CHAPTER – 2

REVIEW OF
RELATED LITERATURE
Chapter II

REVIEW OF RELATED LITERATURE

The summarization of review of related literature and relevant studies concerning the present topic is being presented in this chapter.

The University Education Commission (UEC-1948)\(^1\) in one of its reports has summarized the deficiencies of physical education in the universities and colleges and the most recurrent obstacles it has noticed are as under:

1. there is lack of interest on the part of the students and the authorities,
2. normally insufficient number of trained personnel are being appointed in the Universities and Colleges,
3. great dearth of play grounds, equipment and finance
4. poverty of the students,
5. poor quality of programme and absence of proper organization,
6. less variety of Sports and Games,
7. conflict with academic work and inconvenience of time.

In the same report the University Education Commission also made few suggestions on how to overcome these deficiencies, and how to improve the programmes of physical education and games in the universities and colleges, that are as follows:

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1) Expert leaders should be appointed in the department of the physical education in the university,

2) The professional status and pay of physical education personnel should be recognized as on par with academic professionals.

3) Each university should appoint a properly qualified Director of Physical Education, as far as possible, with Doctor's degree either in physical education or medicine, who should have equal status and pay with other Head of Departments.

4) Every university should make provision for adequate play-grounds, gymnasias and other physical facilities.

A Seminar of State Inspectors and University Directors was held at Delhi in the year 1959, in which the recommendations of the Principal's seminar (1959) in the matter of leadership were discussed and few new recommendations were made for the promotion of physical education in the universities. Some of their important recommendations are as follows:

1) Adequate and fully qualified staff should be appointed and better salaries should be given to them.

2) Talented classroom teachers and pupil leaders should be utilized to help the physical education teacher.

3) Compulsory programme of physical education should be introduced in which intramural and extramural sports are included.

4) As an incentive, certificates rather than material awards should be awarded to the students.

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2 Report of All India Seminar on Physical Education for State Inspectors and University Directors (Delhi: Joise press, 1959), PP19-23
5) Some theory subjects of physical education such as fundamentals of physical education, theories of play, health education, recreation, exercise physiology etc., should be introduced in the curricula of the university courses, and made compulsory for all students like other academic subjects.

6) University Grants Commission should provide adequate grants for the establishment of the Department of Health, Physical Education and Recreation at each university and its affiliated colleges.

7) The Department of Physical Education of the University should be given supervisory responsibilities over its affiliated colleges.

In supporting the issue of compulsory programme of physical education in colleges, Purandare³ had recommended that,

1) Board of physical education should be established at the university level, which includes the Physical Education Directors from affiliated colleges of the university.

2) The board of physical education thus formed should be responsible to prepare syllabus and see that compulsory physical education programme is carried out as per the syllabus prepared.

Sapra⁴, in her study “the role of physical education in meeting certain needs of college women” has described that; the objectives of college physical education programme should meet the needs and interests of the


⁴ Sapra Krishna, “The Role of Physical Education in meeting the Needs of the College Women”, Journal of Physical education and Recreation, Vol.8 (April, 1959); PP 28-31
Thus, going through all the above situations, one could definitely realise that, there is a great need to prepare a core curriculum in Health, Physical Education and Sports for the students of various degree courses in the University of Mumbai and implement it seriously and compulsorily.

The disadvantages of not having a core curriculum of Physical education and Sports at college level are:

1) Lack of continuity of sports activities from school to college level.
2) Lack of basic levels of physical fitness to carry out day to day activities, mental alertness, socialisation and imbalanced personality.
3) Lack of self-esteem, self-confidence, and mental trauma leading to untoward incidents like depression, frustration, suicidal tendencies due to academic pressure and high expectations of the parents.
4) Lack of professionalism in sports.
5) An unorganised system of participation in sports and games.

The advantages of having a core curriculum of Physical education and Sports at college level are:

(1) It will provide a platform for individual and team achievements in the field of games and sports. It can be translated into better results in the academic sphere. It also helps in goal setting and a pre-requisite for successful careers.
(2) Acceptance of academic premises in a sound frame of mind.
(3) It brings about improvement in self-esteem, self-confidence, leadership qualities and a balanced personality.
(4) Common platform for physical education on par with other academic subjects.
students. She also pointed out that, woman is the backbone of every family and the society. So a family and society will stand up and reach to its peak form only when the backbone becomes strong and sturdy. Thus, in order to strengthen the society, it is very essential to make every woman physically fit, mentally balanced, emotionally stable, socially and culturally developed and this is possible only when she actively participates in group games and physical activities held at the school and college level.

