

CHAPTER - 1

Introduction

1.1 General Introduction

Physical education has, until recently, been considered almost exclusively as a profession providing programmes in educational institutions, but is now also an academic discipline with a growing knowledge base whose focus point is human movement. From an evolutionary perspective modern man's advanced technologically based culture has propelled him well ahead of his biologic adaptive capacity. Evidence indicates that organised physical activity programmes developed early in man's existence, first being used to teach physical skills necessary for survival. Subsequently, historic evidence of the role of organised physical activity programmes reveals that various cultures have placed widely disparate value on the need for and purpose of physical education.

The profession of physical education has developed and expanded during the past quarter century in two principal ways.

1. It is increasingly an academic discipline, though it retains a strong professional context, with a growing body of knowledge whose central focus is human movement.

2. Via the dramatically enhanced societal awareness of the optimal health/fitness role of structured physical activity programmes that now extend well beyond the traditional educational settings.

Physical Education's growth as an academic discipline has been a result of the enhanced role of science and research in higher education, and need of the profession for more sound information and theories upon which to develop and administer its programmatic offerings. Concurrently the application of structured physical activity programme has become more pluralistic and diverse, including those for pre school children, middle age adults and senior citizens in addition to the traditional programmes in educational institutions (Adams, 1991).

1.2 Organised Physical Education in India

Organised physical education and formalised teacher training programme in physical education was introduced in India by the initiative of H. C. Buck and Y. M. C. A in

India during 1920. In West Bengal with the initiative of an Englishman James Buchanan the profession of physical education first step in at the cross road of education around 1930. The time was not smooth then. In this juncture physical education teacher training programme was introduced in 1932. However the first training college of physical education for women was established in Calcutta around 1940. Unfortunately the functioning of this college was discontinued in 1946.

After independence efforts was made to re-institute this college but could not materialised till 1975. With the introduction of compulsory physical education in schools as an examination subject at secondary level in 1974, the West Bengal Govt. had to think positively to establish a new physical education training college for women to fill the growing demand of trained women physical education teachers in schools. Smt. Leela Dey took the initiative in this regard and was appointed principal of the new State Institute of Physical Education.

There after three more training colleges were established during 1975-1978. Around 1985 two more Govt. training colleges of physical education for women was established at Hoogly and Dinhata to produce more trained physical education professionals. The need for organised physical education was felt by all concerned and accordingly measures were taken to provide programme of physical education as a curricular subject at least in school system. The facilities were meagre due to paucity of funds and therefore ideal organised physical education programme could not be materialised. However the training colleges were doing their utmost to trained physical education professionals in a very organised manner to develop positive leadership quality among the trainees including females.

1.3 Perspective of Physical Education for women in India.

Like many other countries in India scope and opportunities in physical education and sports was not only limited for women but also there were great social barrier mainly due to conservative attitudes of the males. The change in the global perspective in late 1920's and early 1930's made the education reformers to think positively towards physical education for women. School physical education for women was introduced around 1938 but there were almost no teacher to impart lessons in physical education at schools. Around 1940 the first physical education training college for women was established in Calcutta. Over-coming the social barrier and family discouragement few progressive

women joined the training college and were interested to select physical education as their profession.

These early leaders showed their potentiality and became leaders of our profession. Later classical example of such an early leader is Smt. Leela Dey, Retired Principal, State Institute of Physical Education for women who dominated and lead our profession for several years. Dr. Avinash Sidhu, Reader, L. N. C. P. E is another leading lady in the physical education profession, at present. She showed her potentiality in the field of sports and her training in the country and abroad, knowledge and skill in the subject made her a towering personality and a true professional leader. The intension of the researcher in mentioning such names is to show that if women finds opportunity they will prove their quality and at the same time some of them may lead the profession at par with males.

1.4 Women in sports

In the past female participation in sports and physical recreation was discouraged mainly for aesthetic and cultural reasons. The cultural conditions under which we have lived have insisted that there are distinct physiological and psychological differences between men and women that preclude the latter from participating in strenuous physical activity particularly of a competitive nature. But history reveals that in ancient Greece, for example, the spartan girls were trained by women trainers who employed a programme similar to that of boys including running, Jumping, Javeline, Weight throwing and Wrestling (Klafs & Lyon, 1973). Women's athletics-worthy of the name did not exist prior to world war I and Women began Olympic competition widely only in 1928.

Women in sports – Global perspective :

Coubertin, like many of his contemporaries, held the view that the Olympic Games should be the preservation of male athletes. In an age when process of modernisation seriously threatened to disturb boundaries between the sexes in every day life, sport and the Olympic Games were expected to produce and preserve manhood. Changes that female body and female nature would undergo, masculinization of women and in general disintegration of the gender order were major arguments, put forward in opposition to women's sport. Since women were no longer content to be bystanders in neither public life nor sport, and were anxious to take part in athletic contests, great controversies arose over women's participation in sport generally, and in the Olympic Games in particular. In controversies of women's participation in the Olympic Games,

different interests, demands ideologies, as well as different alliances, were closely interwoven, considerable differences also existed in goals and strategies of various groups involved in the controversies.

