Chapter – 1

Introduction

The human body is designed for physical activity and movement. Throughout his life, man has to be physically active in order to procure his daily food and to succeed in the battle for survival. Improved standards of living and increased affluence, however, have led to decreased emphasis on physical fitness and locomotive power, and in the industrialized world modern human being has become more and more sedentary both at work and during leisure hours.
Physical activity is as natural and essential to human body as the basic needs. Whether one is awake or asleep muscular contraction permits one's lungs to breathe, heart to beat, eyes to move and body to turn. Movement of a part or of the whole body is the primary function of the human muscular system but because no system operates independently movement also involves the skeletal, nervous, circulatory and respiratory systems. These systems support muscular movement and conversely physical activity contributes to their effective functioning and well being (Karry J., 1976).

From a panoramic view from the day today practical experiences of life, it won’t be an exaggeration to say that the people of the world stand badly in need of a better physical and mental fitness awareness to face the challenges of life, whether to make a mere survival or to make an achievement in any sport of international importance. In a more specific manner the student community, which is caught between curriculum and extra-curriculum bothered only to collect degrees and diplomas in number and are scattered without knowing the ultimate purpose of education that knowingly and unknowingly lands them up in heavy stressful life. With the ever-increasing academic commitments, the intensity of the stress acquired is till amplified and intensified. Therefore it is to be carefully noted that an excellent awareness of physical and mental fitness should be propagated among them, which is sure to train and mould the student community to face the upcoming challenges of life with vigour and courage.
1.1. Fitness

‘Fitness’ is a term which is often used as synonym for health in a limited manner. Fitness denotes different facets of health. The term ‘fitness’ is the capacity of the individual to live and function effectively, purposefully and zestfully, here and now and to meet confidently the problems and crises which are among life’s expectations (Reuben B. Frost, 1971).

‘Fitness’ is a state, which characterizes the degree to which the person is able to function. Ability to function depends upon the physical, mental, emotional, social and spiritual components of fitness, all of which are related to each other and are mutually interdependent. This may be referred to as ‘total fitness’.

Physical fitness though not so broad in its meaning as total fitness, would include adequate degree of functioning of vital organs and adequate amount of strength, endurance, co-ordination and flexibility etc.,

Scientific evidence has been produced to show that the general health and physical performance ability of the people make a demand mainly on their physical fitness level (Edwin A. Fleischmann, 1964).

1.2. Physical Fitness

The term ‘physical fitness’ has been an elusive one to define objectively. The simplest definition is, “the capacity of an individual to perform a given task”. Once a person has reached a satisfactory level of fitness and has an
appreciation of how fitness is vital to his full growth and development, the effect of the fitness objective is more completely realized (Donald K. Mathews, 1950).

The greater the physical fitness, the longer a person can keep going and the more efficient will be his performance and his capacity for recovery from fatigue.

It is common knowledge that any organ that is not in optimum use may compel an individual to adhere to some well-established regimen, if he wants to enjoy sound health and physical fitness. It is true that muscles do help in attaining health and fitness by their regular rational employment of physiologically useful work. But it must also be remembered that muscular exercises, which are of local influence on certain parts of the body, will not provide the desired health and fitness. A general requirement of the body is a well-coordinated rhythmical movement, which is specially designed for organic and functional promotion of the body. It should be borne in mind that the influence of mind over body is perhaps much greater than that of the body over the mind because there is a belief that the mental attitude does affect the physical.

"Physical fitness refers to the individual’s capacity to strive and live effectively in his environment" (Harold. M. Barrow and McGee 1979).

"Physical fitness is the total functional capacity of an individual to perform a given task" (J.P. Thomas, 1962).
Fitness is a broad term denoting dynamic qualities that satisfy the needs regarding mental and emotional stability, social consciousness and adaptability. But the term physical fitness denotes that the organic systems of the body are healthy and function efficiently so as to enable the fit person to engage in vigorous tasks and leisure activities without much strain (Charles A. Bucher, 1985).

According to Hollis (1987) Physical fitness is the ability of the body to adopt and recover from strenuous exercise. It is a reflection of one’s ability to work and play with vigour and pleasure without undue fatigue and with sufficient energy for unforeseen emergencies.

