrations are used to calculate R and therefore there is no need of blood sample. Thereby one of the factors that influence exercise tolerance can be calculated from this method.

The study by Yadav, Abhay and Utpal [60] was to discover the impact of training and break method on the mechanism for the fitness of an individual. A sum of 29 male and female players as subjects was chosen. The AAHPERD Youth Fitness Test was conducted as pretest by the department of physical education during the admission of B.P.E.I year. Two posttests, one in prior to and another after a vacation period of seven days, posttest were conducted. Paired ‘t’ test was used among the means of the groups of the two test with a significance at 0.05 significance level. The result of the analysis done statistically inferred that the physical fitness components viz. strength, muscular endurance, agility, leg strength and speed had a significant improvement other than the endurance ability. And the break in training reduced the ability of the whole physical fitness component.