Womens sports becomes a " women's issue "

After world war-I, the growing significance of womens sports had forced the International Olympic Committee(IOC), at regular intervals, to turn its attention to the role of women in the Olympic Family. Coubertin announced, for example, at the IOC session in 1920 that women should be excluded from the games (IOC Session, 1920). In 1923 there was renewed debate in the IOC about the " abuse et excess" of this new womens sport movement. It was recommended that women's sport should be placed under the supervision of the international sports federations. From that moment on, the women's issue belonged on the agenda of almost all IOC meetings.

In 1922, the International Amateur Athletic Federation(IAAF) also started to debate the issue of who was responsible for women's sport. At its 7th Congress in Paris in 1924 the federation, " Concerned about the success of the FSFI (Federation Sportive Feminine International) (FSFI, 1936), decided to take over the administrations of women's athletic (Webster, 1930; Pallet, 1955; Leigh & Bonin, 1977). IAAF delegates however, rejected the participation of women in Olympic track and field events, conflict with FSFI became inevitable and negotiations were initiated (Pallet, 1955).*

In early 1926, these negotiation, led to agreement on a list of proposals which were officially sanctioned by the IAAF Congress. According to these proposals FSFI would continue to be responsible for women's sport, but was bound to the technical rules drawn up by the IAAF. In return, IAAF declared itself willing to use its influence to support the inclusion of track and field events in the Olympic Women's programme at IOC meetings (Pfister, 1996).

1.5 Women in sports – Physiological aspects.

Women by virtue of their sex are at a disadvantage in a very large number of sports. Therefore they should be judged in terms of relative only to the performance standard of their sex. Sex has a definite influence on training principally because of physiological differences in the capacity to perform exercises.

General muscle strength in the female is approximately two thirds that of the male. Strength differences between male and female are reduced when related to body

Webster, 1930., Pallet, 1955., Leigh & Bonin, 1977., cited by. pfister Gertrud. (1996) *The struggle for olympia : The womens's world games and participation of women in Olympic Games.* ICHPER-SD. Journal Vol. XXXII No. 4, Summer. 1996.

size. Again strength differences vary among the different muscle groups. For example, in comparison with men women are weaker in the chest, arms and shoulders but leg strength per unit body weight is actually slightly greater in the female.

With respect to strength development, relative strength - increases in the female are the same or even better than in males following similar weight training programmes. From a weight training programme females can expect little or no change in total body weight, a decrease in body fat and an increase in muscle size.

Women are subject to the same physiological laws as are men. However females have a smaller heart and faster pulse rate. These indicate a greater and more rapid increase in pulse rate at the beginning of exercise and a much slower recovery following exercise. The pulse rates of trained women athletes are about ten beats per minute slower than those of non-athletes.

At rest the average number of r.b.c in the female is 4.5 million per cu. mm as compared to 5 million per cu. mm in the male. Post exercise values reflect an increase of approximately 1 million for both the sexes. The total amount of haemoglobin and the total blood volume for the female are less than for the male, the differences being about 25 percent between untrained men and women and only about 12 percent after each is trained.

At a given level of oxygen consumption women indicate a higher heart rate than do men. On the other hand at a given heart rate men can transport more oxygen during submaximal and maximal work. In both sexes the maximum heart rate bears a linear relationship with an increased work load. However women become exhausted at a lower rate of performance. Blood pressure values both diastolic and systolic, are from 5 to 10 mm of Hg. lower in the female (Banerjee, 1983).

Physical Trainability and Females:

Among trained female subjects a significant increase in the heart volume, maximal cardiac output and stroke volume were observed. When compared with sedentary data and the magnitude of the changes are comparable with that of males.

Trained subjects of both sexes appear to utilise their anaerobic process to approximately the same level. It has also been shown that muscular training in female results increased capacities of 1) A. T. P. - P. C system and 2) anaerobic glycolysis, that is the Lactic acid system. This increase is evidenced by the ability to accumulate significantly greater quantities of blood lactic acid following maximal exercise, but less than male.

There are certain biological differences between females and males. There is no good evidence to indicate that coaches, athletic trainers, or other officials in charge of athletics for women need to be concerned with any special rules and regulations regarding sports participation for normal, healthy girls and women. The young, prepubertal girl is no more at risk for injury than is the young, prepubertal boy.

After puberty, the young women tends to have less strength and a greater percent of body fat than the male. She will be of shorter stature, may require more iron in her diet than the average male, and does not perform as well in speed and strength activities.