The physical fitness of an individual depends upon his / her regular participation in physical activities. The ‘Fittest will survive’ slogan was true in ancient days, when man struggled for survival and had to fight for his food and shelter and even to save him from animals. The process of struggle that involved physical activity helped him to develop a strong and sturdy body. So naturally the ancient man was endowed with robust health without doing any sophisticated physical activity.

Many researchers strongly support the view that regular exercise helps one to keep the heart strong and healthy and to prevent cardiovascular diseases. A physically fit heart beats at a lower rate and pumps more blood per beat at rest. As a result of regular exercise, an individual’s capacity to use oxygen is
increased substantially. Energy production depends on internal chemical process on metabolic changes.

When a sport or game includes training, it is likely to improve physical and physiological fitness. The performance in sports depends largely on physical fitness.

Powell explains that, fitness is not an end, it is the beginning. A person must get fit to perform and will not necessarily get fit by performing. Fitness is not a matter of physical capacity alone. Man is a unit and training can make a person physically fit.

1.3. Physical Fitness and Performance

The increased energy expenditure that accompanies regular physical activity contributes to more efficient functions of various systems. Physical fitness is a related construct and it is also often assumed that the more habitually creative are more fit and that their relationship is casual.

Physical fitness means that a person possessing it meets certain physical requirements. These requirements may be anatomical, physiological or both. Anatomical fitness may require a person to be of a certain height or weight or have specified dimensions of various parts of the body. Physiological fitness may require a person to be able to withstand certain temperatures or altitudes, or be able to perform specific physical tasks involving muscular effort.
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Physical fitness is a fundamental need, like food clothing and shelter. It is not an isolated phenomenon. It is an integral part of life itself. "Physical fitness provides capacity for activity. The greater the physical fitness, the better the physical endurance and precision of movement, which are essentials for any effective living”.

Performance related physical fitness is associated with those ingredients and qualities conducive to better performance in daily life style, sports and other physical activities, such as those requiring endurance, strength, speed and agility.

1.4. Physiological Fitness and Performance

It is universally accepted that the physiological functions of the body improve with the use and decline with disuse. More specifically, the heart, lungs and muscles become stronger and more durable the more they are used. Exercise strengthens the heart muscle. Greater demands are placed on heart cause it to increase in size and get stronger through use. The person who exercises regularly has a lower pulse rate, and this rate returns to normal more quickly after exercise than does the pulse rate of the sedentary person.

Cardiovascular pulmonary endurance is the most important aspect of any total physical fitness program. Exercise helps player’s heart, lungs and circulatory system to perform more efficiently. Heart, which is a muscular
tissue, increases in strength and can pump more blood through this system in fewer beats per minute.

It is a physiological fact that the human organism needs stimulating exercise. When the whole body is subjected to regular muscular activity, requiring a vigorous stress on the heart, lungs and muscles, the general efficiency of physiological functions improves. Research now strongly supports the theory that regular, vigorous exercise helps to keep heart healthy and may prevent cardiovascular disease. A physically fit heart beats at a lower rate and pumps oxygen (this means the ability to do more physical work) is increased substantially. People who keep fit greatly enlarge their fulness of living. They can do the day’s work with ease; they can meet most emergencies; and they can extend their recreational activities. Today, more and more people become interested in outdoor activities and sports. However, to give complete enjoyment, participation in these activities requires an appropriate level of physical fitness, more than that is needed for everyday life”.

Heart rate increases linearly with increasing oxygen consumption in both trained and untrained individuals. Endurance training also tends to lower the resting heart rate (bradycardia). For instance, resting heart rates in highly trained athletes may be as low or lower than 40 to 45 beats per minute. On the other hand, in healthy but untrained subjects, resting heart rates may be as high as 90 to 100 beats per minute. Thus, the trained subject is generally
characterized as having a low resting heart rate and the untrained a high resting heart rate.

Athletic events are performed with the breath hold, notably swimming and track sprints. The physiology of breath holding involves respiratory, circulatory and cardiac changes, all of which are important in the light of recent research. The most obvious changes when the breath is held are the increasing level of CO₂ and the decreasing level of O₂ in the alveolar air. The rising CO₂ level is more important in determining the length of time the breath can be held (A. Devries, 1986).

