CHAPTER II

REVIEW OF RELATED LITERATURE

CHAPTER-2
This chapter gives an account of the review of the related literature through which the researcher has traversed to establish the relevant and necessity of the present study. The present review of literature in this study is chronologically arranged from the present to the past.

Kvaavik et al. (2009) conducted studies to examine the association of childhood physical activity and physical fitness with cardiovascular disease risk factors in adulthood. Furthermore, interpretation of these findings is hampered by methodological short comings. In a population-based cohort study, we explored the influence, if any, of childhood physical activity and physical fitness on later cardiovascular disease risk factors. Data were taken from the Oslo Youth Study, a prospective cohort study that began in 1979, when 1016 students (mean age 13 yrs; range 11-15 years) who were attending six schools were invited to participate in a health education intervention. Cardiovascular disease risk factor data were collected at baseline and again in 1981 (mean age 15 years; range: 13-17 years), 1991, (mean age 25;range:23-27 years),1999,( mean age 33years;range: 31-35 years), and 2006 ,( mean age 40 years; range: 38-42 years), results shows that at baseline, physical fitness was inversely related to BMI, triceps skin fold thickness and blood pressure (systolic and diastolic, N=716). These associations where also present prospective analysis at age 15 (N=472), 25 (N=250; except for systolic blood pressure), and 33 years (N=410, only BMI measured)-albeit with progressively diminishing magnitude- but were lost at 40 years (N= 294). There were fewer relationships with cardiovascular disease risk factors when physical activity was the exposure of interest. Controlling for educational attainment of both the parent and the study member had little impact on these associations. It is concluded that although childhood physical fitness seems
to reveal some inverse associations with obesity and blood pressure in early childhood, these effects diminished markedly into middle age.

Ruiz J.R et al. (2009) conducted a study to investigate whether physical fitness in childhood and adolescence is a predictor of cardiovascular disease (CVD) risk factors, events and syndromes, quality of life low back pain later in life. Physical fitness – related components were: cardio respiratory fitness, musculoskeletal fitness, motor fitness and body composition. Adiposity was considered as both exposure and outcome. The results of 42 studies reporting the predictive validity of health related physical fitness for CVD risk factors, events and syndromes as well as the results of five studies reporting the predictive validity of physical fitness for low back pain in children and adolescence were summarized. Strong evidence was found indicating that higher levels of cardio respiratory fitness in childhood and adolescence are associated with healthier cardio vascular profile lighter in life. Muscular strength improvements from childhood to adolescence are negatively associated with changes in overall adiposity. A healthier body composition in childhood and adolescence is associated with a healthier cardio vascular profile lighter in life and with a lower risk of death. The evidence was moderate for the association between change in cardio respiratory fitness and CVD risk factors and between cardio respiratory fitness and the risk of developing the metabolic syndrome and arterial stiffness. Moderate evidence on the lack of a relationship between body composition and low back pain was found. Due to a limited number of studies inconclusive evidence emerged for a relationship between muscular strength or motor fitness and CVD risk factors, and between flexibility and low back pain.

Huff et al. (2000) conducted a study for the comparison of physical fitness level of homes school and public school students in South Alabama. The difference in the physical fitness levels between home school students and public students were investigated. The President’s Challenge Physical Fitness and Sports Test Battery were used to measure the physical fitness
level. The statistics analyzed indicated that the home school students were significantly more fit than the public school students in the area of upper body strength and endurance, flexibility and cardiovascular endurance. There was no significant difference in abdominal strength and endurance between home school and public school students. Comparison made with the state scores revealed that the students from South Alabama with the exception of upper body strength and endurance for male students and upper body strength and endurance, and cardiovascular endurance for female public school students. When data from this research were compared to the national norms, 56% of the female home school students, 48% of male home school students, 39% of the male public school students, and 35% of female public school students scored above the 50th percentiles. Since physical fitness assessment of home school students is a new field of research, there is a paucity of empirical evidence to support or reject these findings.

Stern William Howard (1999) conducted a study of the Physical abilities of academically high achieving children. The purpose of this study was to compare academically high achieving and average boys and girls in grades 4 and 5 on accepted tests of balance, coordination, strength, endurance, and flexibility, as well as measures of ages, height, and weight, to see if, as some researchers have found, high achieving children are taller, heavier, stronger, more flexible, exhibit better balance, and are better coordinated than their non gifted classmates. Graders earned in physical education class were compared to see if high achieving children performed better in physical education than average children. All boys and girls in grades 4 and 5 in an upper middle class school district were tested on the variables of balance, coordination, physical education grade and pull-ups; push up, sit and reach, sit ups, and the six hundred yard run. In addition, age height and weight were compared to national norms. Only students completing all tests were used in the study of 949 children. A2 x 2 factorial designs was used with gender and IQ group as independent variable. Multiple analysis of covariance was used on the independent variable of
balance, coordination, physical education grade, pull-ups and push-ups, sit and reach, sit-ups, and the six hundred yard run.

Meena Thuse (1997), conducted a study to compare the cardiovascular fitness of students in the NCC camp, 7 states held at Amravathi University campus. It was decided to see the cardiovascular capacity of those students of different states by comparing physical efficiency index with Harvard Step Test Standard norms. It was found that according to long formula the students had a good cardiovascular fitness. Maharashtra and Karnataka showed better performance and the others showed average performance.

Blair, S.N et al, (1994), examined the potential role of physical fitness (PF) in preserving functional health status (FHS) was examined among 8,489 men and 2772 women receiving clinical assessments between 1970 and 1990 (average follow-up time 8.4 years). Study subjects were between the ages of 40 and 90 years in 1990 and had responded to a 1990 mailed follow-up survey. FHS was assessed by responses to 10 questions on the participant's ability to perform recreational, household, daily living, and personal care tasks. Approximately 19% of the men and 33% of the women reported functional limitations (unable to perform at least one of the activities) PF was assessed by a maximal exercise treadmill test, and participants were grouped into low (least fit 20%), moderate (next 40%), and high (top 40%) PF groups. Logistic regression analysis controlling for age, health status at baseline, years of follow-up, and smoking indicated a steep inverse gradient of functional limitation across PF categories. Relative to the low PF group, the relative risks (95% CI) for functional limitation in the moderate PF groups were 0.44 (0.37-0.51) for men and 0.43 (0.34-0.55) for women. Corresponding values for high PF were 0.17 (0.14-0.21) and 0.18 (0.13-0.23). We conclude that higher levels of PF are associated with reduced risk of developing the functional limitations associated with aging.
Kennedy et al. (1994) conducted a study to determine how various fitness components (½ mile run, the pacer test, triceps and calf skin-fold sums, shoulder stretch, trunk lift, sit & reach, curl-up, and flex arm hang) related to motor performance skills according to the Bruininks-Oseretsky test. Fifty kindergarten or first grade children participated in this study. All values recorded in the fitness components were compared to standardized motor skill scores. Student fitness score (Mean ± SD) results indicated: weight = 43.4 lbs ± 10.3; height = 43.4 inches ± 6.3; half-mile run = 6.2 min ± 1.3; pacer = 7.1 laps ± 2.7; triceps skin-fold = 12.6 mm ± 10.4; calf skin-fold = 10.5 mm ± 8.7; trunk lift =9.2 inches ± 4.7; and flex arm hang = 2.7 sec ± 3.7. The motor performance standardized scores (Mean ± SD) were running = 20.0 ± 5.8, balance = 9.0 ± 4.1, bilateral coordination = 13.8 ± 5.4, and strength = 18.6 ± 3.9. Regression analysis indicated that run performance was negatively correlated with body weight but independent of skin-fold sums for the ½ mile run and pacer tests. Comparison between the fitness parameters and motor skills indicated significant correlations for the ½ mile run and pacer fitness tests. These results indicated that the 14 mile run was negatively correlated with balance (p< 0.04); bilateral coordination (p<0.014); and strength (p<0.005) while the pacer test was positively correlated with only the strength motor skill variable. These results indicate that during continuous walk-jog movements (½ mile run) in a relatively homogeneous population, increases in body size improve balance, bilateral coordination, and strength but negatively affect run performance. In contrast, in more interval related activities (The pacer test), increased strength levels in kindergarten and first grade children improves performance.

Roberta (1991) in their study evaluated the effects of a three year exercise programmes on motor performance and cognitive processing speed of previously sedentary older women; aged 57-85 variables tested were simple and choice reaction time (CRT), balance, sit & reach flexibility, shoulder flexibility and grip strength. Subjects participated three times a week in exercise performance classes designed to meet American College
or sports medicines guidelines. Results indicated that performance was significantly improved on all measures during the course of the study except for the sit and reach test (SRT) where significance was approached but not reached. A comparison of exercise subjects with a comparable group of non-exercising control subjects revealed significant interactions between treatment and time on all variables except CRT and Grip Strength.