Kothiwale⁵ suggests that, all the universities should introduce physical education as a compulsory subject for their various degree examinations. He also believes that, the perfect integration of body and mind will take place only when every individual will receive physical education with academic or professional education.

Govinda Rajulu⁶ believes that, due to lack of academic value of Physical Education in the Indian Universities, the people in-charge of Physical Education Department in majority of these universities and its affiliated colleges are not in a position to organize and administer physical education programme successfully. He further states that, majority of those who are in-charge of physical education programme in the universities and colleges either do not have deep and sufficient scientific knowledge of physical education or lack in administrative knowledge. Hence no suitable programme pertinent to the particular age group is being promoted. This kind of situation


will ultimately kill the interest of students towards physical education.

In attempting to establish a rationale for the inclusion of a physical activity programme at the college and the university level, Annarino, Cowell and Hazelton\(^7\) have suggested the following objectives and goals for such a programme as

1. Maintenance of physical fitness,
2. Refinement of skills,
3. Introduction to new skills and

Three Associated Professors of Michigan State University\(^8\) have tried to guide the students to utilize the increased number of leisure hours more efficiently, so those, the tensions, anxieties and stresses of students are released. In specifying the contents and structure of the course, they have suggested that, at the beginning of the course, every student be oriented on their physical state, potentials, body type and performance level through a number of physical performance tests, and anthropometric measures, so that, the student becomes acquainted with their own physical status in relation to their physical potentials. The final part of the programme is devoted to the specific course offered in the curriculum, together with the intramural opportunities. Every one of them is given an opportunity to observe the course and to explore the equipment and some of the pattern involved.

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Through this experience, they are better able to judge the specific contribution of each activity better as it applies to them personally and can select the future physical education courses wisely.

Varkey⁹ made a study on the physical education curriculum for higher secondary schools in the Mysore State. On the basis of the findings, he has proposed some recommendations to the Education Department of the Government of Mysore state (now known as Karnataka) for the compulsory inclusion of physical education in the school curriculum, standards for play areas, equipment, leadership and development of inexpensive fitness tests. A curriculum that he recommended for standards IX, X, and XI was taken up as planned guide for physical education teachers.

Sattari¹⁰ devised an inventory to collect data to study the development of model graduate programme in physical education, using the inventory, the professional opinion of a group of 89 experts in the U.S.A. were solicited. The result of the survey served as guide lines for the construction of a model graduate programme leading to a Master's degree in Iran.

Rao¹¹ suggested a pattern of organization of a department of physical education for a teaching-cum-affiliated university, mentioned that the

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¹⁰ Sattari Esfandier, “The Development of model Graduate Programme in Physical Education for the Colleges and Universities of Iran” Dissertation Abstract International, (February 1976); p.530-A.

programme should be designed for all the students with adequate facilities. Health instruction and practices should be included in the programme. Qualified personnel should be employed for smooth functioning of the programme, which is essentially needed for the betterment.

Mishra\textsuperscript{12} in his study carried out in the state of Orissa has revealed, that the lack of qualified physical education personnel in proportion to the strength of students in the institutions, affects the effectiveness of the programme. The Facilities and equipment play a significant role in the success of the programme. Mass participation was ignored by most of the institutions. The State Government and the authorities of the institutions have a stringent attitude in respect of financial aids to the educational institutions programme.

Majumdar\textsuperscript{13} used survey method to collect the relevant data for her study, "To evaluate the effectiveness of the undergraduate curriculum in physical education". In the survey method the questionnaire which she used, contained three sections, where in Section-I was a preliminary section, which was used for recording identification data, Section-II was divided into three parts i.e. (a) Teaching (b) Intramural, Extramural Sports Programmes and Competitions and (C) Budget and Evaluation, while Section- III was intended to gather information regarding professional preparation in terms of,


how much the training programme at Lakshmibai National College of Physical Education, Gwalior had equipped the individual adequately regarding his teaching work.