There are a number of body fluctuations which occur in the young women with the menstrual cycle. At present there is no evidence that such variation is an overriding consideration in women's participation in sports or exercise. Further there is no evidence that would indicate that vigorous athletic activity, conducted in a proper and intelligent fashion, is harmful to those women athletes who subsequently will bear children. Pregnancy may be a deterrent to the competitive athlete. Certain modifications must be made during this period. Because physical activity is necessary for proper human functioning, it is essential that women, as well as men, participate in many of the opportunities which are available in sports and physical activity programmes.

Present information concerning physical training indicates that training frequency, duration and intensity have similar effects on both sexes. Adaptation to athletic training are more similar than differences do exist, but they should be recognised mainly as differences in magnitude rather than mechanism. There are very little research available in present time concerning the female and physical training. However the findings support the idea that in general, females benefit from training just as males do and that this benefit is brought about through similar physiological changes (Fox & Mathew 1981).

1.6 Women in sports–Psychological aspects.

Considering biological differences between male and female there is no supportive documents from a physiological view point that influence of exercise are different in male and female participants. Though limitations are there in respect of intensity, duration and load with particular reference to involvement of strength in case of female.

From a psychological view point also there is no supportive literature indicating difference of male and female in respect of behavioural aspect of exercise. Through the process of socialisation and sex role stereotyping , gender related differences in predominant needs and preferred personality characteristics do exists.

From the findings of Garai and Scheinfeld (1970) Helmreich and Spence (1977) it appears that those women (both athletes and scientists) who succeed in those areas of endeavour defined as stereotypically masculine do not do this at the expense to femininity. They further concluded that our stereotypical conception of masculinity and femininity in relation to achieving woman may have been overly simplistic. Study in women athletes, Williams (1978) identified that certain characteristics appear to be related to highly skilled female athletes. These athletes appeared to be more " Assertive dominant self sufficient independent aggressive, intelligent ,achievement oriented, reserved and to have average to low emotionality."

From the current literature relating to behaviour and sport no meaningful conclusions can be drawn on the differences of the personality of athletes versus non athletes.

From a psychosomatic view point acute effect of exercise are less interesting than the possibility that regular exercise has lasting effect on psychological functioning, affecting the physiological response to stress in general. Numerous claims (Sachs & Buffone 1984, Sime 1984, Morgan and Golston 1987) have been made regarding the possible psychological benefit of exercise. There are several possible mechanisms by which exercise may impact on psychological functioning. Geus(1992) concluded that activation of the autonomic nervous system and the Cardiovascular responses to exercise are generally regarded as the common pathway by which stress compromises our health. Studies have claimed a beneficial effect of fitness training on psychological well being in terms of decreased feeling of anxiety and increased self esteem. Roth (1989) concluded that both active and inactive individual experience acute reduction in anxiety following single bouts of exercise. Even in the absence of changes in cardiovascular reactivity. Steptoe *et al.* (1990) suggested that one of the mechanisms through which physical inactivity influence hypertension and coronary morbidity is by moderating stress related haemodynamic reaction. From the available literature it appears that measurement of psychological parameters through sophisticated instrument may reveal the positive psychological responses along with physiological changes due to regular exercise.

1.7 Profession of Physical Education and Leadership.

A profession is made up of a group of people who provide a unique social service to human kind . This service is marked by specialised skill obtained in a body of knowledge of an academic discipline acquired by its members during a period of extended preparation and conducted according to standard for moral behaviour and ethical practices.

In physical Education to day , practitioners seek public recognition and acceptance as professionals , they strive for acceptance both as members of an academic discipline and a profession. If these aspirations are to become realities , then physical educators must pursue similar procedures and follow path ways that other recognised profession have followed as they slowly imerged to professional status.

Physical Education can be viewed as a profession, a discipline or a programme of activity. However, regardless of the view point, its central focus is human movement involving motor skills such as sport, games, gymnastics, dance, exercise and fitness activities.

Progress in a pofession is indispensable and the quality and amount of that progress are closely related to leadership. Basic to professional leadership are several components. Among them the most important are scholarship, philosophy and inquiry (Barrow, 1983).

Physical Educaion and sports should assume its share of responsibility in the development of human values. A programme of value education in sport would work best when integrated with a total school programme of value clarification and disciplined caring.

Those members of the group who outstandingly influence the group may conveniently be termed the "Leaders". Leadership has been thought of as a specific attribute of personality, a personality trait, that some persons posses and others do not, or at least that some achieve in high degree and others scarcely at all (Gibb, 1947).

Leadership depends on attitudes and habits of dominance in certain individuals and submissive behaviour in others (Warren, 1934). Leadership quality can be defined as the ability and readiness to inspire and guide others, individuals or groups, toward specific objectives.