Margret Safrint J. (1990) conducted a study on measurement of physical education and exercise science. The province of Manitoba developed the Manitoba physical fitness programme test which identified desirable fitness and lifestyle objectives for Canadian schools children and teachers. The test measures primarily health-related fitness of youth ages 5 to 19. However, an agility item is included with questionable measures to health-related fitness. Six items were included in the test battery. One minute speed sit-ups, sit and reach test, flexed arm hang agility run, 800 meters run and skin fold measurement.

Charles A. Bucher and Wrest (1987), conducted a study to examine whether trained individuals are in a better state of physical fitness than a person who follows a sedentary life. When two persons, one trained another untrained of approximately the same build are performing the same amount of moderate muscular work, evidence indicate that the trained individual has lower oxygen consumption, lower pulse rate, longer stroke volume per heart beat, less cell count, slower rate of breathing, lower rate of blood pressure and heart rate; the heart become more efficient and is able to circulate more blood while beating less frequently.

Koko (1986) Research has shown that the hard reality of being a child in a developing Country means that there is much work and little play. In a study conducted by a child psychologist it was discovered that children could only devote 25% of the time to play while 75% was taken up by various other choices.

Garden Jackson (1985) has conducted a study on male civil servants in London which suggests that those who do most physical
exercise in their leisure time are least likely to suffer from heart problems. There have been many similar studies; two of the most notable were carried out in United State of America by Professor Paffer Barger, one in a population of San Francisco doctors and the others among the graduates of Harvard University. Again both suggest, the doctors are in leisure time like the Harvard graduates, the less risk on run of premature heart artery disease.

Uppal (1982), in his study found that the efficiency of an individual in performing physical activities basically on cardio respiratory changes and training results in development of the curculio respiratory efficiency. As a result of his study he concluded that by endurance training the efficiency of the circulatory and respiratory system is improved maximal oxygen uptake is increased stroke volume and cardiac output are also increased.

Mary Walker F. (1982), conducted a study on 50 blacks and 50 white females, 10th grades students were randomly selected and compared on the AAHPRD youth fitness test. The black students scored significantly higher (P<0.05) than the white students on leg power (m=44.6% and 31.2% respectively) and speed (m=57.8% and 30.1% respectively). The white student performed significantly higher than the black students on abdominal strength (M=31.5% and 27.7% respectively). No other comparisons were significant.

Robson (1978), conducted a study on a simple physical fitness test battery for elementary school children. 152 boys and 150 girls of Kendriya Vidyala, Gauliyar, and Studying from grade 1 through 5 acted as the subjects which were at random. All the subjects and assistance were oriented to the test battery comprising (1) 50 meters dash, 2) 600 meters run/walk 3) straight leg sit-up 4) vertical jump 5) 4x10 meters shuttle run and 6) modified push-ups. The subjects were given practice in these items so that they were able to give the correct performance in each item. The assistants were properly oriented to record measurements accurately so that mistakes could be avoided. The test items were administered to the
subject on two days allotting three items each day. After a day’s test, the test items were administered again to the same students on the 4th and 5th day for finding out the reliability. The value of ‘r’ obtained was 0.87 which revealed that the subject had achieved consistency of performance in the test items. The readings were taken during forenoon section. Norms were computed for the 6 physical fitness test items. The norms can be used for classifying the children into ability groups by assessing their physical fitness.

Patricia A. Beckford (1976) conducted a study to evaluate the physical fitness level of Navajo girls who were 14 to 16 years old. AAHPERD youth fitness test was administered on the subjects selected from seven schools of the region to measure the physical fitness level. It was also established on the basis of scores obtained from test results from these schools. These norms were compared to national norms found in the manual occupying the AAHPERD youth fitness test. The result of this study gives an indication of the overall fitness level of 14, 15 and 16 years old Navajo girls of the seven test items. The Navajo norms were below the national norms on five items and above on the softball throw and 600 yard run and walk.

Karle Ruth S. Johnson (1970), conducted a study, proved that AAHPERD youth fitness test is partial indicator of both motor and cardio respiratory fitness. He administered these two tests on 47 women physical educator major. Significant relationship was found between the t-test score total of the AAHPERD test and both the distance covered and fitness categories of cooper’s 12 minutes run/walk test. Other significant relationship found between each items of AAHPERD test battery and t-test score total of the battery. Five of these items i.e. 600 yard run-walk, soft ball throw, standing broad jump, shuttle run, and bent arm hang were found to be significantly related to 12 minutes run-walk test.

The HELENA study group (2008) conducted a study to examine the reliability of a set of health-related physical fitness tests used in the
European Union-funded Healthy Lifestyle in Europe by Nutrition in Adolescents (HELENA) study on lifestyle and nutrition among adolescents. A set of physical fitness test was performed twice in a study sample, two weeks apart by the same researchers. A total of 123 adolescents (69 males and 54 females from 10 European cities participated in the study. Flexibility, muscular fitness, speed/agility and aerobic capacity where tested using the back-saver, sit and reach, hand grip, standing broad jump, squat jump, counter movement jump, and abalakov jump) bent arm hang, 4X10 metre shuttle run and 20 min shuttle run test where conducted. The ANOVA analysis showed that neither systematic bias nor sex difference where found for any of the studied test, expect for the back-saver sit and reach tests, in which a borderline significant sex difference was observed (P = 0.044) . The Blant-Altman plots graphically showed the reliability patterns, in terms of systematic errors (bias) and random errors (95% limits of agreement), of the physical fitness test studied. The observed systematic errors for all the fitness assessment test was nearly zero. The final result shows that neither learning nor a fatigue effect was found for any of the physical fitness test when repeated. The result also suggests that reliability did not differ between male and female adolescents. Collectively it can be stated that the reliability of the set of physical fitness test examined in the study is acceptable the data provided contribute to a better understanding of physical fitness assessment in young people.

Cathy S. McMillian et al. (2001) conducted a study to describe gender-specific health related physical fitness measurements in kindergartners and determine relationships between body fatness and health related physical fitness test performance. Children participants were 1585 kindergartners (792 boys, 793 girls) form a rural Midwestern public school district. The sum of triceps and medial calf skin folds (SSK) was calculated from height and weight measures (wt/ht²). Cardio respiratory fitness was assessed via a one mile run/walk test. A sit-and-reach test was used to measure flexibility. Muscular strength/endurance was assessed from pull-up and one minute bent-knee sit-up tests. Pearson
correlations were used in the analysis with the alpha level set at .01. Descriptive statistics for boys are as follows: age = 6.2 ± 0.4 years (n=792); height = 1.19 ± 0.06 m (n = 792); weight = 23.1 ± 4.4 kg (n = 792); BMI = 16.1 ±(n = 792); SSK= 21.1 ± 8.2 mm (n = 791); BF% = 16.5 ± 6.0% (n = 791); one mile run/walk time = 12.57 ± 1.93 min (n=718); sit-and-reach test = 0.414 ± 0.052 m (n=791); pull-ups = 1.0 ± 1.6 (n=719); and one minute bent-knee sit-ups = 17.9 ± 7.8 (791). Descriptive statistics for girls are as follows: age=6.1 + 0.3 years (n=793); height = 1.18 = 0.06m (n=793); weight = 22.5 ± 4.4 kg (n=793); BMI = (n=793); SSK =24.4 ± 8.7 mm (n=793); BF% =20.0 ± 5.3% (n=793); 1-mile run /walk time 13.12 ± 1.95 min (n=712); sit-and-reach test = 0.433 ± 0.049 m (n=792); pull-ups = 0.7 ± 1.4 (n=727); and one minute bent-knee sit-ups. = 17.2 ± (n=793).

Significant positive relationships were found between SSK and 1- mile walk/run times for both boys (r = 0.27) and girls (r = 0.22). Significant inverse relationships were found between SSK and pull-ups for both boys (r= -0.27) and girls (r = -0.25), as well as SSK and 1-min bent-knee sit-ups for both boys (r=-0.12) and girls (r= -0.15). Neither boys nor girls showed a significant relationship between SSK and sit-and-reach. Correlations between BMI and SSK were 0.68 and 0.72 for boys and girls, respectively. Excluding the sit-and-reach test, we found higher body fatness to be significantly associated with poorer health related physical fitness test performance in both kindergarten boys and girls.