The purpose of the study of Grant\(^{14}\) was to determine the current status of physical education, inter-collegiate athletic and intramural programmes in community colleges in the States of Ohio. Information pertaining to the ten Ohio community colleges were collected by means of a questionnaire and a follow-up interview with the Chairman of the physical Education Departments. The findings were summarized and recommendations were made for consideration of all Physical Education Administration of Ohio Community colleges as under:

The writer feels that, lack of momentum in administrative roles in athletic and physical education should be dealt within the near future. Adopted physical education programme should be monitored closely to determine the needs of students, local schools, and district and community leaders in this area.

The writer further believed that colleges with required physical education programme should carefully study the advantages and disadvantages of an elective system. The physical education, athletic and intramural programmes should be put administratively under an academic dean who believed that the educational values are inherent in the programmes.

Daughtrey and Woods\textsuperscript{15} mentioned that, basic guiding principles must be first established in the light of departmental and professional objectives for the development of the activity curriculum for colleges and university. Consideration is usually given to sociological, psychological physiological principles as they relate to the student population and discipline. The following appropriate guidelines for the development of a college or university activity curriculum have been selected from these materials.

(1) The determination of philosophy,
(2) The interpretation of these philosophy,
(3) The determination of basic objectives,
(4) The allocation of specific objectives to specific activities and skills,
(5) The determination of course contents,
(6) The preparation of teaching units and course outlines.

In directing the future researches in physical education curriculum, Bain\textsuperscript{16} has mentioned that, the goal of curriculum research is to enhance theory guided practices. The Progress requires attention to the process of theory development. The grounded theory research procedure is discussed as a promising approach to the task, a model of curriculum deliberation and/or curriculum design. An overall view of each area is provided in which variables, research methods, instrumentation, theoretical perspectives etc. are discussed. The curriculum design which results from the curriculum deliberation process exists at three levels (1) in the document of philosophy


policies and procedures, (2) in the minds of participants, the perceptions of the programme, and (3) the curriculum in action, what actually occurs in classroom or gymnasium.

A Committee on Physical Education\textsuperscript{17} appointed by University Grants' Commission, for collecting information on present facilities for Physical education in various universities and colleges, sent a questionnaire to 39 universities and 155 colleges were selected by means of stratified sampling. After obtaining the necessary information the Committee formulated its views that, physical education should be regarded as an essential and integral part of education and human development and hence the development of the facilities in the universities and colleges should be given highest possible priority. A truly effective programme of physical education has to meet four important conditions, namely

(a) it should bring the entire student population within fold as quickly as possible,

(b) it should be organized on a regular and permanent footing as an integral part of education generally,

(c) while the programme should be compulsory, every university college student should be able to choose a game, sport or exercise programme according to his interest and aptitude,

(d) the operation of the programme should be watched by a central agency on national basis, which should emphasize the national character of physical education so as to develop in students a sense of unity.

\textsuperscript{17} Report of the Committee appointed by University Grants Commission on Physical Education”, (New Delhi, University Grants Commission, 1967) ; PP 4-21
De Young and Wynn\(^{18}\) suggested the following 11 principles of curriculum construction.

(1) The curriculum should be broad and comprehensive.

(2) The curriculum has its roots in a philosophy of education.

(3) Curriculum building is a cooperative enterprise.

(4) The administrative organization should be simple and flexible.

(5) The housing of the school should conform to the curriculum needs.

(6) The curriculum should provide for individual differences.

(7) Guidance has to be inextricable linked with the curriculum.

(8) The curriculum should be well life centred, shaped by both present and future needs of the individual and society.

(9) The curriculum should be well balanced.

(10) Evaluation is essential for pupil and curriculum.

(11) Constant curriculum revision is necessary.

Oberteuffer and Ulrich\(^{19}\) suggest nine basic principles that should provide comprehensive guidelines in the construction of the physical Education curriculum. They are:

(1) The curriculum should be planned to allow for progression in learning, with a minimum of repetition of activities.

(2) The curriculum should be arranged in such a way that student’s have consecutive interval time to learn.

(3) The curriculum should consist of activities having inherited values


which are intrinsically interesting, and helpful to the students to develop compatibility.

(4) There should be comparative planning in conceiving and executing the curriculum.