The volume of air breathed varies with every change in bodily activity, sleeping, sitting, walking and running. The amount of air breathed cannot be estimated from mere inspections. The total volume of air inhaled and exhaled during a certain period rarely can be exactly controlled by the will, but is automatically adjusted to maintain the interior atmosphere of the body as nearly constant as possible.

Respiration essentially plays a two fold part in the body during physical exertion. On the one hand, it supplies the oxygen required by the muscles and on the other hand it serves to keep the acid – base balance of the blood constant within certain narrow limits.
1.5. Physical Fitness Status of People at Present

In the age of machines, when life has become convenient beyond our wildest dream and when physical exertion threatens to become absolute, we pay more attention to our television sets, dishwashers and other machines than we do to the condition of our own bodies. Why does this unhealthy state of affairs exist? Simply because, people in our country, young and old do not get enough exercise. Modern society is steadily drifting away from the habit of work. Most of our works are done by a machine or a computer and all what we need to do is simply sit with it and just co-ordinate with the work done by it.

Most of the cultivated lands have been converted into concrete forests of factories and houses and the percentage of physical work in the existing field, is reduced to a larger extent by the advent of modern farm equipments like tillers and tractors. As a whole, man has become idle and sedentary in this ‘push-button’ age. What is to be done for that? In the mechanized age of today, there is a pressing need for human beings all over the world to acquire physical fitness that will enable them to survive to the shocks of the speedily changing environment and to meet the demands that the modern life imposes on them. Before he is crippled due to inactivity, he should be made aware of the importance of physical fitness programme. Everybody must be provided with opportunities for activities (Thomas Kirk, 1965).

In the modern educational system the student community is caught between curriculum and extra curriculum mainly, bothered to collect degrees
and diplomas in number and are scattered without knowing the ultimate purpose of education, which knowingly and unknowingly lands them up in heavy stressful life. Together with the academic load psycho-physiological stress keep growing and developing. Therefore it is to be carefully noted that an excellent awareness of physical and mental fitness should be propagated among them, which can be an ideal thing to be done as the need of the hour.

1.6. Yoga – A Brief Overview

Yoga has been practised in India for over two millennia. Stories and legends from ancient times testify to the existence of yoga, and to the practitioners and divinities associated with it. Indian literature is a storehouse of knowledge about yoga covering every conceivable level. In some chronological order are the vocals (books of scriptural knowledge), the Upanishads (philosophical speculations), and their commentaries; then the Puranas (ancient cosmologies), and the two epics, the Ramayana and the Mahabharatha. The Mahabharatha contains within itself that masterpiece of Indian scripture the Bhagavad Gita. Towards the end of Vedic period comes the aphoristic literature, with the “Yoga Aphorisms” of Patanjali of special interest to yoga students. There are, besides, whole bodies of works both ancient and more modern dealing with various aspects of yoga and yoga philosophy, testifying to the continued relevance of yoga as a discipline (Mira Mehta, 1994).
1.7. History of Yoga

The word ‘Yoga’ itself comes from a Sanskrit word meaning ‘yoke’ or ‘union’. It conveys the idea of harnessing oneself to a discipline and at the same time of unifying the parts of the self, body, mind and spirit and the individual self with something greater and transcendent, a concept which may be expressed as God, the Absolute, the Greater Self, the Universal Flow of Life and so on, according to one’s religious and philosophical stance.

The term ‘Yoga’, therefore, has a broad definition, being a way of living and a way of understanding life. It is universal in the sense that it can be practised by followers of any religion or belief, yet it encompasses exact disciplines which spring from the yogic view of life and foster it.

Little is known about the early history of yoga. But over the centuries, literary references to it occur with increasing frequency and in greater detail. Different forms of yoga discipline were developed and named. The science of posture and training the body by means of the asanas is Hatha yoga. The earliest known written works on Hatha yoga date from the fifteenth century, but it is believed that a thousand years earlier, it was already defined and practised. The techniques of meditation of observing and making the mind still became known eventually as Raja Yoga (‘Raja’ means ‘King’). Karma yoga is the yoga of action and can be applied to the way we perform everything in our daily life. Gnana Yoga is the yoga of knowledge and of the intellect. Bhakthi yoga is the devotional path to union. The main paths of yoga, its philosophy
and its relevance to our everyday life, are described in the Bhagavad-Gita, written in the sixth century B.C.