Leadership is partly a learned ingredient and is composed of a matrix of qualities. Since all learning is a result of doing and since leadership is partly a learned attribute there must be practice and training in leading. In physical ed ucation professional training institutes such training is being provided so that the trainee become a professionals and at the same time to develop qualities to lead the profession. In the present study the researcher will attempt to find the qualitative improvement in leadership among the trainee females in the physical education professional (teachers training) course.

1.8. Current Global Trends

The fact that girls and women can successfully compete in strenuous athletic activities without psychological and physiological harm is gradually gaining belated acceptance in our society. In the past female participation in sports and physical activity was discouraged mainly due to aesthetic and cultural reasons. The serious research on the consequence of female participation in competitive sports has just been utilised. We have to learn the specialised physiology involved in the reaction of females of different ages to the various stressors in athletic competition.

Further more women's athletics have developed around modifications of existing men's sports; whether these activities are best suited to the unique interests and the physiological, psychological and sociological needs of girls and women has yet to be properly established. Even though it is well accepted by all concerned in this field that a woman can be both physically active and feminine at the same time. Expert opinions gathered from doctors of medicine, teachers, researchers, psychologists and the women athletes themselves produce an ever increasing amount of proof that as long as a girl or woman is physically fit, voluntary participation in competitive sports is not detrimental to either her health or her morals. It is, rather, definitely beneficial. Women have an ambivalent relationship to sport. Many women have experienced sport only through their school physical education programme, and found this, at best, a temporary pleasure, and, at worst, painful irrelevance to the rest of their life. Some live in countries, where there is no physical education at all. There are relatively few person's including women themselves who recognise the benefits of sports and recreation for women and girls and protest against the discrimination to the females in respect of opportunities. However, globally foremost, the issue of women in sport is a non-issue (Brackenridge, 1995).

World wide opportunities in sports at all levels - local to international are increasing for girls and women. Taboos and myths of the past are slowly being reversed. Folkways, mores and traditions are changing to accommodate modern girls and women in sport. Unfortunately, change and progress often do not occur as rapidly as they should or as are desired by many people. However because of dedication and commitment of many women through out the world, girls and women continue to break with convention and venture extremely successfully into an ever expanding wide world of sport.

In Indian context the researcher has no hesitation to say that the girls and the women who are admitting themselves in physical education training college for a professional carrier in physical education and sports are definitely progressive in respect

to their times . They would lead the profession in future at the same time they will teach the young talents.

The researcher thought it would be fit to study critically these trainee females by a wide range of variables to observe the training influence from a total humanistic approach. In next few chapters to come, the researcher will attempt to throw light on the influence of organised physical education training, that prevailing in the training colleges of our country, on trainee females on perspectives of fitness, skill learning, physiological & psycho-physiological response.

1.9 Statement of the Problem

The present investigation is concerned with the influence of organised physical education programme on selected performance variables and psycho-physiological potentialities on trainee females.

1.10 Purpose of the study

The purposes of the study were as follows :

- 1) To observe the impact of organised physical education programme on the qualities of trainee professional females.
- 2) To find the development or improvement in physical fitness status, if any, through organised physical education programme.
- 3) To look into the skill development, if any, in selected sports and games through organised programme of physical activities.
- 4) To observe the changes, if any, in physiological potentialities due to organised physical education programme.
- 5) To observe the psychological status before and after the participation in organised programme.
- 6) To observe the development of leadership qualities, if any, through organised physical education programme.
- 7) To find the changes, if any, on psycho-physiological reactivity due to exposure to organised physical education programme.

1.11 Significance of the study

1) Physical Education professionals conducting organised physical education may utilise the information of the study in evaluating their training programme.

2) This study may throw some light on the magnitude of development of strength, speed, endurance, agility etc. as well as physical fitness status on the professional females.

3) How far organised physical education can help in acquiring new skills may be evaluated from the findings of the study.

4) Physical training elicit changes in physiological potentiality but the magnitude and direction of such changes on trainee females are a new coverage - an outcome of the study.

5) The training programme of the females in a professional training institute may be suitably modified on the basis of the findings of the study.

6) The findings of the study may be utilised to develop positive behaviour and leadership qualities among females.

7) An inference may be drawn from this study regarding the potentialities of the prospective female teachers of our state.

8) Further, inference may be drawn on the nature and qualities of teaching of physical education teachers.

1.12 Limitation of the study.

1) Since the present research project is an experimental one and the treatment were exercise programme, the researcher had to restrict the sample size. It would have been better if the study be conducted for several years but the paucity of time, resource etc. the researcher confined her study to only one training session (1994-95).

2) Some tests were conducted in the morning and some on evening of the same day. The effect of diurnal variations if any, was beyond the control of the investigator. This was adjusted so that their academic programme remains unaffected.

3) Dearth of facility compels the researcher to predict VO_2 max from HR instead of direct measurement.