Barfield et al. (2001) based on three health-related physical fitness measures, Pate, Trost et al. (1999) documented that children tend to track in the same fitness categories (at risk-not at risk for poor fitness) from grades 5 through 7. the FITNESSGRAM test battery uses criterion-referenced standards (healthy- unhealthy) in a similar manner, classifying a child as having a level of health on a particular test item that may prevent morbidity due to inactivity, The purpose of this study was to document the intra-individual changes (i.e., tracking) of FITNESSGRAM criterion-referenced scores among children in grades 3 through 6 across a school year. Children (N=390) from two local elementary schools, participating in
physical education class twice a post, were tested on the following FITNESSGRAM items: (a) the 1-mile run/walk, (b) the modified pull-up, (c) the curl-up, (d) the back saver sit-and-reach, (e) the trunk lift, and (f) the body mass index. Percentage of agreement (Pa) and kappa (K) statistics were calculated between fall and spring criterion classifications (healthy-unhealthy) on each test item. Percentage of agreement indexes for the entire sample were high among the mile run, the sit-and-reach, and the body mass index, ranging from 86-88% (K= 0.53 - 0.73). The entire sample demonstrated less agreement on the curl-up (Pa = 72%, K = 0.42) and modified pull-up tests (Pa = 80%, K= 0.39). The current values are similar to the tracking scores reported by Pate, Trost et al. (1999; Pa=77-82% and K= 0.54 - 0.64 on, selected health-related fitness items). In the current study, consistency of classification on the body mass index was higher among older girls than younger (Pa increased from 68% in grade 3 to 94% in grade 6). Although gender differences were noted in grades 3 and 4 on strength and aerobic capacity scores (i.e., higher agreement among boys), gender was not associated with consistency of classification on other test items across grade levels. Regarding children moving from unhealthy to healthy classification from fall to spring, few boys and girls improved health status on the mile run (9%, 9%), body mass index (4%, 9%), and modified pull-up (7%, 6%). However, a larger percentage of boys and girls were able to improve health status on the curl-up (13%, 19%). Unfortunately, an equal amount of children moved from health to unhealthy classifications on the mile run (4%, 8%), body mass index (8%, 8%), modified pull-up (12%, 16%) and the curl-up (13%, 12%).

Andy Mooneyhan et al. (1999) conducted a study on the effects of frequency and duration of physical education program on the Health Related Physical Fitness of Sixth Graders. The purpose of this investigation was to determine the effect that number of weekly physical education lessons and the number of minutes of physical education per week had on the health related fitness of sixth grade children. 789 sixth grade children (boys 409, girls 380) participated in the study. All participants were
fit for life (Brynteson, Barber, Gaines, and Adams, 1991) project that includes fitness testing at the beginning and end of the students sixth grade year. The fitness levels of each child were determined using the procedures and criteria established by the Physical Best Health Assessment McSwegin, Pemberton, Petray, and Going, 1989. Fitness items included; cardiovascular fitness (1-mile walk/run test), Body composition (skin fold test), muscular strength (pull-ups test), muscular endurance (sit-ups test), and flexibility (sit-and-reach test). Additionally, height, weight, number of sit-ups, pull-ups and blood pressure were determined. Using walks a criterion, multivariate analysis of covariance indicated significant differences in both frequency and duration of physical education programme. Subsequent univariate analysis based on frequency revealed significant differences in flexibility, aerobic capacity, muscular strength, muscular endurance, and body composition. In addition univariate analysis based on duration indicated significant differences in aerobic capacity, body composition, muscular endurance, but not flexibility, and muscular strength. Post hoc analysis of simple contracts using the Bonferroni technique determined that the 5 days week and 30 min/class groups had the other comparison groups. However, no significant practical or gender differences were noted on the other health related fitness parameters. It was concluded, in general, the more days a physical education class meets per week the greater the level of health-related fitness, thus greater the aerobic capacity and muscular endurance. In addition, it appears that meeting 50-min per class does not yield any higher level of fitness than class meeting 30-min.

Allan W. Jackson et al. (1997) conducted a study on 825 young females with AAHPERD Health Related Physical Fitness test to measure back and hamstring flexibility. The measurement included the sit and reach test and passive hamstring flexibility. These findings indicated that the sit and reach test has moderate criterion related validity when used as an assessment of hamstring flexibility in health related physical fitness.
Jaya (1996) conducted a study to compare the health related physical fitness and skill related physical fitness between inter collegiate women kabaddi and kho-kho players. To achieve this purpose 25 women kabaddi and kho-kho players were selected from St. Mary’s College, Thoothukudy and Govindammal Aditanar College for women, Tiruchendur. In health related physical fitness components, the test items Queen’s college step test for cardiovascular efficiency, sit-ups for muscular endurance, sit and reach for flexibility were used for this study. In skill related physical fitness components the test items were 50 meters run for speed, vertical jump for power and AGCO test for agility co-ordination.

The collected data on all these items were converted into standard total scores, then the average total scores obtained by each student were computed and also mean and standard deviation were calculated for both groups. Finally, the difference in mean of health related physical fitness and skill related physical fitness between Kabaddi and kho-kho players were tested for statistical significant difference using total ratio. Then it is resulted that there was no significant difference to be found between both the groups.

Lehnhard R.A, et al. (1995), conducted a study in 226 low income children, ages 10 through 14 years two parameters, triceps skin fold and one mile run/walk, from the American alliance for health, physical education, recreation and dance, health related fitness test were assessed. Group means by age and sex were compared with state and national moves, as a whole, on both fitness parameters. This low income sample fells in the bottom quartile for the state of mains. The group’s national ranking was even lower. The study assessed that not only one low income families burdened financially but also it appeared that the children are also at health risk.

Jennifer Lamb et al. (1994) investigated the health-related fitness of minorities in America. This study compared the health-related fitness of Hmong -Youth (male and female), grades 6-11, to all other ethnic
 backgrounds in a Midwestern school district. Subjects were 2,674 students, 202 of which were Hmong. The subject population was split into 2 groups, Hmong (H) and all other (AO), then subsequently divided into 3 age categories: 13 years and under, 14-16 years, and 17 years and over. All subjects performed the following tests: sit-ups (SU), one mile run (MR), sit and reach (SR), flexed arm hang (FAH), and skin-fold measures (SF). T-tests were used to determine significant differences between H and AO (P< 0.05). Measured fitness levels were also compared to health-related criteria for each component of fitness as established by the FITNESSGRAM test battery. For SU, H females, across all age groups, fell into the suboptimal category and were significantly lower than AO females. For MR, both H and AO fell into the good or marginal fitness category and no significant differences were found for any age classification. For SR, H was significantly higher than AO (except H females, 14-16 years) and fell into the above optimal category. For FAH, H (males and females) 13 years and under were below optimal and H females were significantly lower than O females. For SF, all subjects were within the optimal under who were above optimal). This research identifies the current health-related fitness levels of H and AO students in a Midwestern school district. Furthermore, it suggests that cultural differences may explain differences in the health-related fitness, specifically flexibility and muscular fitness between H and AO. This information suggests the need for practical interventions, such as combining cultural physical activities, to expand the educational approach to physical education and enhance health-related fitness in youth.

David A. Rowe (1994), in his study, selected 929 Bahamian elementary school age children who were tested for cardio vascular fitness (CVF) upper body strength and endurance (UBSE) body composition (BC) abdominal strength and endurance (ASE) and flexibility (FL). According to protocols used in the national children and youth fitness study and the national children and youth fitness study comparisons were made between Bahamian Ss and Ss tested in two United States (US) studies using one sample test. Bahamian children were found to be generally better than US
children in CVF, UBSE and BC (Boys only) Bahamian and US girls had similar BC. US children in FL, ASE performance was better for Bahamian children at the early ages, but the Us children’s were better at the later ages within the Bahamian samples, boys were fitter than girls in CVF, UBSE, ASE and BC, while girls were better in FL. Fitness course improved with ages for CVF, UBSE, and ASE but not BC or FL. Norms were developed for every 5th percentiles and recommendations were made for improvement of HRF through physical education.

Julio Morales (1994) conducted a study on health related physical fitness of different population and some of its components have been related. Data from 91 college females aged 17-44 years. Female college students from a Main Land American University with a similar group of female from a university in Puerto Rico were collected measures were age, Weight, sit up. Sit and reach, sum of skin folds and one mile run. The group showed no difference in age nor for initial value of weight and sit and reach. Significant differences were found in the initial values for sit up skin fold and one mile running. After the 7 weeks period, significant differences were presented favoring the United States group.

Lori Key Miller (1990), conducted a study to determined whether or not participation in selected physical education activities affects’ the health related physical fitness of college students. Subjects consist of 228 university students enrolled in either in aerobic dance, archery, bowling, swimming, tennis, badminton for weight training. The YFT programme manual served as a guide in defining the test components and procedures. Skin-fold thickness was evaluated body composition. The twenty minutes steady state-jog evaluated cardio respiratory endurance. The sit and reach test evaluated flexibility through the use of a flexibility measuring apparatus. Muscular strength and endurance where evaluated by means of the Bent Knee Curl up. A correlated t-test was performed to determine whether there were significant differences in pre-test and post-test scores of each item in the test battery for each group. ANACOVA was used to
determine the significant difference existed among groups on the post-test scores for the four performance variables. Test of simple effects performed to clarify of significant interactions. A difference was considered significant if it reaches the 0.05 levels.