Yoga was first summarized and systematized around the second century A.D. by a man known as Pathanjali, and his yoga sutras are still regarded as the classic work on the subject. Pathanjali discusses the nature of enlightenment, the means of attaining it, the obstacles and problems of practice and ways of overcoming them. He lists the eight ‘limbs’ of stages of yoga, an eight – fold path of yoga practice, which is still used today. The first two limbs are rules of conduct, Yama and Niyama. According to sage Pathanjali Yama comprises five prohibited forms of behaviour; violence (harming others), stealing, covetousness, dishonesty and incontinence (lack of restraint of sensual appetites). Niyama consists of five virtues which are to be cultivated; purity, austerity, contentment, study and devotion to God. Asana, Pranayama and Prathiyagara forms the next three, the last three limbs, sometimes known as samyana comprise Dharana - Concentration, Dhyana - contemplation; and Samadhi - absorption or blissful union. The eight limbs are seen both as progressive stages and as inter-related aspects of yoga practice. Yama and Niyama for the foundation of study, and posture and breath control are mastered before meditation. But the more one progresses, the more one realizes that the development of the limbs cannot be separated (Sophy Hoare, 1984).
1.8. Meaning of Yoga

Yoga : Yoga’s – citta – vṛtti - nirodah

Citta - consciousness

Vṛtti - fluctuation

Nirodha - restriction

Yoga is the restriction of the fluctuations of consciousness (George Feuerstein, 1989).

Yoga has a complete message for humanity. It has a message for the human body. It has a message for the human mind. And it has also a message for the human soul.

Yoga-sastra unmistakably recognizes the interdependence of body and mind. It prescribes exercises for both the body and mind, so that the two might develop themselves in a spirit of co-operation to such a balanced psychophysiological condition that they should cease to enslave the human soul. Yogis are convinced that thus freed from the thralldom of body and mind, the soul realizes the boundless existence of infinite bliss (Swami Kuvalayananda, 1977).

The term ‘Yoga’ is used to indicate both the ‘End’ as well as the ‘Mean’. In the sense of the ‘End’, the word ‘Yoga’ signifies ‘Integration’ at its highest level. All the means that subscribe to reach this goal also constitute yoga, in the sense of ‘yukti’ the means of technique. All the practices, whether high or low, that are calculated to help the progress of the aspirant towards
such an integration are together known by the name ‘Yoga’. Yoga is thus an integral subject, which takes into consideration men as a whole. It does not divide him into watertight compartment as body, mind and spirit etc. (S.L. Vinekar, 1971).

Through constant practice of yoga, one can overcome all difficulties and eradicate all weaknesses. Pain can be transmitted into bliss, sorrow into joy and failure into success and sickness into perfect health. Determination, patience and persistence lead us to the goal (Ananda, 1982).

1.9. The Concept of Yoga

Although the word ‘yoga’ has many connotations, etymologically it means ‘integration’. The term ‘Samatva’ of Bhagawad Gita conveys the same meaning, other terms like homeostasis, equilibrium, balance, harmonious development etcetera, more or less, suggest the same thing. The aim of yoga itself is integration of personality in its all aspects.

In order to help the development of such integration, various techniques are employed. These techniques or practices are added to the yogic literature and handed down in different traditions, they also go under the name of yoga.

1.10. The Aim of Yoga

It may be said that the goal of yoga is to bring about a complete harmony within the individual, due to the cessation of the process of desire and achievement, as a result of realization of the futility of that process. It is a state
of separation from misery and sorrow, a state of silence and peace. But it becomes almost impossible for most of us to attain such a state, because the minds of most of us are endlessly caught up in wishful thinking, seeking security, prestige, power, permanent and lasting pleasure and so on. We, thus, forever carry a burden caused by desires, cravings, hopes and despairs, greed and envy. It becomes very difficult to understand clearly how this burden and tension is essentially of our own making, because our beliefs, judgments and conclusions, hardly ever permit us to think in a free manner. We are conditioned by the beliefs that we unknowingly gather from our parents, friends, teachers, leaders and other influential members of the society. This process of conditioning has an overwhelming influence on almost every child born in society. The goal of yoga is to put an end to this conditioning, seeking and grief. An individual, then, stops looking at the problems he confronts, through what others have said, and he starts understanding any situation as it is. But all this indeed remains beyond the grasp of most of us, because we lack sensitivity and simplicity of mind. It is, therefore, that individuals who reach the goal of yoga are very rare in any society.