(5) The curriculum should be constructed in relation to the development of community needs and facilities without engendering national background or ethnic characteristics.

(6) The curriculum should provide activities, which are susceptible to informal rather than formal teaching method.

(7) Curriculum materials should be selected in relation to the age, sex, and physical conditions of students.

(8) The curriculum should make ample provision for the inclusion of those learning skills associated with motor activities.

(9) Integration as an education process and concept has a bearing on physical education.

According to the Report of the seminar on Physical Education Programme for Secondary Schools\textsuperscript{20} the curriculum should be deliberately planned by the physical education teacher, in consultation with selected members of the senior class students, whenever it is possible and feasible to do so. The planning should be made for the entire year, subdivided into terms, months and days. The students and teachers should know at the beginning what is expected of them during the course of the year. The criteria for selection of activities should help to develop the individual, provide

motivation, offer variety and consider the individual differences in terms of capacities, needs and interests.

Miyahato\textsuperscript{21} viewed that, students should be taught to obtain scientific knowledge about the body and the social and moral meanings of the physical activities. They must also be taught to perform all the physical activities and practices willingly and only to the limit of individual capacities, with deep understanding and interest, so that health and other benefits are derived from the workload. Accordingly he has suggested the following contents which are required for an effective course in physical Education.

1. Lecture: The contents of lectures are divided into two parts (a) Health Education and (b) Theories of Physical Education.

2. Physical Activities: Physical activities are selected and provided by each institution from among the following activities, depending upon the resources such as man, material and money that are available with the institution, Gymnastics, Track and Field, Ball games, Combative sports, Aquatics, Dances, outings, etc. are some of the recreational activities.

3. Physical Examination: At the beginning of the academic year, the physical examination should be conducted and the students are classified according to their physical conditions into various groups such A, B, C and D as under:

A - Common - Those who participate freely in any activity.

B - Robust - Those who participate in all the activities with full enthusiasm

C - Sub-par - Those who participate in activities with some restrictions.

D - Sick - Those who do not participate in any activity.

An extremely important contribution of Physical Education and Sports science is the promotion of health and physical fitness. Both health and physical fitness are one's richest possessions, which cannot be purchased, but it has to be earned through a daily routine of physical exercises. Without a high level of physical fitness, no individual will be able to withstand the stress and strain emerging out of daily situations in the life. The physical fitness, in addition to raising the level performance in games and sports, helps in prevention of injuries in the long run\textsuperscript{22}.

Eichner\textsuperscript{23} in reviewing the benefits of exercise concluded that "the epidemiologic evidences supports that persons who exercise regularly have a lower risk of coronary diseases. Exercise has also been shown the reduction in mortality and morbidity rates".

Linder\textsuperscript{24} Conducted a study of the fitness of selected women aged between 30 and 60, enrolled in a programme of conditioning exercise at the Tarleton state college. The subjects were 38 women, who were tested before and after a 10 week programme of conditioning exercises. The subjects were


\textsuperscript{24} Linder Hearn, "A study of fitness of selected women aged thirty to sixty enrolled in a programme of conditioning exercise at the Tarleton state college", completed a research in Health, Physical Education and Recreation 8, (1966), P. 108.
divided into "high" and "low" exercise groups according to the amount of class exercises. Analysis of variance showed that the total group gained significantly in agility, flexibility, strength of leg, abdomen, arm and shoulders girdle and weight reduction, but the difference between percentage gains was not significant.

Smally and Smally\(^{25}\) studied the change in endurance and in arm and shoulder girdle strength in college women participating in physical education classes. The students chosen were given the modified Burpee test and the push and pull dynamometer test at the beginning. They were re-tested after eight weeks of participation in their regular class activity. The results showed significant improvement.

Capen\(^{26}\) studied the effects of systematic weight training on various aspects of physical fitness viz. strength, muscular and cardio-respiratory endurance. He used two groups of students in this study, out of which one group (A) attended weight training classes, while the other group (B) participated in conditioning classes. Both the groups met twice a week for eleven weeks. The groups were tested in muscular endurance, muscular strength, cardio-respiratory endurance and athletic power prior to and after twelve weeks of experimental period. Analysis of the data revealed that, there was a significant difference between the two groups in muscular endurance and cardio-respiratory endurance. As expected Group A programme gave

\(^{25}\) Jeannettle E. Smally and Martin A. Smally, "Changes in Endurance and in Arm and Shoulder Girdle Strength of College Women in Certain Physical Education Class at Different Stages of Training" Research Quarterly 16 (May 1945) 139.

greater general improvement in muscular strength than did Group B programme. However, in power events Group B had an initial test that averaged higher than Group A, while in speed events significant improvement was noticed in Group A.