Results of this study indicated that a ten week programme of activity would elicit the following effects.

1. Aerobic dance and weight training elicit significant improvements in flexibility and muscular strength.

2. Archery, bowling, and tennis are not effective in the enhancement of health related physical fitness.

3. Swimming elicits a significant improvement in cardio respiratory endurance, flexibility and muscular strength and endurance.

4. Males can be expected to improve flexibility more than females following a ten week programme of swimming.

5. Weight training is the most influential activity in improving flexibility in females.

Baumgartner and Andrews (1987), the AAHPERD health related fitness norm Published in 1980 was based on over 12,000 boys and girls. A cluster sample representing several geographic regions was followed in 1985 and the results of national children and youth fitness study was published in January 1985, issues of journal of physical education recreation and dance over 8500 boys and girls in grades five through twelve were administered health related and motor fitness test. This represented national probability sample with few exceptions for selected age groups. The children that comprised the 1980 health related physical fitness test samples were more fit than 1985 Naeyes Samples.

Singh (1986) constructed physical fitness norms for thousands of male students belonging to pre-university classes of Punjab University,
Chandigarh. Fleishman’s Physical Fitness Battery was administered on them. The three scales namely – percentile scale, Hull scale and T-scale were prepared. It was also concluded that physical fitness improved linearly with age and the students belonging to rural areas were significantly superior in their performance when compared to the students of urban areas.

William Callaway Robin (1985) conducted a normative study for Alabama students. AAHPERD Youth Fitness Test (YFT) and AAHPERD Health Related Physical Fitness Test (HRFT) were given to 2,545, six to fourteen years old boys and girls. Percentile tables were constructed for each items based on age and sex. Alabama and national means were compared. Alabama students scored better on events measuring agility, speed and cardio-vascular endurance but the score in abdominal muscular endurance and flexibility was better.

Sterin N. Blair et al. (1983) conducted a study on Health Related Physical Fitness in young children and the results of these studies where important because they provided new information about Health Related Physical Fitness in young children. The data presented have suggested strongly that physical education programme of school activity habits and parental activity habits had a significant impact on cardio respiratory endurance and body composition.

Bommandevara Hanumantha Rao (1983) conducted a study on construction of norms for health related physical fitness variation for school boys of 15 years in Andhra Pradesh. He selected 1005 subjects from various schools in Andhra Pradesh. The following variables were selected for study aerobic endurance, body composition, muscular strength and upper body strength. Mean, Standard Deviation and Hull scale were the statistical techniques used. In aerobic endurance as per the qualitative grading for the constructed norms, 185 subjects were poor, 194 subjects were fair, 319 subjects were average, 182 subjects were good, 84 subjects were very good and 41 subjects were excellent. In body composition as per
the qualitative grading for the constructed norms, 181 subjects were poor, 218 were fair, 383 subjects were average, 102 subjects were good, 63 subjects were very good and 58 subjects were excellent. In muscular strength/endurance as per qualitative grading for the constructed norms, 334 subjects were poor, 249 subjects were fair, 97 subjects were good, 68 subjects were very good and 55 subjects were excellent. In upper body strength/endurance as per the qualitative grading for the constructed norms, 249 subjects were poor, 159 subjects were fair, 290 subjects were average, 170 subjects were good, 52 subjects were very good and 38 subjects were excellent.

Lawrence A. Holding and Andrew S. Jackson (1980) conducted a study on physical fitness. The norms reflected standards where developed from scores of over 1500 men and women, who were tested at different Young Men’s Christian Associations in the United States. The Standards included the test scores associated with selected percentiles. A percentile was the percentage of people of a given age group and gender who achieved score. Maximal oxygen uptakes of 54 ml/kg, minimum fall in the ninety fifth percentile, for men in the age group of thirty five years and below. This means that of all men tested who were 35 years and younger, ninety five percent had a score of 54 ml/kg for lower and only five percent had a score higher than 54 ml/kg minimum.

Chen T. L et al. (2009) conducted a study to investigate the effect of yoga exercise on the health-related physical fitness of school-age children with asthma. The study employed a quasi-experimental research design in which 31 voluntary children (exercise group 16; control group 15) aged 7 to 12 years were purposively sampled from one public elementary school in Taipei County. The yoga exercise program was practiced by the exercise group three times per week for a consecutive 7 week period. Each 60-minute yoga session included 10 minutes of warm-up and breathing exercises, 40 minutes of yoga postures, and 10 minutes of cool down exercises. Fitness scores were assessed at pre-exercise (baseline) and at
the seventh and ninth week after intervention completion. A total of 30 subjects (exercise group 16; control group 14) completed follow-up. Results included: 1. Compared with children in the general population, the study subjects (n = 30) all fell below the 50th percentile in all five physical fitness items of interest. There was no significant difference in scores between the two groups at baseline (i.e., pre-exercise) for all five fitness items. 2. Research found a positive association between exercise habit after school and muscular strength and endurance among asthmatic children. 3. Compared to the control group, the exercise group showed favorable outcomes in terms of flexibility and muscular endurance. Such favorable outcomes remained evident even after adjusting for age, duration of disease and steroid use, values for which were unequally distributed between the two groups at baseline. 4. There was a tendency for all item-specific fitness scores to increase over time in the exercise group. The GEE analysis showed that yoga exercise indeed improved BMI, flexibility, and muscular endurance. After 2 weeks of self-practice at home, yoga exercise continued to improve BMI, flexibility, muscular strength, and cardiopulmonary fitness.

David Shapiro et al. (2007) conducted a study to present further data on the intervention, focusing on individual differences in psychological, emotional and biological processes affecting treatment outcome. Twenty-seven women and 10 men were enrolled in the study, of which 17 completed the intervention and pre- and post-intervention assessment data. The intervention consisted of 20 classes led by senior Iyengar yoga teachers, in three courses of 20 yoga classes each. All participants were diagnosed with unipolar major depression in partial remission. Psychological and biological characteristics were assessed pre- and post-intervention, and participants rated their mood states before and after each class. Significant reductions were shown for depression, anger, anxiety, neurotic symptoms and low frequency heart rate variability in the 17 completers. Eleven out of these completers achieved remission levels post-intervention. Participants who remitted differed from the non-remitters at
intake on several traits and on physiological measures indicative of a greater capacity for emotional regulation. Moods improved from before to after the yoga classes. Yoga appears to be a promising intervention for depression; it is cost-effective and easy to implement. It produces many beneficial emotional, psychological and biological effects, as supported by observations in this study. The physiological methods are especially useful as they provide objective markers of the processes and effectiveness of treatment. These observations may help to guide further clinical application of yoga in depression and other mental health disorders, and future research on the processes and mechanisms.

Kyeongra Yang (2007) conducted a study on, Yoga programs for four leading Risk Factors of Chronic Diseases. Yoga, a form of physical activity, is rapidly gaining in popularity and has many health benefits. Yet healthcare providers have been slow to recognize yoga for its ability to improve health conditions, and few interventions have been developed that take full advantage of its benefits. The purpose of this was to review published studies using yoga programs and to determine the effect of yoga interventions on common risk factors of chronic diseases (overweight, hypertension, high glucose level and high cholesterol). A systematic search yielded 32 articles published between 1980 and 2007. This study found that yoga interventions are generally effective in reducing body weight, blood pressure, glucose level and high cholesterol, but only a few study examined long-term adherence. Additionally, not enough studies included diverse populations at high risk for diabetes and its related common health problems.

Badr Aljasir (2007) conducted a study on, yoga practice for the management of Type II Diabetes Mellitus in Adults. The effect of practicing yoga for the management of Type II Diabetes was assessed in this systematic review through searching related electronic databases and the grey literature to the end of May 2007 using Ovid. All randomized controlled clinical trials (RCTs) comparing yoga practice with other type of intervention
or with regular practice or both, were included regardless of language or type of publication. Each study was assessed for quality by two independent reviewers. Mean difference was used for summarizing the effect of each study outcomes with 95% confidence intervals. Pooling of the studies did not take place due to the wide clinical variations between the studies. Publication bias was assessed by statistical methods. Five trails with 363 participants met the inclusion criteria with medium to high risk of bias and different interventions characteristics. The study results showed improvement in outcomes among patients with diabetes type II. These improvements were mainly among short term or immediate diabetes outcomes and non all were statistically significant. The results were inconclusive and not significant for the long-term outcomes. No adverse effects were reported in any of the included studies. Short-term benefits for patients with diabetes may be achieved from practicing yoga. Further research is needed in this area. Factors like quality of the trials and other methodological issues should be improved by large randomized control trials with allocation concealment to assess the effectiveness of yoga on diabetes type II.