1.11. General Effects of Yoga

1. Relief from tension
2. Improvement of complexion
3. Normalized weight
4. A trim and firm figure
5. Cleanliness and strengthening of lungs.
6. Improved circulation
7. Recovery from chronic fatigue
8. Makes the person slim, flexible and clastic
9. Cures and helps in prevention of diseases
10. Helps in regulating the breathing mechanism and increases vital capacity.
11. Develops fitness by improving strength, endurance and flexibility.
12. It is most cost effective

1.12. Health Benefits of Yoga
1.12.1. Physiological Benefits

- Stable autonomic nervous system equilibrium, with a tendency toward parasympathetic nervous system dominance rather than the usual stress – induced sympathetic nervous system dominance.
- Pulse rate decreases.
- Respiratory rate decreases.
- Blood pressure decreases (of special significance for hypo reactors)
- Galvanic Skin Response (GSR) increases
- EEG- alpha waves increase (theta, delta and beta waves also increase during various stages of meditation)
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- Cardiovascular efficiency increases
- Respiratory efficiency increases (respiratory amplitude and smoothness increase, tidal volume increases, vital capacity increases, breath – holding time increases).
- Gastrointestinal function normalizes
- Endocrine function normalizes
- Excretory functions improve
- Musculo skeletal flexibility and joint range of motion increases
- Posture improves
- Strength and resiliency increase
- Endurance increases
- Energy level increases
- Weight normalizes
- Sleep improves
- Immunity increases
- Pain decreases

1.12.2. Psychological Benefits

- Somatic and Kinesthetic awareness increase
- Mood improves and subjective well-being increases
- Self – acceptance and Self – actualization increase
- Social adjustment increases
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- Anxiety and depression decrease
- Hostility decreases

1.12.3. Psycho Motor Benefits

- Psychomotor functions improve
- Grip strength increases
- Dexterity and fine skills improve
- Eye-hand coordination improves
- Choice reaction time improves
- Steadiness improves
- Depth perception improves
- Balance improves
- Integrated functioning of body parts improves

1.12.4. Cognitive Benefits

- Cognitive function improves
- Attention improves
- Concentration improves
- Memory improves
- Learning efficiency improves
- Symbol coding improves
- Depth perception improves
- Flicker fusion frequency improves
1.12.5. Biochemical Benefits

The biochemical profile improves, indicating an antistress and antioxidant effect, important in the prevention of degenerative diseases.

- Glucose decreases
- Sodium decreases
- Total cholesterol decreases
- Triglycerides decreases
- HDL cholesterol increases
- LDL cholesterol decreases
- VLDL cholesterol decreases
- Cholinesterase increases
- Catecholamines decrease
- ATPase increases
- Hematocrit increases
- Hemoglobin increases
- Lymphocyte count increases
- Total white blood cell count decreases
- Thyroxin increases
- Vitamin C increases
- Total serum protein increases (Dr. A.K. Uppal & Dr. G.P. Gautam, 2000).
1.13. Yoga and Physical Fitness

Physical fitness is a must for any good performance in day today life. Different activities require different type of fitness emphasizing a particular fitness factor. However, general level of physical fitness is necessary for every individual to function effectively. The law of use and disuse suggests that if you want to be fit you must exercise. The routine of exercise differs from individual according to purpose.

This can be attained excellently by indulging in Yogic routine. Yogic exercises deal with the vital organs of the body on which health depends. The precursor of physical fitness lies in the efficient working of the vital organs of the body and yoga aims at it. The various selected Asanas giving different movements to the spine, controlled respiration, relaxation technique and concentration practice as a whole form an excellent routine to take care of the health of vital organs of the body.

Yoga can contribute to the promotion of sport whether we use the term sport in a restricted sense or in a wider sense. The concept of lifetime sports suggests that exercise is for everyone including those persons who have various handicaps. From this point of view Yoga could be fittingly called life – time sports. Yoga, therefore, not only contributes to the other sports but also is a sport by itself, which is excellent in nature.
1.14. Exercise

Exercise from the practical point of view may be formulated as "any bodily exertion for the sake of keeping the organs and their functions in a healthy state" (Karambelkar, 1971).