Crews\textsuperscript{27} investigated the inter-action of frequency and intensity of training and their effects physical work capacity, cardiovascular function and body composition of adult males. 46 sedentary male members of the teaching and research faculty and staff of the University of Missouri, Columbia were pre-tested on the following variables: Physical work capacity, exercise and recovery heart rate, oxygen consumption, oxygen debt, respiratory quotient, ventilation equivalent and percent body fat. Participants were randomly assigned to one of the six training groups after an initial blocking on pre-test physical work capacity scores. At the conclusion of the pre-testing the subjects trained for seven weeks, as members of the six groups representing all possible combinations of three levels of frequency of training (five, three or one day per week), and two levels of intensity of training (exercise heart rate 150 to 120 beats per minute). All participants exercised 50 minutes per week and thus the duration of training session was dependent on the frequency of training.

Uppal\textsuperscript{28} conducted a study to determine the effects of continuous load method and interval training on cardio-respiratory endurance and selected

\textsuperscript{27} Thaddens Reed Crews, ”Interaction of Frequency and intensity of Training on Physical Work Capacity” Dissertation Abstract International 34 (July 1973) :1115

\textsuperscript{28} Uppal Arun Kumar, “Comparative effects of two duration load methods and Interval running method on Cardio-respiratory endurance and selected physiological variables”, (Unpublished Doctoral Dissertation, Jiwaji University, Gwalior, 1980)
physiological variables. 80 untrained subjects were selected and divided them into 4 groups, i.e. 3 experimental and one control group. Out of the experimental groups, one group was given interval training, second group was allotted fartlek training, and the third group was given slow continuous running for a period of ten weeks. The load was progressively increased after every two weeks. He found that, all the 3 groups has equal training effects on maximal oxygen uptake, vital capacity, leg strength, positive breath holding time and negative breath holding time. Slow continuous and fartlek methods results in insignificantly higher improvement in cardio-respiratory endurance, when compared to interval training. Slow continuous running method and interval training were superior to fartlek in reducing resting pulse rate.

Bhandari, Ramnami and Shaw\textsuperscript{29}, conducted a study to investigate the effects of a long term training programme on one's performance. For the purpose of this study they selected 50 male and 25 female students of IGIPRESS, Delhi, who had undergone a six weeks training of conditioning programme (i.e. exercising with 120 ± 10 heart beats for duration of 45 minutes for five training session per week, emphasized more on endurance and flexibility with slow continuous nature) on strength improvement. The subjects were tested before and immediately after the training by employing various testing items viz. 1) vertical jump without swing, 2) vertical jump with swing, 3) broad jump, 4) sit-ups, 5) push-ups, 6) back strength, 7) Leg strength 8) right grip strength, 9) left grip strength, 10) squats, 11) Burpee jump and 12) Shuttle run. The statistical technique employed were

\textsuperscript{29} Bhandari Dharshana, Ramnami Reema and Shaw Dhananjay, “Effects of Six Weeks Conditioning Program on Strength and Agility”, SOUVENIR : 5th National Conference of NAPESS and GANSF,*INDIA (October 28-29, 1995), P. 24.
percentage, mean percentage etc. for both the sexes. The findings revealed that, there is an improvement in strength and agility in both males and females.

Brent\textsuperscript{30} selected 80 male college students enrolled in a conditioning class at Western Illinois University to study the effects of three different physical training treatments upon their performance and physiological changes. He divided the subjects in to four groups and assigned to various treatments as follows. Treatment 1: Control group, who had no organized training during the experiment. Treatment 2: Continuous running training – i.e. the individuals assigned to this group ran two miles, three times per week at a pace determined by them. Treatment 3: Interval Running Training - these subjects ran two miles, three times per week on the basis of two miles preset time, improvement in the interval group was accomplished by increasing the length of the interval and keeping the same pace. Treatment 4: Continuous Pace Running Training - the subjects in this group ran two miles, three times per week, trying to improve the total time each day.