Kerstin Khattab et al. (2007) conducted a study on, lyengar Yoga increases Cardiac Parasympathetic Nervous Modulation among healthy Yoga practitioners. Relaxation techniques are established in managing of cardiac patients during rehabilitation aiming to reduce future adverse cardiac events. It has been hypothesized that relaxation-training programs may significantly improve cardiac autonomic nervous tone. However, this has not been proven for all available relaxation techniques, tested this assumption by investigating cardiac vagal modulation during yoga examined 11 healthy yoga practitioners (7 women and 4 men, mean age: 43 ± 11: range: 26-58 years). Each individual was subjected to training units of 90 min once a week over five successive weeks. During two sessions, they practiced a yoga programme developed for cardiac patients by B.K.S. lyengar. On three sessions, they practiced a placebo program for relaxation. On each training day they underwent ambulatory 24 hr. Hitler
monitoring. The group of yoga practitioners was compared to a matched group of healthy individuals not practicing any relaxation techniques. Parameters of heart rate variability (HRV) were determined hourly by a blinded observer. Mean RR interval (interval between two R-waves of the ECG) was significantly higher during the time of yoga intervention compared to placebo and to control ($P<0.001$ for both). The increase in HRV parameters was significantly higher during yoga exercise than during placebo and control especially for the parameters associated with vagal tone, i.e. mean standard deviation of NN (Normal Beat to Normal Beat of the ECG) intervals for all 5-min intervals (SDMNi, $P <0.001$ for both) and root mean square successive difference (MSSD, $P < 0.01$ for both). In conclusion, relaxation by yoga training is associated with a significant increase of cardiac vagal modulation. Since this method is easy to apply with no side effects, it could be a suitable intervention in cardiac rehabilitation programme.

Kim and Heather (2006) conducted a study on, “The Influence of Yoga-Based programmes on Risk Profiles in Adults with Type 2 Diabetes Mellitus”. There is growing evidence that yoga may offer a safe and cost-effective intervention for Type 2 Diabetes mellitus (DM 2). However, systematic reviews are lacking. This article critically reviews the published literature regarding the effects of yoga-based programmes on physiologic and anthropometric risk profiles and related clinical outcomes in adults with DM 2 the study performed a comprehensive literature search using four computerized English and Indian scientific databases. The search was restricted to original studies (1970-2006) that evaluated the metabolic and clinical effects of yoga in adults with DM 2. Studies targeting clinical populations with cardiovascular disorders that included adults with co-morbid DM were also evaluated. Data were extracted regarding study design, setting, target population, intervention, comparison group or condition, outcome assessment, data analysis and presentation, follow-up, and key results, and the quality of each study was evaluated according to specific predetermined criteria. The researchers identified 25 eligible
studies, including 15 uncontrolled trials, 6 non-randomized controlled trials and 4 randomized controlled trials (RCTs). Overall, these studies suggest beneficial changes in several risk indices, including glucose tolerance and insulin sensitivity, lipid profiles, anthropometric characteristics, blood pressure, oxidative stress, coagulation profiles, sympathetic activation and pulmonary function, as well as improvement in specific clinical outcomes. Yoga may improve risk profiles in adults with DM 2, and may have promise for the prevention and management of cardiovascular complications in this population. However, the limitations characterizing most studies preclude drawing firm conclusions. Additional high-quality RCTs are needed to confirm and further elucidate the effects of standardized yoga programmes in populations with DM2.

Madan Mohan et al. (2005) conducted a study on the effect of slow and fast pranayams on reaction time and cardio respiratory variables. A comparative study of the effect of short term (3 weeks) training in savitri (slow breathing) and bhasrika (fast breathing) pranayams on respiratory pressures and endurance, reaction time, blood pleasure, heart rate, rate-pressure product and double product. Thirty student volunteers were divided into two groups of 15 each. Group one was given training in savitri pranayam that involves slow, rhythmic, and deep breathing. Group II was given in bhasrika pranayam, which is bellows-type rapid and deep breathing. Parameters were measured before and after 3 week training period. Savitri pranayam produced a significant increase in respiratory pressure and respiratory endurance. In both the group, there was an appreciable but statistically insignificant shortening of reaction time. Heart rate, rate-pressure product, and double product decreased in savitri pranayam group but increased significantly in bhasrika group. It is concluded that different types of pranayams produce different physiological responses in normal young volunteers.

Udupa et al. (2003) conducted the study on the effect of pranayam training on cardiac function in normal young volunteers. Systolic time
intervals (STI) are non-invasive and sensitive tests for measuring the ventricular performance. It has been reported that practice of pranayam modulates cardiac autonomic status and improves cardio-respiratory function. Keeping this in view, the study was designed to determine whether pranayam training has any effect on ventricular performance has measured by STI and cardiac autonomic function tests (AFT). Twenty Four school children were randomly divided into two groups of 12 each. Group I (pranayam group) subjects were training in nadishuddhi, much-bhastrika, pranav and savitri pranayams and practiced the same for 20 minutes daily for a duration of three months. Group II (control group) subjects were not given any pranayam training. STI (QS2, LVET and PEP) and AFT (RRIV and QT/QS2) were measured in both the groups at the beginning and again at the end of three months study period. Pranayam Training produced an increase RRIV and a decrease in QT/QS2, suggesting and enhanced parasympathetic and blunted sympathetic activity respectively. QS2, PEP and PEP/LVET increased significantly, where as LVET was reduced significantly in pranayam group. In contrast, the changes in STI and AFT were much less marked in the control group. The study shows that three months of pranayam training modulates ventricular performance by increasing parasympathetic activity and decreasing sympathetic activity. Further studies on a larger sample size may illustrate the underlying mechanisms involved in this alteration.

Raub (2002) conducted a study on, Psycho physiologic effects of Hatha Yoga on musculoskeletal and cardiopulmonary function. Yoga has become increasingly popular in Western cultures as a means of exercise and fitness training; however, it is still depicted as trendy as evidenced by April 2001, Time magazine Cover story on “The Power of Yoga”. There is a need to have yoga better recognized by the health care community as a complement to conventional medical care. Over the last ten years, a growing no. of research studies have shown that the practice of Hatha Yoga can improve strength and flexibility, and may help control such physiological variables as blood pleasure, respirations and heart rate, and
metabolic rate to improve overall exercise capacity. This review presents a summary of medically substantiated information about the health benefits of yoga for healthy people and for the people compromised by musculoskeletal and cardiopulmonary disease.

Mark D. Tran et al. (2001) conducted a study on effects of Hatha yoga practice on the health-related aspects of Physical fitness. Ten healthy, untrained volunteers (nine females and one male), ranging in age from 18-27 years, were studied to determine the effects of Hatha yoga practice on the health-related aspects of physical fitness, including muscular strength and endurance, flexibility, cardio respiratory fitness, body composition and pulmonary function. Subjects were required to attend a minimum of two yoga classes per week for a total of 8 weeks. Each yoga session consisted of 10 minutes of pranayams (breath-control exercise), 15 minutes of dynamic warm-up exercises, 50 minutes of asanas (yoga postures), and 10 minutes of supine relaxation in savasana (corpse pose). The subjects were evaluated before and after 8 weeks training programme.

Iso-kinetic muscular strength for elbow extension, elbow flexion, and knee extension increased by 31%, 19%, and 28% respectively, whereas isometric muscular endurance for knee flexion increased 57%. Ankle flexibility, shoulder elevation, trunk extension, and trunk flexion increased by 13%, 15%, 18% and 14% respectively. Absolute and relative maximal oxygen uptake increased by 7% and 6% respectively. These findings indicate that regular hatha yoga practice can elicit improvements in the health-related aspects of physical fitness.

Kalidasan (1998) conducted a study on, the influences of training with and without selected yogic practices on technical skill level among cricketers. Three matched groups each having 10 boys of 18-20 years of age served as subjects. Training programme was specially designed for cricketers and yogic practices were drawn. Training was given for 2 hours in the evening and yogic practices were given for 30 minutes in the morning for 6 days a week for a period of 8 weeks. The results indicate that there
was significant difference in technical skill level among the three groups due to treatment. The analysis showed that training with Yogic practices improved the technical skill level.

Kulkarni and Datar (1997) conducted a study on the effect of short term yoga training programme on peak expiratory flow rate. The study was conducted on healthy adult males (48) and females (15) between the age group of 16-24 years. The Peak Expiratory Flow Rates were recorded by Mini Wright's peak flow meter before and after Yoga training. The yoga training was for the period of 21 days (3 weeks). The results showed an increase in the Peak Expiratory flow Rate after Yoga training.