Exercise comprises all movements designed to act on the muscles, the blood vessels, the nervous system, the skin and the abdominal organs (R. Tait, 1944).

Exercise can be classified in various ways. However, there are certain basic movement patterns in each exercise. These may be expressed in terms of tension development in the muscles. The term 'contraction' has often been used to mean tension in the muscles resulting in their shortening. The shortening of the muscle is called concentric contraction and the lengthening of the muscles as eccentric contraction. Both concentric and eccentric contractions are also known as isotonic contraction. When a muscle develops tension but the length of the muscle remains unchanged, it is called static or isometric contraction.

The various systems of gymnastic exercises developed in Europe in the nineteenth century had exercise as one of their objectives in the development of muscular strength. The experimental investigation by De Lorme (1949) demonstrated that the tension developed in the muscle is the determining factor in strength increase. Hellebrandt and Houtz (1956) experimentally demonstrated that muscular endurance was increased when repetitive exercises
were performed against heavy resistance. Today, we have a variety of exercise like Calisthenics, Gymnastics, Marching, Jogging, Dancing, Stretching exercises, Mobility exercises, Aerobics, Weight training exercises and Yogic exercises, including Asanas. For the past many years, a technique known as ballistic stretching, static stretching and Proprioceptive neuromuscular facilitation (PNF) have been advocated for the improvement of joint flexibility.

Exercise is referred to as physical activity ranging from light to fairly vigorous nature. It is as necessary for the body as music is for the soul.

Regular stimulation of the total body through vigorous exercise produces increased strength, endurance and such other characteristics associated with good health.

Exercise should become a lifetime commitment for people in all walks of life. The advocates of “Hatha Yoga” say that a purpose of exercise is to increase the circulation and have oxygen. Simple movements of the spine and various joints of the body can achieve this with deep breathing without violent movement of the muscles. Exercise is a physiological pattern, and like emotion involves a variety of bodily changes. Experts in the field of physical Education believe that regular vigorous physical activity helps to improve the strength and functioning of the heart, lungs muscles and it also appears to have much potential for adding not only more life to the years but also possibly more years to life.
1.15. Importance of Physical Exercise

Physical Exercises are essential for better living. Exercise keeps muscular tones, joints and circulation in motion. Exercise can also be used to control blood pressure. Hypertension causes an inordinate amount of pressure on the walls of the arteries. This pressure can result in the rupture of the arteries in the brain, which is called stroke. Any hypertensive individual, who exercises regularly, is able to lower his/her blood pressure thereby helping to prevent strokes, one of the leading causes of death in the world. Regular exercise helps to prevent obesity, which is related to both coronary heart disease and hypertension and helps for mental alertness. Regular exercise can be an effective way of lowering stress. It helps for emotional stability and enhances spiritual and moral development. The purpose of exercise is to increase the circulation of blood and intake of oxygen.

Exercise can be performed in many ways. Modern men and women feel that their daily work provides them with enough exercise for fitness. Running up and down stairs or standing all the day at a job seems to be physical exertion. But such activities are limited activities that neither use the lungs nor provide adequate stimulation for the heart to produce the training effect.

1.16. Exercise and Health

It has been seen that those who maintain a relatively high degree of fitness through the nature of their work or through physical activities suffer less
from degenerative diseases and probably live longer than those who follow a sedentary life.

Obesity, muscle atrophy, cardiovascular deficiency, joint stiffness, and impairment of various metabolic functions are possible effects of prolonged inactivity. Sudden cessation of work activity in older individual as sometime happens on retirement, often seems to lead to rapid physical degeneration if no substitute activity is provided. The successful use of physical activity in the medical management in patients indicates the beneficial effect of exercise in preventing or delaying organic disease and degeneration.

The benefits of exercise (Physical-Activity) are more clearly observed in their relation to certain organic disease. Regular exercise is now considered to help retard the onset of further progress of diabetes. However, exercise regardless of its nature or extent, cannot provide immunization against infections, illness, or cure for communicable diseases.