Pre and Post test was given to all subjects in the following areas: (a) Laboratory Test - blood pressure, Brozsekkeys test of body composition, three second timed vital capacity and Astound-Rhyming test of predicated maximal oxygen uptake ; (b) Field Test- Cooper's Twelve minute run and Two mile run for time. It was concluded that all three experimental groups showed significant gains in oxygen consumption in litres and in Cooper's twelve minute at 01 level of significance, in two mile run for time as compared with control group.

Santo\textsuperscript{31} selected 76 college men to study the effect of physical conditioning programs on cardio-respiratory fitness of college men. The subjects were divided into four different groups, three of which participated in different conditioning programs. One was control group which had no formal physical conditioning. The programs were I) Cooper's Aerobic program, II) Interval conditioning program, III) Regular physical education program and IV) Control group. Cardio-respiratory fitness was measured by using the Harvard Step Test, twelve minute run/walk, a three minute shuttle run and a one minute lateral jump. It was concluded that interval conditioning, aerobic conditioning and regular physical education groups improved significantly in cardio-respiratory fitness in comparison to the control group.

Mc. Namara\textsuperscript{32} investigated the effect of three days conditioning program on selected physical and physiological parameters of college students. Cardio-vascular endurance was one of the physical parameters selected. The subjects were both males and females enrolled in physical fitness training program at Boston University Army. Physical readiness training program, weight training program and callisthenics groups were given treatment for 10 weeks, 3 days in a week for a total of 23 hours. Pre and Post test measures were collected in separate group sessions prior to and after completion of the 10 week program. It is of interest to that female improved as best as much on all training methods as did the males for all variables.

\textsuperscript{31} Park Del Santo, “A Study of the Effect of Physical Conditioning Program on Selected Physiological Components of College Age Men” Dissertation Abstract International 36 (June 1976) :7929-A

\textsuperscript{32} J. Michael and Mc. Namara “The Effect of Three Conditioning Programs of Selected Physical and Psychological Parameters of College Students” Dissertation Abstract International 38 (December 1978) 7217*A
although they were no statistically significant differences among the training methods.

Steven[^33] studied to determine if significant change would occur following participation in selected physical education activities relative to the health related physical fitness components: body composition, cardio-respiratory endurance, flexibility and dynamic strength. In addition it was determine if there were also significant differences among the selected activities relative to the health related fitness components and if applicable to locate the differences. 132 students enrolled in physical education activity courses at Tarlatal State University were the subjects. Experimental group included those students who were enrolled in weight training, aerobic dance and racquetball. A control group was also analyzed in this study and consisted of those students enrolled in archery. Pre-test procedures involved evolutions of body composition by skin fold measurements and cardio respiratory endurance by the 1.5 mile run. In addition flexibility was measured by the sit and reach test and dynamic strength by the sit up test following completion of the program activities; identical procedures were used to collect post-test data. A correlated test was performed to determine if there were significant differences in pre-test and post-test scores of each item in the test battery. An analysis of covariance (ANOVA) was calculated on the post-test scores for the four performance variables to determine significant difference among groups. Turkey's HSD was used to locate the differences. A difference was considered significant if it reached .05 level. Result of the study indicated

that all groups experienced significant changes due to participant in the
program activities. Subject involved in the weight training and aerobic dance
groups experienced significant positive change in body composition, flexibility
and dynamic strength. The racquetball group observed positive changes in
flexibility and dynamic strength, the control group experienced significant
negative changes in cardio respiratory endurance. It was concluded that
improvement in body composition, flexibility and dynamic strength can occur
due to participation in weight training and aerobic dance. Participation in
racquetball was found to produce improvement in flexibility and dynamic
strength. In addition no improvements can be expected due to participation in
archery.