Raju (1997) examined the short time effect of four weeks intensive yoga practice on physiological response in six healthy adults, female volunteers were measured using the maximal exercise treadmill test. Yoga practice involved daily morning and evening sections of 90 minutes each. Pre and post yoga exercise performance was compared. Maximal work output for the group increase by 21% with a significantly reduced level of oxygen consumption per unit work but without a concomitant significant change in heart rate. After intensive yoga training at 144 W min (-1) (corresponding to W max of the pre yoga maximal exercise test) Participants could exercise more comfortably with a significantly lower heart rate (P<0.05). Reduced minutes ventilation (P>0.05) and a significantly lower respiratory quotient (P>0.05), the implications for the effect of intensive yoga on cardio respiratory efficiency are discussed with the suggestion that yoga has some transparently difference quantifiable physiological effects to other exercises.

Rawal S.B et al. (1994) conducted study on, Effect of yogic exercises on thyroid function in subjects residing at sea level upon exposure to high altitude. Ten healthy male volunteers in the age range of 20-30 years were used as test subjects in this study with each serving as his own control. The subjects were randomly divided into two groups of 5 each. One group practiced hatha yogic exercises, while the other group
performed the regular PT exercises. The subjects performing PT exercises for the same duration at SL showed significant thyroid uptake of radioactive iodine at 24 hrs. Subsequently their SL showed significant thyroid uptake continued to rise until 72 hrs without any demonstrable thyroidal. These intend to raise slowly unit 72 there without inducted by conventional PT exercise.

Schell F.J et al. (1994) conducted a study on, Physiological and psychological effects of Hatha- Yoga exercise in healthy women. They measured heart rate, blood pressure, the hormones Cortisol, prolactin and growth hormone and certain psychological parameters. There were no substantial differences between the yoga practicing group and a control group concerning endocrine parameters and blood pressure. The course of heart rate was significantly different; the yoga group had a decrease during the yoga practice.

Rai L (1994) conducted a study on Energy expenditure ventilator responses during Siddhasana-yogic seated posture. Various cardio-ventilatory responses were studied in states of the horizontal supine, chair-sitting and Siddhasana. It was observed that sitting in siddhasana posture was characterized by greater minute ventilation, larger tidal volume, higher oxygen consumption, greater CO2 illumination, higher heart frequency, greater oxygen pulse and lesser as compared with other two postures.

Bera (1993) conducted a study on body composition, cardio vascular endurance and anaerobic power of yogic practioner. Forty male high school students, age 12-15 years, participated for a study of yoga in relation to body composition cardiovascular endurance and body composition. Cardiovascular endurance was measured using standard method. The duration of experiment was one year. A significant improvement in cardio vascular endurance was observed as result of yoga training.

Moorthy A.M (1993) randomly selected 180 students (90 boys and 90 girls) in each age group ranging from 6-11 years. He concludes after discontinuing the training in both non yogic exercise as well as yogic
exercise. The improvement percentage seen has been decreased. By the decreasing non yogic exercise group is more significant as compared to the decrease in yogic group. Thus, yogic exercises help to retain their effect longer than the non yogic exercises and hence are more advantages than non yogic exercises for boys and girls.

Tells S et al. (1993), conducted a study on, physiological changes in sports teachers following three months of training in yoga. This report shows that in a group of 40 physical education teachers who already had an average of 8-9 years of physical training, three months of yogic training produced significant improvement in general health (in terms of body weight and BP reduction and improved lung functions).

Jyothi Reghuram (1991), in her studies states that, “In a significant breakthrough that may open up new horizons in the treatment of the mentally retarded and cerebral palsy children on scientific basis, research studies have established the efficacy of yoga in substantially improving all categories of the mentally retarded. A year-long controlled study on 45 pairs of mentally retarded children in Bangalore showed high rates of improvement in all the three parameters studied. IQ social adaptation and psychomotor coordination in the yoga group, in contrast to the control group whose progress was almost nil. The key factors in this new approach are to circulate more blood into the head, increase sensitivity of different organs and develop the emotional faculties. The specially designed yoga techniques loosen the joints and relax the musculature, helping the children to improve their physical skill and basic control. The study conducted by Vivekananda Kendra Yoga Research Foundation found that 89% improved their IQ in the yoga group. 68% enhanced their social adaptability and 56% their psycho motor coordination”.

Durgalakshmi A (1989) conducted a study on “Effect of Yogic exercise on selected physiological variables of high school boys”. The groups consist of 60 students. The result of the study showed that systolic pressure was increased and diastolic pressure remains unchanged after 6
weeks of training of yoga. The score in breath holding time and vital capacity had also improved. It was statistically significant. She also recommended that the athletes can adopt these exercises and increase the cardio respiratory function, and further, she adds, the yoga can be included in the regular programme of physical education in the schools and colleges.

Moorthy A.M (1982) conducted a study on minimum muscular fitness of school children of age group 6-11 years and compared the influence of selected yogic exercises and physical exercises on them. In that study, 1000 children (571 boys and 429 girls) from 2nd standard to 7th standard attended at pre-schools in Pune. 90 boys and 90 girls from the failure where randomly allotted to control group. Experimental group I (physical exercise) and experimental group II (yogic exercise) were undergone the treatment for a period of 6 weeks. He concluded that both experimental groups showed significant improvement after 6 weeks training when compared to control group. The percentage of improvement was seen much greater in yogic group than in physical exercise group.

Gore and Bhole (1982) found that after 10 days of training in Asana the students were taken up for experiment. Pulse rate near wrist joint was measured before and immediately after the following three conditions given with the sufficient rest in between. The pulse rate showed great variation due to different types of muscular activity involved in them. Any activity of an isometric nature increases muscle tension and through it the level of body awareness, while in Asana the tension in muscles, have to be relaxed by withdrawing one’s effort to its optimal level. Naturally relaxed muscles will put less strain and demands on the heart.

Thankamma Oomen (1981) investigated the comparison of isometric yogic physical culture and combination training on body composition and physical fitness status of high school boys. It was shown that all the three exercise groups show a significant increase in toe touching scores. The inter-group differences show that yogic physical culture group is more helpful in developing extent flexibility than the isometric and combination
groups. And in dynamic flexibility comparatively yogic exercises are the best in developing dynamic flexibility.

Li CL et al. (2006) conducted a study to evaluate the effect of aerobic exercise intervention with goals of improving health related physical fitness in one high-tech Company in Taiwan. This study was conducted as a Quasi-experimental design. Among the 54 subjects enrolled in the study, 26 subjects of the volunteers agreed to participate in an aerobic exercise programme. The control group was comprised of a similar sample of 28 subjects working at the same company. The subjects in the exercise group participated in a 12-week aerobic exercise programme, while subjects in the control group did not participate. The results of the analysis of variance with repeated measures of health related physical fitness showed that the subjects in the exercise group had significantly more improvement in abdominal muscle strength and endurance than the subjects in the control group. It is concluded that one 12-week aerobic exercise programme was effective in improving the abdominal muscle strength and endurance of employees of a high-tech company.

Xiang-hong N.I (2005) in his study analyzed the influence of functions of aerobics on the college students' health by means of teaching experiment and with the methods of literature study, questionnaire, and mathematical statistics. The results showed that aerobics is fit for the students of different genders and levels. However, there still existed differences in its mental health function. It is suggested that a set of scientific self-evaluation system should be set up to monitor its periodic effect of aerobics' teaching.

Baquet G et al. (2003) conducted a study on Training-induced adaptations in aerobic fitness have been extensively studied in adults, and some exercise scientists have recommended similar training programmes for young people. However, the subject of the response to aerobic training of children and adolescents is controversial. The effects of exercise training on prepubertal children are particularly debatable. The latter may be partly
explained by different training designs, which make comparisons between studies very problematic. They have analyzed the procedures applied to protocol design and training methods to highlight the real impact of aerobic training on the peak oxygen uptake (V-dotO₂) of healthy children and adolescents. In accordance with previously published reviews on trainability in youngsters, research papers were rejected from the final analysis according to criteria such as the lack of a control group, an unclear training protocol, inappropriate statistical procedures, small sample size, studies with trained or special populations, or with no peak V-dotO₂ data. Factors such as maturity, group constitution, consistency between training and testing procedures, dropout rates, or attendance were considered, and possible associations with changes in peak V-dotO₂ with training are discussed. From 51 studies reviewed, 22 were finally retained. In most of the studies, there was a considerable lack of research regarding circumpubertal individuals in general, and particularly in girls. The results suggest that methodologically listed parameters will exert a potential influence on the magnitude of peak V-dotO₂ improvement. Even if little difference is reported for each parameter, it is suggested that the sum of errors will result in a significant bias in the assessment of training effects. The characteristics of each training protocol were also analyzed to establish their respective potential influence on peak V-dotO₂ changes. In general, aerobic training leads to a mean improvement of 5–6% in the peak V-dotO₂ of children or adolescents. When only studies that reported significant training effect were taken into account, the mean improvement in peak V-dotO₂ rose to 8–10%. Results suggested that intensities higher than 80% of maximal heart rate are necessary to expect a significant improvement in peak V-dotO₂. There is clearly a need for longitudinal or cross-sectional studies that investigate the relationship between maturity and training with carefully monitored programmes. Further research is also needed to compare interval training and continuous training.