There is no longer any doubt that the level of physical activity does play a major role in weight control. Maintaining a good calorie balance between dietary intake and energy output enquires a sound approach to both food consumption and exercise (B.S. Yadav, 1986).

1.17. Physical Fitness and Exercise in Relation to Performance

Physical fitness plays a vital role in performance and an individuals physical fitness and performance depend on the co-ordinated functioning of
various factors such as physical and physiological abilities, nutrition, technique, tactics, physique, body size and body composition (P.S. Astrans, 1956).

Clarke (1986) states that the cardiovascular endurance involves the continued activity of the entire organism during which major adjustments of the circulatory and respiratory systems are necessary as in running, swimming, jumping and the like. This form of endurance depends not only upon the strength of the muscle involved in the activity but relies greatly on the effective functioning of the circulatory system.

Fitness for effective living has many interdependent components involving the intellectual, the emotional and the physical. Fitness rests upon the solid foundation of good health. Fitness for effective living implies freedom from disease enough strength, ability, endurance and skill to meet the demands of daily living and sufficient reserve to withstand stress and strains. Optimum fitness permits a person to enjoy life to the fullest. In addition to the day's routine work one should still have enough vitality to enjoy vocational intents and to meet special challenges that may interrupt the daily routine. The possession of physical strength, agility, flexibility and endurance may enable the individual or group to serve, whereas lack of fitness may spell catastrophe. Though hereditary factors play an important role in fitness, the development of physical fitness depends upon one's own potential for fitness which includes
his daily living practices, exercise, adequate nutrition, sufficient rest, relaxation etc.

The greatest effect of exercise is the improved organization of the body functions, which support activity. This improved physiological efficiency is reflected in increased endurance, strength and agility.

Clarke (1974) has reviewed reports of various studies on the development of muscular strength and power of various methods of loading that is exercises of varying intensity, duration, with or without warm up mental practice etc, and has found that exercises involving various parts of the body with different numbers of repetitions, durations and tempo had long been a popular and proven method of developing the factors of physical fitness, essential for superior level of performance in any specific athletic event.

1.18. Need for the Study

Taking into account the positive health and fitness contribution of yogic practices and physical exercises through reading literature, the researcher was interested in finding out and analyzing the effects of training through yogic practices and physical exercises on selected physical and physiological variables. Moreover yoga is considered only as a therapeutic element, which in a practical sense could usefully be adopted as a training method for fitness and health even. Hence, the researcher was motivated to take up this analysis.
1.19. Statement of the Problem

The purpose of the study is to analyze the effect of training in yogic practices and physical exercises among the residential male college students on selected physical and physiological variables.

1.20. Objective of the Study

i. To find out the effect of Yogic Practices on Speed, Agility, Flexibility, Explosive Power, Cardio Respiratory Endurance, Resting Pulse Rate, Breath Holding Time, Maximum Inspiratory Volume and peak flow rate.

ii. To find out the effect of Physical Exercises on the above Physical and Physiological Variables.

iii. To compare the training effects of Yogic Practices and Physical Exercises and find out the better group from the analysis.

1.21. Significance of the Study

The study is significant in the following ways:

(i) The study will indicate the training effects of yogic practices and physical exercises.

(ii) It will further provide which of the two training methods enhances the efficiency of the selected physical and physiological variables.

(iii) Further it may give additional information to the physical education professionals and coaches in their training plan.
(iv) The findings of this study would be helpful to sports participants to resort to yogic practices not only for its psycho-physiological benefits but also for economy in cost and time.

(v) The study will also highlight the positive fitness contribution of yoga to personal health and performance in sports.

1.22. Hypotheses

The formulated hypotheses in the present study based on the literatures related to the study are:

i. Yogic practices would develop and enhance the efficiency of certain physical and physiological variables.

ii. Physical exercises would develop and enhance the efficiency of certain physical and physiological variables.

iii. The experimental groups would be significant in the training effects more than the control group.

iv. The yogic practices group would be a significant and better group.

1.23. Limitations

The study is limited to the following aspects:

(i) The effect of unidentified and uncontrollable factors like food habits, life style and health conditions of the subjects during the training as well as testing periods that might have influenced the test items were accepted as a limitation.
The changes in climatic conditions such as temperature, atmospheric pressure, humidity etc., during the training as well as testing period could not be controlled. So, their influence on the results of the study was recognized as limitation.