4) The scope of psycho-physiological measurement in response to exercise stress in our country is very limited, so that the researcher selected few variables which are commonly used in psychological testing.

5) The subjects of this study were the boarders of two different hostels. So the leisure time, activity habits and other life style could not be controlled.

1.13 Delimitation of the study.

1) The subjects of the study were delimited to Bengalee women.

2) The study has been confined to trainee females undergoing professional physical education course.

3) The age of the subjects were restricted to 22-24 years.

4) The study was confined to the evaluation of performance of trainee females of only one training institute, due to lack of facilities in other training institutes.

5) The study was restricted to observation and measurement of four dimensions.

a) Fitness

b) Performance

c) Physiological potentialities

d) Psychological status and psycho-physiological reactivity.

1.14 Hypothesis

On the basis of current literature and consultation with the expert of the subject following hypotheses have been drawn.

1) Organised physical training is expected to improve fitness status of the trainee females.

2) The training programme designed for the present study would have no influence on skilled performance in the selected physical activities.

3) There would be positive and significant improvement on physiological variables measured in this study following training.

4 (a) There would be no or insignificant change/influence in psychological variables due to training on female subjects.

(b) However, leadership qualities is expected to be improved through organised physical training.

5) There may be a positive influence on psycho-physiological reactivity among trainee females. Thus reaction time and skin conductivity may be reduced following training.

Review of Related Literature

Sports science research is relatively new, but unfortunately most of these findings are on male athletes/volunteers. Women sports is not yet established a firm grip in the society as that of men.

Naturally research scientists are also not taking that much interest to explore the possibilities and consequences of exercise training on females. There are still lot of confusion and misconception about women in sports. If the misconceptions about the effects of strenuous activity on women are to be dispelled, research findings on the women subjects should be accessible to everyone interested in women's athletics.

Towards this end the present researcher attempted to gather research findings on female subjects that have been conducted by leading researchers and appeared in published literature as far as she had the access to collect these reports. The present investigator has strong belief that by presenting such research reports on females participation in exercise training would help to clear away negativism and misunderstanding regarding 'women in sports'.

However since the research report on female participation in exercise/sport are not too many, obviously the reports relating to males occupied a sizable portion in this chapter. The review of related literature are presented in this chapter according to the dimensions set in this study.

2.1. On Fitness Dimension

Cureton (1941), Chui (1950), Nunneys (1960) recommended that exercise programme not only improved the strength endurance but also an aspect of physical fitness. The American Medical Association (1964) recommended exercise and health benefits that can be gained from it is important to the women as it is to the men. Shaffer (1963) suggested that the healthy women who participated in athletics need not fear danger to her health because there are no significant risks involved. Richard (1964) observed that the strengthening exercise help the male subjects in improving their performances in vertical jump and have also resulted in the improvement of running performance.

Metz (1968) administered two exercise protocols (intermittent and continuous step up test) to improve maximal work capacity and AAHPER Youth Fitness Test. He found significant correlation between fitness components and maximal aerobic capacity in fifteen years old boys.

Edwards (1974) also found that significant improvement in fitness has also been produced in young sedentary females with as little as 4 weeks of training with 5 training sessions per week.

Brown et al. (1974), Mayhew et al. (1974) and Wilmore, J. (1974) suggested that muscular strength in both men and women increases following weight training programme.

Lamb (1978) influenced by J. Keul's work and there he viewed that strength training programme improved the performance in vertical jump, standing long jump, medicine ball throws, base ball throwing.

Mcnamare (1978) designed to compare the effects of three physical fitness training programme on selected Somatic (body composition, posture, flexibility, muscular strength, muscular endurance and cardiovascular endurance) and psychological variables on males and females. Analysis of the data indicated that physical fitness training enhance both the physical condition and psychological well being of the trainee.

Dunn (1980) conducted a study on fifteen women and thirteen men who underwent a ten weeks programme of timed callisthenics. The data obtained by Dunn indicated that the callisthenics was effective in increasing aerobic capacity and muscular strength and endurance, but not for altering body composition.

Cunningham (1981) conducted a supervised aerobic programme for six months. The result showed a significant change in some physical fitness and physiological variables of the total group.

Macdonald (1983) conducted 6 weeks sequence training on 22 women and 16 men. It was found that two training session per week were sufficient to cause a significant increase in body fat, a cardiovascular endurance, muscular endurance, flexibility and strength.

Priest (1984) studied the effect of 6 weeks aerobic dance and exercise. The result showed a general improvement of physical fitness as an effect of both exercise and dancing.

Fox (1984) opined that exercise can improve effectively the motor fitness. Sailors *et al* (1987) studied to compare the effect of eight weeks training programme on strength & muscular endurance of pubescent boys and male college students. Both training groups significantly increased in strength and endurance.