Mc. Murray R.G et al. (1998) compared the accuracy of two equations for predicting - VO₂ max of children using sub maximal cycle
aerometry. Repeated measures comparing treadmill measured maximal aerobic power (VO2 max) with two methods of predicting VO2 max using cycle aerometry testing. Thirty three children (15 boys and 18 girls) aged 7-13 years served as subjects. Each child completed a treadmill graded exercise test (GXT) to volitional fatigue to assess VO2 max. Each child also completed a progressive 9 minute, three stages, sub-maximal cycle ergometer test. Heart rates obtained during the last minute of each stage of the ergometer test were used to predicting VO2 max. Predictions were based on a gender-specific modification of the PWC 170 and a modification of the PWC 195 using a 1.17 correction factor and an age and gender-adjusted estimate of resting metabolic rate. The correlations between both sub-maximal test and the GXT were significant. However, the correlations between the GXT and the PWC 195 equation were higher than the correlation between the GXT and the PWCGS equation. Analysis indicated that the PWCGS equation significantly under estimated the VO2 max compared to either the GXT or PWC 195. These results suggest that although the gender specific PWCGS method is easier to compute and may be acceptable. The modified PWC 195 method is a more accurate estimate of VO2 max in children.

Gordon. J. Bell et al (1997), investigation examined the relationship between several different aerobic fitness test results and measurements of metabolic recovery from intermittent, high intensity exercise in 16 male cyclists. No significant correlations were found between maximal oxygen consumption, ventilation threshold, various sub maximal endurance measures and the rate of metabolic recovery, net excess post exercise oxygen consumption, or blood lactate removal after intermittent high-intensity exercise except for sub maximal heart rate (r= 0.66, p< 0.05). These data indicate that aerobic fitness assessments do not indicate the ability to recover after intermittent, high-intensity exercise in endurance-trained cyclists.
Michele Olson S (1995), investigation was to develop a sub-maximal exercise test for estimating \( \text{Vo}_2 \max \) utilizing aerobic dance. One hundred females between the ages 18-40 years served as the subjects for the test validation. The subjects completed the treadmill test to determine \( \text{Vo}_2 \max \) and were assessed for heart rate (HR) response on a bowl of aerobic dance. The data associated with response to treadmill exercise and the aerobic dance test, in conjunction with descriptive variables (eg: age, BMI) was utilized in the validation of the multiple regression models. Reliability was determined by correlation and paired “t” tests of the aerobic dance routine test and retest trails. The construction of the multiple regression equation, via forwarded entry analysis, and the cross validation of the regression equation were completed to ensure the validity and the reliability of the protocol in accurately estimated \( \text{Vo}_2 \max \) test, retest reliability for the dance exercise routine was demonstrated \((r=0.98)\). Moreover, no significant difference were the HR response to four minutes aerobic dance (HR 4) body mass index (BMI) and age (years) cross-validation of the aerobic dance test was determined with a second group of 50 female subjects. Additionally, the application of the validation group regression equation to the cross-validation group yielded a comparable ‘r’ of 0.82. Comparison of the predicted values for \( \text{Vo}_2 \max \) from both equations also yielded a highly significant in variance co-efficient of 0.96. Finally the result of ‘t’ test between the observed and predicted mean values for \( \text{Vo}_2 \max \) revealed no significant difference. Therefore, the final predicted equation, based on collapsing the means associated with the validation and cross validation samples was \( \text{Vo}_2 \max \). These results indicate that a four minute aerobic dance test provides a valid and reliable sub maximal protocol for estimating \( \text{Vo}_2 \max \) and providing an index of aerobic fitness in apparently healthy 18-40 years old females.

Larry Tucker A (1994) examined the relationship between aerobic dance (AD) volume and total/HDL cholesterol ratios in 11,826 women \((M=40.4 \text{ years})\), and assessed the effect of potential confounders, such as age, smoking, alcohol use, body mass, estrogen use, and physical activity
other than AD, on the AD-cholesterol association. Physical activity was assessed using a questionnaire that measured frequency and duration of 21 activities. Blood (venipuncture) was analyzed by a certified lab using the enzymatic method. Five AD volume categories were formed, AD0-AD4. ADO subjects were not involved with AD. AD4 reflected the highest AD volume. ADO was used as the reference group. High risk was defined as ratios >= 4.5. Risk of elevated Total/HDL ratios was substantially lower for AD4-AD1 compared to ADO without control of the potential confounding factors (Odds Ratios: 0.30; 95% CI = 0.53 - 0.97, respectively). After adjusting for all of the potential confounders simultaneously, risk remained significantly lower for AD4 and ADS (OR: 0.57 CI=0.33-99; 0.67 CI=0.45-1.11), respectively. Although cause-and-effect conclusions are not warranted, regular aerobic dance seems to be strongly related to favorable cholesterol levels in women. Women involved in high and moderately high volume AD appear to be at reduced risk of unhealthy cholesterol levels compared to women not involved in AD.

Rogers et al. (1994) investigation with Controlled Eccentric Aerobic Dance (CEAD) or "power low" is a form of aerobic dance which attempts to optimize the benefits of both high (HI) and low impact aerobic dance. To date however, no studies exist which compare the cardio-respiratory response of CEAD and HI either during performance of the routine, or during, recovery. After careful screening to ensure that each participant was equally proficient at both types of routines thirteen college aged women were chosen as subjects for this study. Each subject performed a CEAD and HI routine within a 72 hour period (1 day rest). Each routine was pre-taped (same leader), and matched according to the number and type of movements, verbal cues and duration (26 min). Oxygen consumption (VO2), heart rate (HR), and respiration exchange ratio (RER) were measured throughout each routine and during a ten minute recovery period. Ratings of perceived exertion (RPE) were obtained every 3 minutes. Lactate (LA) levels were assessed at rest, immediately following the routine and at 5 and 10 minutes post exercise. VO2 and RER were
found to be significantly greater during performance of HI. In contrast, HR and RPE were not significantly different between CEAD and HI at any of the time points examined. HI, RER, IA and VO₂ during recovery from HI were significantly greater than following CEAD. Thus, despite the strong emphasis on enhanced lower body muscular activity CEAD does not appear to be as intensive a cardiovascular workout as HI.

Mark. A. Babcock et al. (1994) the kinetics of gas exchange at the on-transient of exercise are appreciably slowed in older individuals. Eight older men (72 yr) completed 6 months of aerobic cycle training. Ventilation and gas exchange kinetics were determined at the onset of a below threshold (ventilatory threshold VEthernet) square wave exercise function and compared with control values (n=4, age 70 yr). Gas exchange data were measured breath-by-breath and signal averaged data were fit with a mono-exponential function to determine the time constants (r). The training group showed significant increase in VO₂ max (20%) and VO₂ at VEthernet (21%). The r for oxygen uptake kinetics decreased significantly (62.2 ± 15.5 to 31.9 ± 7.0s). The rVC02 (70.9 ± 10.9 TO 43.8 ± 11.4 s) and rVE (89.2 ± 18.0 to 50.4 ± 11.3) also were significantly faster post training; however, rHR (38.1 ± 20.5 to 28.6 ± 7.2) was not significantly altered. Thus, with a vigorous training program, the kinetics of gas exchange of older individuals were faster, and approached values reported in fit young subjects.

Roberts (1994) in order to determine the effects of step aerobics and resistance training on VO₂max and upper body strength in children, 5 female and 12 male students (12.37 ± 1.06 yrs) (M±SD) were randomly grouped to an experimental (N=9) and control (N=8) group. VO₂ max was determined via open- circuit Spiro meter using a self-selected running treadmill protocol. Upper body strength was determined via modified push-ups to fatigue and iso-kinetic testing (omnitron). The control group was instructed to participate in normal daily activities, including after school sports, while the experimental group engaged in a step aerobics and resistance training program for 40 min, 3 times a week, for 12 weeks.
Repeated measures ANOVA (P< 0.05) revealed a significant group test effect for VO2 max (P< 0.05) (44.2 ± 7.6 to 50.1 ± 9.7 ml / kg / min), and upper body strength (38.5 ± 16.5 to 60.2 ± 32.7 push-ups). ISO kinetic testing revealed no significant differences. No changes occurred in body composition. However both height and weight increased significantly in experimental and control groups. No injuries were reported in either group. This research concluded that a step aerobics and resistance training program for children is safe and effective at improving cardio respiratory fitness and upper body strength.