Wallace\textsuperscript{34} took 31 college women (aged 17 to 42) and divided them in
four groups to observe the effect of four months of cardio-vascular training on
the composition of body fat. Training was 3 days/week for an average 15
minutes each session, at 80\% of physical work capacity. Measurement of
perfect body fat, weight and girth were taken before and after months of
training. Daily caloric needs and daily caloric intake were measured along with
the caloric expenditure of each workout. Each group decreased in percent
body fat significantly. This significant decrease was found in the group that
was extremely above the optimal fat ranges. The remaining groups were
within the optimal fat ranges. Weight changes did not reflect fat loss due to
lean body mass development. Daily caloric needs were equal to daily caloric
expenditure of the maintenance. All fat was therefore due to caloric

\textsuperscript{34} Janet P. Wallace, "Responses of the Composition of Body Fat to
Cardiovascular Training in College Women" Dissertation Abstract International 34
(July 1973):1115
expenditure of the training. Over fat individuals can reduce body fat significantly with simple cardiovascular training of walking and running. Individuals within the optimal ranges can maintain body composition with simple cardio-vascular training of walking and running. Further fat loss can be done by increasing the intensity, duration and frequency of exercise.

Weber and Knowlton\textsuperscript{35} compared the cardio-respiratory and anthropometric assessment made on 95 randomly selected young college males enrolled in three physical fitness sections and one tennis course, each lasting eight weeks. Laboratory and field measures were utilized to report and evaluate changes in functional fitness and physique variables including nine selected fat and girth measurements, height and weight, timed vital capacity, Harvard step test, grip strength, one mile run and vertical jump. Analysis of the data yield the following conclusions: a) Eight weeks of physical fitness training can produce significant improvement in physique and cardio-respiratory characteristics; b) a skill oriented tennis class demonstrated no significant physical improvement; c) Body weight can be increased while body fat is lost; d) Vital capacity has little value in reflecting levels of physical pressure, body weight and percentage of body fat. Analysis of covariance was used to determine, if any significant difference between the two groups existed on the variables. The results of this study indicated: significant difference at .05 level in resting hearth rate between the groups. No differences were found in either systolic or diastolic blood pressure, body weight, or percentage of body fat. It was concluded that water aerobics can be

\textsuperscript{35} Herbert Weber and Ronald G. Knowlton, "A Comparative Study of Physique and Performance Measures Relating From a Short Term Physical Fitness Course" Dissertation Abstract International 39(December 1969):1107
of sufficient intensity to increase fitness of young, sedentary individuals.

Amusa and Sohi\textsuperscript{36} examined changes in muscular strength, muscular endurance, muscular power, speed, agility, cardio-respiratory endurance and body composition in college age soccer players following a twenty weeks training. The study concluded that muscular power, speed agility and cardio respiratory endurance improved significantly whereas a reduction in fat percent was also seen.

Niblock\textsuperscript{37} conducted a study in order to ascertain differences in personality traits and intelligence level of female athletes and non-participants. 92 school girls of whom equal numbers had or had not participated in inter-scholastic competitions were given the Guilford Zimmerman Intelligence Survey. Intelligence scored based on the Large Thorndile Intelligence Test was obtained. When the mean scores of total athletes and non-participants groups were compared significant differences in favour of athletes were found for 4 of the personality variables; general activity ascender, sociability and emotional stability. When mean scores for intelligence were compared, the non participants were found to be significantly superior to the athletes.

Verma and Malhotra\textsuperscript{38} depicted BP-HR relationship in four different

\textsuperscript{36} Lateef O. Amusa and A.S. Sohi, “ The Effect of Soccer training on Muscular Performance Cardio-vascular Efficiency and Body Composition” SNIPES Journal 8 (January 1985) :3

\textsuperscript{37} Marjoie W. Niblock, “ Personality Traits and Intelligence level of Female Athletes and Non- Participants from the Mc Nally High School” Completed Research in Health, Physical Education and Recreation 10 (1968) : 129

sportive groups among themselves and before and after training in athletes and basketball players. 49 Indian National belonging to four different physical activity groups viz. wrestlers(12), weight lifter(12), athletes(8) and basketball players(17) have been studied during their training camps at Netaji Subhash National Institute of Sports, Patiala in 1982. The systolic blood pressure (BP) and the heart rate (HR) of subjects during rest, exercise and recovery were measured. BP was measured with the help of Cuff sphygmomanometer, $V_O^2$ max was determine by a progressive step increment test using an electronically controlled cycle ergo meter. ANOVA, mean and standard deviation were applied to analyze the data. The results indicated differences in the BP-HR relationship corves during exercise and recovery in the various sportive groups.