Mondal and Banerjee (1984) organised six weeks multigym conditioning programme on the young male subjects and found significant changes in physical fitness components.

Barik and Banerjee (1990) observed that after 6 weeks conditioning programme speed, strength, agility increased significantly.

Rikli and Edwards (1991) evaluated the effects of a three years exercise programme on motor performance and cognitive processing. Results indicate that motor performances was significantly improved on all measures (balance, reaction time, shoulder flexibility and grip strength) during the course of the study.

Hassmen and Backman (1992) suggested that after 3 months low-intensity walking increased the physical exercise capacity in the exercised women groups than the non exercising controls.

Nair and Dey (1992) observed improvement in explosive leg strength, speed and speed of movement developed as a participation in weight training programme for 12 weeks.

Dey, and Sinha, (1994) conducted a study on 24 female volley ball players to findout the effect of training (12 weeks) on selected physical and Physiological characteristics. After statistical treatment back and grip strength were increased 10% and 21% respectively. Significant correlations were observed between anthropometric variables and field tests.

2.2. On physiological potentialities

As far back as 1930, Tuttle attempted to find the differences between athlete and non athlete women. He showed that the normal heart rate of women athletes was

slower than that of non athletic women and they had a higher degree of physical efficiency.

Michael and Gallen (1960) indicated that training in various games and sports significantly decreased the resting heart rate.

Jones et al. (1962) noticed that 5 minute rope skipping daily for 4 weeks period reduced the mean resting heart rate.

Brouha et al. (1963) have pointed out that female athlete has lower pulse rate and blood pressure during submaximal exercise.

Hallmann et al. (1963) studied six previously sedentary subjects who were trained for a period of 10 weeks. During this period the Vo_2 max increased from an average of altogether 21%.

Skubic & Hodgkins (1963) found that trained women swimmers performed the second and third minutes of test with slower heart rates and that they had a slower heart rate during recovery, than women who were not conditioned.

Wilson (1967) suggested that training in games and sports significantly decreased the resting heart rate.

Saltin et al. (1968) observed that after strenuous programme Vo_2 max was increased in the sedentary young men.

Webb & Davis (1968) have shown that maximal O_2 uptake might be improved by interval training method.

Eklom (1969) found that endurance programme has improved the Vo_2 max.

Rabisl & Kachadorian (1969) took eleven college subjects and twenty four middle aged men to predict Vo_2 max from running performance. Maximal oxygen intake was highly related with running.

Romero (1970) and Fringer et al. (1974) suggested that for the average, college age female, significant physiological changes can be realised from training programmes conducted as few as 2 or 3 times per week.

Kilbom (1971) found that physiological changes were obtained on non athletic normal females between the ages of 19 to 31 years of age by physical training during maximal exercise.

Kilbom (1971) indicated that performing submaximal work of the same intensity before and after physical training in both sexes, the most consistent differences are i) little or no change in steady state Vo_2 max ii) a significant decrease in heart rate.

Pollock (1973) observed that strenuous types of training increases oxygen up take.

Joseph (1974) conducted a study on forty middle aged men trained by callisthenics for ten weeks and after that they were divided into swimming and jogging group and participated in their special programme for another seventeen weeks. Results indicated significant reduction in heart rates.

Banerjee *et al.* (1974) found 46 ml/kg/min Vo_2 max in the trained group where as it was 39.9 ml/kg/min in sedentary group.

Getchill (1975) investigated the adaptation of middle aged women and men to ten week physical training programme. Result showed the increased oxygen consumption but no significant decreases in basal heart rate.

Fox *et al.* (1975) have conducted studies on two groups of male college students using the interval training methods and found improvement of Vo_2 max.

Eisenman (1975) observed over eight girls and eight young women for 14 weeks training and found both girls and women had a significantly higher Vo_2 max and V_E max values following training.

Buccole *et al.* (1976) have shown that the method of continuous running significantly improved Vo_2 max.

James (1978) and Shephard (1978) indicated that training in various games and sports significantly decreased the resting heart rate.

Lesmes (1978), Pedersen (1978), Weltman (1978) indicated that six to seven weeks of training have like wise led to significant improvements in aerobic and anaerobic capacities for young sedentary females.

Emes (1979) reported from a study on senior members, who participated in an exercise programme (45 minutes per day, 3 times a week for 12 weeks) with gradually increased in intensity. The difference between the means of pre and post programme revealed positive effects. Both resting and exercise heart rates declined with significant reduction.

Shoenfeld and Karen (1981) conducted a study and found lowest resting heart rate in athletes engaged in sports activities. They also indicated that a training period of two months may bring a decrease in heart rate parallelly to the rise in Vo_2 max.

Shaver (1981) opined that the trained subject is generally characterised as having a low resting heart rate and untrained as a high resting heart rate, training tends to lower the resting heart rate (Bradycardia).