James. H. Tanaka (1989) in his study investigated the relative effects on spot reduction of two types of exercise, one representing the anaerobic (abdominal exercises) or spot reduction model, and other representing the aerobic (jogging/running) - model. Fifty-four male voluntary subjects of age from seventeen to fifty six from Northern California community college were stratified into three fitness levels. All subjects were then pre tested on the hydrostatic and anthropometrical measures. The population was then randomly assigned to either Order 1 (twelve sessions of anaerobic followed by twelve sessions of aerobic), or Order 2 (twelve sessions of the 12 exercise sessions, all subjects were tested on the hydrostatic and anthropometrical measures). The analysis involved two pairs of ANCOVA's, one for each dependent variable; first ANACOVA analyzed aerobics versus anaerobic effects by three levels of fitness, with age as a covariant, the second ANACOVA analyzed effects of Order 1 compared to the effects of Order 2, by three levels of fitness and age as a covariant. After only 12-25 minute exercise cycles, aerobic exercise resulted in a four percent decrease in the percent of body fat and approximately a one inch loss in waist girth for the jogger/runners. Anaerobic treatment showed no effect.

Williford (1988) evaluated for healthy untrained females (age 23 yrs) to determine the effect of 10 weeks of aerobic dance training on pleasure lipid and lipoprotein level cardio respiratory function and body composition.
A control group of eight untrained females, (mean age 26 yrs) underwent to same evaluation procedures as trained group. Fasting blood samples collected, pre and post test were arranged for triglycerides (TG) total cholesterol (TC) high density lipoprotein cholesterol (HDL-C) maximal treadmill test and body composition was determined by hydrostatic weighing methods. Triglyceride, TC, HDL-C, Low density lipoprotein (LOL – C) CHOL / HDL-C did not significantly change for either the control or experimental groups. Changes in the experimental groups were significantly greater (P, 0.05) than in the control or experimental group for maximum oxygen consumption (VO₂ max. 12% VS 2%) body composition did not change significantly in either group. It was concluded that 10 weeks of aerobic dance training can significantly improve cardiovascular fitness independent changes in serum lipids, lipoprotein or body composition, music and aerobic dance.

Bernard Gutin et al. (1976) determined the relationship between directly measured aerobic power and a variety of field tests including runs of twelve minutes, 600, 1200 and 1800 yards. Aerobic power also predicted from sub maximal heart rate while cycling using modified standard rhyming procedure. This study showed that in children, training reduced sub maximal heart rate without affecting maximal oxygen uptake "implying the maximal oxygen uptake and sub maximal heart rate are to some extent independent of each other. Therefore the correlations between sub maximal heart rate and the other measures were also determined. The subjects were 15 boys and 5 girls aged 10 - 20. The laboratory tests consisted of a predicted maximum VO₂ test on a Bicycle Ergo- meter and a progressive treadmill test for max VO₂. The predicted max test was poorly related to walking VO₂ and running performance, thereby indicating that the use of this measure provides very little information concerning aerobic power or performance in which the individual must move his own body.

Gentry and Roy (1973) studied the effects of a nine weeks aerobic jogging programme on selected cardio vascular functions of the young
male students of college through a time course evaluation process. Fifteen male students of college ranging in age from 18-22 years participated in the study. The subjects were administered a predictive maximum oxygen uptake test prior to the training period to ensure that each person was initially placed in the proper fitness category. Once training commenced, each subject progressed at his own rate, depending upon his level of fitness and rate of adaptation. In this instance the training programme consisted of jogging or walking a specified distance five times per week. The results indicated significant decrease in resting diastolic blood pressure and steady state heart rate. While no change occurred in exercise cardiac output, resting and exercise cardiac index and resting heart rate.

Yi-chin Wei (2007) the purposes of this study were as follows: 1. to analyze the effect of the instruction of the Safe out Calisthenics on primary school student’s health-related physical fitness and physical self concept. 2. To analyze the effect of the Safe out Calisthenics of different instructional modes on primary school students’ health-related physical fitness and physical self concept. A quasi-experimental design with pre-test and post-test nonequivalent groups was used in this study, and three classes of fourth graders in Ching-Sau Primary School, Chang-Hua County, were selected as the subjects. These 101 students are classified into three groups according to their classes. The controlled group consisted of 33 students who totally have no training. The experimental group A consisted of 35 students who learn Safe out Calisthenics with the instructional mode of watching VCD three times per week, and practice for 18 minutes each time. The experimental group B consisted of 33 students who learn Safe out Calisthenics with the instructional mode of teacher demonstrating three times per week, and practice for 18 minutes each time. In order to complete the whole program, the exercise has been carried out three times per week and lasted 8 weeks. The intensity of exercise was over 130 heart beats per min. All students were given pre-tests and post-tests according to the test methods of health-related physical fitness standardized by the Ministry of Education, Republic of China; and the scale
of children’s physical self concept were fabricated by the researcher. The five test items for health-related physical fitness were specified as follows: Body-Mass Index (BMI): Weight is divided by height N height, Flexibility: Sit and reach, Muscular strength and Muscular endurance: One-min sit-up, Explosive force: Standing board jump, Circulatory-respiratory endurance: 800-meter run. The data were gathered by using health-related physical fitness test, the scale of children’s physical self concept, and the check list of exercise. SPSS version 12.0 was used for the statistical analysis. The quantitative analysis of the basic data was conducted through descriptive statistics. The similarity of the pre-test values among three groups was analyzed by one-way ANOVA. The t-test was used to examine the differences between the pre-test value and the post-test value for every group. The differences of the health-related physical fitness and the physical self concept between experimental group A and experimental group B were tested by one-way ANCOVA. The result shows that there was no group difference in the pre-test value of children’s health-related physical fitness and physical self concept. There were significant differences between the pre-test value and the post-test value in children’s health-related physical fitness of the experimental group A and B. But there were no significant differences between the pre-test value and the post-test value in children’s physical self concept of the experimental group A and B. There were no significant differences between the pre-test value and the post-test value in children’s health-related physical fitness and physical self concept of the controlled group. The differences of the health-related physical fitness and the physical self concept between the experimental group A and B were not significant. In conclusion, the results showed a striking effect of the instruction of the Safe out Calisthenics on performance in children’s health-related physical fitness. But there were no significant differences on children’s physical self concept.

Tsourlou et al. (2005) this study evaluated and compared the effectiveness of an aerobics-calisthenics (A-CAL) and an aerobics/weight training (A-WT) programs on lower limb strength and body fat (%). Thirty-
five adult women (age 42.1 +/- 5.2 years) were randomly assigned to A-CAL (n = 14), A-WT (n = 14), or a control group (n = 7). The A-CAL and A-WT trained 3 days per week for 10 weeks. Maximal bilateral isometric and iso-kinetic knee extension (KEXT) and flexion (KFLEX) torque, squat jump (SJ), and body fat (%) were measured before and immediately after training. The results revealed non significant differences between A-CAL and A-WT (p > 0.05). Both A-CAL and A-WT improved SJ (p < 0.001). A-WT increased isometric torque of KEXT and KFLEX (p < 0.05), iso-kinetic torque of KFLEX (p < 0.05), and decreased body fat (%) (p < 0.05) when compared with controls. In summary, the application of a 10-week light-weight training program improved selected strength parameters of healthy women, compared with controls, but the effectiveness of the calisthenics exercises as an independent form of strength training is obvious.

Perez Lopez et al. (2003) conducted a study to evaluate calisthenics effect on maximal expiratory flow rate in asthmatic patients. A prospective, observational and descriptive study was done through a soccer game. Male and female asthmatic patients from 6 to 16 years old with intermittent and mild asthma were included. Maximal expiratory flow rate was measured before the beginning of soccer game, and then, at the end of the first and second sets. Statistical analysis was made through the media values comparison and t Student test. 60 patients were included. They were 11.3 +/- 2.4 mean aged. 45% had diagnosis of mild asthma, 36.6% mild asthma and allergic rhinitis and 6.6% persistent asthma. Average of basal maximal expiratory flow rate was 275 +/- 90 L/s, and no significant changes were observed in 52 patients: mean maximal expiratory flow rate at the end of first and second sets was 275 +/- 86 L/s and 273 +/- 96 L/s, respectively. Maximal expiratory flow rate diminished at 77 +/- 3.8% and 83 +/- 9.5% in the other eight patients at the end of the first and second sets, respectively. This study reveals that, calisthenics made before physical activity prevents maximal expiratory flow rate diminishment.
Leonard H. Epstein et al. (1985) conducted a study to evaluate the reliability of previous study that showed, lifestyle exercise is superior to programmed aerobic exercise programs for the long-term treatment of childhood obesity along with the addition of a low-intensity calisthenics group to control for nonspecific aspects of participating in an exercise program. Results showed similar and significant weight changes across the exercise conditions during the year of treatment for parents and children. However, during the next year of observation, children in the lifestyle group maintained their weight change, while children in the other two groups gained significant amounts of weight. Similar trends were observed for parents. The results for children replicate the positive effects of lifestyle exercise on child weight control.