Apart from the training programme the involvement of the subjects in daily routines was not taken into consideration.

No special motivational techniques were used to encourage the subjects to attain their maximum performance.

1.24. Delimitations

The study was confined to the following aspects.

i. Only male students of School of Engineering and Technology, Bharathidasan University, Tiruchirappalli, India were chosen as the subjects.

ii. The age of the subjects ranges from 17 to 22 years.

iii. The training period was limited to 12 weeks.

iv. Two experimental groups and one control group was employed in the study.

v. The study was delimited to the following physical and physiological variables.

1. Speed

2. Agility
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3. Flexibility
4. Explosive Power
5. Cardio Respiratory Endurance
6. Resting Pulse Rate
7. Breath Holding Time
8. Maximum Inspiratory Volume
9. Peak Flow Rate

1.25. Definitions and Explanation of Terms
1.25.1. Fitness

Fitness is a state, which characterizes the degree to which the person is able to function. Ability to function depends upon the physical, mental, emotional, social and spiritual components of fitness, all of which are related to each other and are mutually interdependent. This may be referred to as 'total fitness' (Reuben, 1971).

1.25.2. Yoga

Yoga : citta vrtti nirodha

citta - consciousness

vrtti - fluctuation

nirodha - restrictions

Yoga is the restriction of the fluctuations of consciousness (George Feuerstein, 1989).
1.25.3. Asanas

Asana - sthira sukha asana
sthira - steady
sukha - joy
asana - posture (George Feuerstein, 1989).

1.25.4. Pranayama

Pranayama is an exercise that prolongs life. The word Pranayama is derived from the Sanskrit root called ‘Prana’ and ‘Ayama’. The syllable Prana denotes the air that leaves from the body. Ayama has two meanings.
i) to elongate
ii) to withhold (Dr. K. Chandrasekaran, 1999)

1.25.5. Meditation

Overcoming the fluctuations is meditation (George Feuerstein, 1989).

1.25.6. Exercise

Any and all activity involving generation of force by the activated muscle(s).

1.25.7. Physical Exercise

Physical Exercises improve the circulation of voluntary system, thereby resulting in better muscle development as a result of improved function of the muscles.
1.25.8. Speed

Speed may be defined as the capacity of individual to perform successive movements of the same pattern at a faster rate (Charles A. Buker, 1960).

1.25.9. Agility

Agility is the ability to change direction of the body and its parts rapidly (Clayane R. Jenson, 1972).

1.25.10. Flexibility

‘Flexibility is the range of motion available in a joint’ (Charles B. Corbin, 1985).

‘The ability to move a joint through its full range of motion is defined as flexibility’ (A. Gosh, 1980).

1.25.11. Explosive Power

It is the ability to release maximum muscle force in the shortest time as in executing a standing broad jump (Ted A. Baugartner, 1987).

1.25.12. Cardio Respiratory Endurance

Cardio Respiratory endurance has been defined as the ability of the lungs and heart to take in and transport adequate amount of oxygen to the working muscles allowing large muscles to sustain over long periods of time. It has an additional implication as to recover from severe exercise (Mathew and Pox, 1976).
1.25.13. Resting Pulse Rate

Measurement of heart rate when an organism is under physical and mental rest can be termed as resting pulse rate (Morehouse and Miller, 1976).

1.25.14. Breath Holding Time

‘Breath holding time has been defined as an individual’s ability to hold the breath (a voluntary forced maximal inhalation) without inhaling or exhaling during the period of holding the breath’ (Morehouse and Miller, 1976).

1.25.15. Maximum Inspiratory Volume

Inspiratory volume can be defined as ‘maximum volume of air inspired from resting expiratory level.

Inspiratory volume is the volume of the gas which can be breathed in a full inspiration, staring from the resting inspiratory position, it is equal to the sum of tidal volume and inspiratory reserve volume or total lung capacity-functional residual capacity. (http://members.lycos.co.uk/alisonGaunt/medI.htm)

1.25.16. Peak Flow Rate

The peak flow rate measures how fast a person can exhale air. (http://www.accessatlanta.com/shared/health/adanency/article/3443.html)
### 1.26. Operational Terms

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