Shephard (1982) suggested that the female who were participated in fitness programme showed a substantial decrease of 6 min exercise heart rate with an increase of Vo_2 max.

Massicotte (1983) observed that sixteen women were submitted to a training programme on bicycle ergometer, 3 times a week for a total duration of sixteen weeks. Following eight weeks of training significant changes in Vo_2 max corresponding to 18% and 19% increases were respectively observed.

Hickson (1985) found that twelve subjects participated in an exercise programme of cycling and running 40 min/day, 6 days/week. After 10 weeks continued to training the average increases in maximum O_2 uptake between 11% and 20% observed when measured during cycling and treadmill running.

Banerjee (1987) measured maximum oxygen uptake among athletes of various sports groups. He found significant difference in mean O_2 uptake among various sports groups.

Mondal and Banerjee (1990) found significant reduction in resting heart rate after six weeks multigym training programme adopting progressive resistance method on young athlete.

Laurenson et al. (1993) investigated, and compared the physiological characteristics and training protocols of elite and competitive (club) women triathletes who compete at olympic distance. The Vo_2 max measured on the treadmill was significantly higher in the elite women (65.6 ± 6.0 ml. kg^{-1} , min^{-1}) as compared to the club level women (60.4 ± 3.1 ml. kg^{-1} , min^{-1}). The elite triathletes had significantly lowered heart rate ($p=.01$)

Collins et al. (1993) investigated to determine whether the sequence of strength training before endurance training is more or less effective than endurance

training followed by strength training. Twenty three females and Eleven males were assigned. The seven week training programme consisted of strength training using 10 exercises for two sets of 3-12 repetitions and running for 20-25 min. Vo_2 max was measured during a graded treadmill test. The Vo_2 max was significantly increased 6.7% and 6.2% respectively.

2.3. On Psychological Dimension :

Nelson and Langer (1963) examined some of the psychological variables presents among athletes in competitive situations. They assessed anxiety levels of the team members by using the Taylor Manifest Anxiety Scale. The results showed that the performance of athletes with extremely high levels of anxiety was poor.

Eysench and Gillian (1964) found that highly motivated subjects performed at a lower level on hand-steadiness tests than did subjects at a lower motivational level.

Atkinson (1964) found a clear link between achievement need and the incidence of competitive and individualistic games. De vries (1963) conducted on EMG observation immediately before and after exercise and concluded that exercise can contribute significantly to the reduction of muscular tension.

Hollingsworth (1965) found a strong relationship between state and trait anxiety and performance. The performance level increased with practice and anxiety level tended to decrease.

Wills (1968) did not subscribe to the view that high performance was linked with high achievement motivation.

Wills and Bethe (1970) stated that there were also some evidences indicating that people having high achievement motives tended to exhibit certain strong personality characteristics, they exhibited high degree of self confidence, and they emerged as top performers when conditions were of moderate uncertainty.

Tutko (1971) suggested that the athlete who could maintain a moderate level of anxiety would be most efficient performer.

Venkateswarlu (1975) found more tension in sedentary college students than the physically active college students. The difference was highly significant.

Carron and Bennet (1977) observed low level of state anxiety of the athletes in the age range of 12-19 years children than non athletes.

Purvis and Morgan (1978) suggested from his findings that anxiety does not influence physical work capacity.

Morgan (1979) stated that the successful wrestlers scored lower than the unsuccessful wrestlers on the tension anxiety variable prior to competition and he also established that physical activity has a direct influence on reducing anxiety.

Pauly *et al.* (1982) investigated over 73 male and female subjects. The subjects underwent exercise programme such as running and cycling to a target level for 20 minute session to determine the effects of physiological and psychological parameters. After 14 weeks, significant improvements were found in self concept, trait anxiety, resting heart rate etc.

Blucker *et al.* (1982) reported that too high level of motivation could impede performance of a complex skill. This increased level of motivation could lead to increase muscle tension which could inhibit performance the skills required lower motivational levels for optimal performance.

Lazarevic and Bacanac (1985) showed that sports motive achievement significantly correlated with emotional engagement in sports achievement situations.

Lazarevic and Havilka (1985) found significant difference in the achievement motive displayed by active athletes, and non-athletes.

Kamlesh *et al.* (1987) used sports achievement motivation test (SAMT) in 43 inter collegiate female players of 19 to 23 years of age and found that the inter collegiate female players have a moderate level of sports achievement motivation.

Bala, S. (1987) studied 185 female players of nine different games and sports namely Athletics, swimming, gymnastics, Hockey, Basketball, Volleyball, Cricket, Badminton, and Table Tennis. She stated that game groups had no effect on the level of anxiety, and the relationship between anxiety and performance is very high in individual games than team games, and sophisticated games.

Sudhan *et. al* (1987) investigated that the effect of physical conditioning on stress states, specially state and trait anxiety using psychological and physiological methods of measurement. After 10 weeks of conditioning programme fitness level increased significantly but heart rate, blood pressure and trait anxiety level reduced significantly.

Singh (1988) tried to compare anxiety level of champion and non-champion male & female judo players of National level. Male judo players of National level were low in competition anxiety than their non champion counter part. But champion non-champion female players did not differ in sports competition anxiety level.

Singh (1988) told in his study that the male athletes and players have less competitive anxiety as compared to females. Athletes are differ significantly in competition anxiety with Hockey players.

Geus et al. (1990) reported that aerobic fitness has been associated with various desirable psychological and physiological characteristics and suggested that training of longer duration is necessary to induce the psychological or physiological changes under lying reduced reactivity.

Barry (1990) investigated cardiac and electrodermal responses in competitive gymnast differing in levels of trait anxiety and depression. The results established a number of psychological differences between group differing on state and trait anxiety.

Kamlesh et al. (1991) observed that college female athletes were not physically fit according to the original norms. In intelligence they were found to be far below the norms and in case of sports achievement motivation, the female college athletes were average. There was no relationship between physical fitness and intelligence but there was a positive low co-rrrelation ship between physical fitness and SAMT.

Sivarama, (1994) found no significant difference in sports Achievement Motivation levels between Indian women Basketball and Volleyball players and there was no significant difference between Basketball and volleyball women team players in anxiety levels.

2.4. On Psycho-physiological Reactivities

Jonson (1922) observed that reaction time decreases in more anxious subjects. Through out the developmental stage upto about 25 years of age reaction time decreases at first rapidly and then more slowly following the same type of growth function.

Luria (1932), Gordaner (1935) were of the opinion that the young child might be expected to show a very short reaction time.

According to Hull (1942) reaction time do differ from individual to individual and as also in the same individual it varies from day to day and even from event to event.

Keller (1942) observed that the reaction time of persons specialising in individual events is slower than those participating in team events.

Burpee and Stroll (1936, Beise and Peasley (1937), Elbel (1940), Burley (1944) indicated that the more skilful performers in sports have a faster reaction time and more quickly than the less skillful performers.

Landis and Hunt (1945) concluded that skin conductance was probably an indicator of change of direction of mental activity.

Hammel (1955) reported that varsity athletes, had a significantly shorter reaction time to a light stimulus than physical education majors.

Youngen (1959) found that women athletes were significantly faster than nonathletes women in speed of arm movement and reaction time. He also indicated that the speed of performing specific movement can be improved through training but that the initial reaction reflex time does not differ significantly among trained skilled players.

Sikolov (1963) used SC as a measure of stimulus response relationship in his study on " orienting response ".

Studies concerning the physical performance and discrimination reaction time, Goodenough (1935), Seashore and Seashore (1941), Teicher (1954), Hodgkins (1962), Noble, Baker and Jones (1964) have shown males to be generally superior to females.

Venkateswarlu (1975) had compared GSR level between sedentary and physically active groups and found significantly higher GSR level in the sedentary group.

Chattopadhyay and Das (1985) used SC as an autonomic measure and were of the opinion that Sc appeared to be more representative index of arousal.

Powell (1983) studied seven weeks of aerobic condition upon 36 sedentary males in terms of its effect upon common fitness measurements and reaction time measurements (simple reaction time and choice reaction time). Result showed

significant improvements in all fitness variables. Both reaction time variables showed insignificant change with an improvement trend noted in the choice reaction time measurements.

Thexton (1982) showed increased SC responses during a serial subtraction task among regular exerciser who were temporarily deprived of their work outs.

Russell, Epstein and Erickson (1983) found no differences between various exercise condition and a control condition in the skin conductance responses to mental arithmetic.

Singh (1986) also found significant difference in visual reaction time between the players of individual events and group games.

Hascelik *et al.* (1989) reported that physical conditioning exercise affected physical fitness positively and moreover, auditory and visual reaction times were shortened.

Moses *et al.* (1989) indicated that in physiological responsivity in the various experimental groups the most positive effects were recorded in the moderate training group.

Geus (1990) has discussed the effect of fitness training on physiological stress reactivity and concluded that the hormonal component of the stress response was not related to fitness.

Singh (1990) found that the high performer has less reaction time. Short distance runner has less visual reaction time and more auditory reaction time as compared to middle and long distance runners.

Mondal, Bhowmik and Banerjee (1992) found significant reductions in SC level following a chronic exercise programme in aged sedentary people.

Mondal and Banerjee (1993) observed an insignificant change in SC level after chronic training programme on young sedentary men.

Reviewing the above literature of leading researchers it appeared that there is dearth of information regarding women's participation in exercise training, particularly on physical education trainee females. In the present thesis the researcher intends to venture in this area among the Bengalee female trainee.