Chapter-1

INTRODUCTION

Stand up, be bold, be strong.

Take the whole responsibility

on your own shoulders,

and know that

you are the creator

of your own destiny.

All the strength and succor

you want is within yourselves.

Therefore make your own future.\textsuperscript{1}

- Swami Vivekananda

We never appreciate health so much as when we lose it. Although it is very herculean task to change the health habits of the people, educational institutions should educate young people about their health and fitness. This is not only essential from the individual’s point of view but also in view of this country’s national posture.\textsuperscript{2}

\textsuperscript{1} Swami Lokeswarananda, \textit{“Great sayings”} (Kolkata: The Ramakrishna Mission Institute of Culture, 1989), p. 52.
\textsuperscript{2} Charles A. Bucher, \textit{“Foundation of Physical Education”} 8\textsuperscript{th} ed. (St. Louis: The C. V Mosby Company, 1979), p. 244.
Changing pattern of social life influences on physical and mental health of people. In present era the technological advancement and sophistication have completely changed our social scene and family life from what it used to be a hundred years ago.

Manual labour has been replaced by machine labour at home and in the job situations. Recreation through folk dances, song and festivals has been replaced by monotonous T.V. shows and cinema. Food habits have changed to match new life-style and consequently agricultural practices have changed too to meet the need. All these changes including overcrowding in social scene have led to new situations responsible for accidents, occupational hazards, sexually transmitted diseases, stress disorders like blood pressure, heart problems, and mental problems involving delinquent behavior such as misuse of drugs, alcohol and tobacco, crime and suicides, etc.

Modern life, as characterized by sedentarianism, automation and computerisation has created a new class of human beings who just sit for hours each day. The 21st century is an age of space and technological gigantism, charged by speed, noise and other tension producing factors. The stress created by the demands of our social and economical systems, and our devotion to intellectualism is tremendous.
Urban life style has caused many tensions and it will grow worst for mankind.\(^3\)

Today life style such as cigarette smoking, habitual hostility, suspiciousness towards others, diets high in fat and low in fibered and sedentary jobs lead to many psychological and psychosomatic problems. Stress and anxiety have become major killers in our developed world, particularly the youth, the college going students health is reported the increase in student-stress nationwide. Good mental health is one of the greatest resources for vitality, creativity and wealth, while poor health is contrasted significantly drains of the aforementioned. When the stress is perceived negatively or becomes excessive.

Thus in the universe man is facing, as never before, the crisis of existence and adjustment. To survive and overcome this present crisis, the need of the hour is to groom up a courageous, bold, physically, mentally, emotionally, socially and intellectually strong individual. Physical education is the agency which is fulfilling this social

obligation very effectively by providing comprehensive and diverse physical education programme.⁴

Physical education is basically concerned with the human movement, which is imparted through the 'physical'. It is human body, which has stood the catastrophic changes of the environment and it is imperative that it should be trained in such a way as to cope up with the still changing environment biologically.⁵

Man is a biological entity and in hierarchy of biological evolution, he stands at the zenith. Thus science has revealed to us an irrefutable fact that the man has travelled from the primitive type of existence to the present highly complex life.⁶

The human body is intricately engineered and fantastically coordination. At this very movement, inside the person millions of chemical reactions are occurring, brain single are flying along nerve pathways, muscles are contracting and relaxing to maintain one posture against gravity, food is being digested and converted to energy, and all

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⁴ M. L. Kamlesh and M. S. Sangral, “Principal and History of Physical Education” (Ludhiana: Prakash brothers, 1981). p.52
⁵ Ibid., p.52
⁶ Ibid.
these thing and many more are happening simultaneously, routinely, and without conscious thought.

Biology has revealed to us quite clearly as to what changes took place in human physique in the long span of biological evolution. The changing environment on the earth forced that changes in human body structures, which subsequently brought innumerable changes in his mode of walking, running, climbing, hitting, leaping, bouncing, thinking, and understanding his environment. The evolution has not come to an end and it is gradually and imperceptibly going on. Perhaps none can predict what shall be the final outcome to such an unceasing process not only on the surface of the earth but also in human body as well as mind.\(^7\)

A human organism is a combination of body and mind. It is not merely a total of nerves, bones, blood etc. it has an internal aspect also i.e. mind, the power to think, sift, analyse and act with his organs accordingly. The whole texture of mind and body is very beautifully woven. The behaviour of an individual has two aspects-one internal (the mental) and the other external, (the bodily).\(^8\)

\(^7\) Ibid., p.38  
\(^8\) Ibid., p. 65
The physical activities affect the mind as well as mental behaviour and vice-versa. This inter-relationship between mind and body is known as psycho-physical unity or unity of man. It has been substrated on the bases of psycho-physical research that mind has no existence away from the body. On the other hand the physical parts of the body move and control on the behests of mind. Body, mind and soul make the 'whole man', where along with physical, physiological, psychological, biological factors, stress and anxiety plays very important role.

Stress, either quick or constant, can induce risky body-mind disorders. Immediate disorders such as dizzy spells, anxiety attacks, tension, sleeplessness, nervousness and muscle cramps can all result in chronic health problems. They may also affect our immune, cardiovascular and nervous systems and lead individuals to habitual addictions, which are inter-linked with stress.

The "stress reactions", "relaxation responses" and stress management techniques are some of the body’s important built-in response systems. As a relaxation response the body tries to get back balance in its homeostasis. Some hormones released during the 'fight or flight' situation prompt the body to replace the lost carbohydrates
and fats, and restore the energy level. The knotted nerves, tightened muscles and an exhausted mind crave for looseness. Unfortunately, today, we don’t get relaxing and soothing situations without asking. To be relaxed we have to strive to create such situations.

Stress occurs when there is a substantial imbalance between the physical and psychological demands placed on an individual and that person’s response capability and under conditions in which failure to meet the demand has important consequences. People who are easily irritated are more likely to develop cardiovascular, digestive and respiratory ailments. When we are angry or stressed we may restrict the flow of blood to the heart muscles, which can cause angina pectoris. Similarly, if we suffer from tension in the abdomen, the blood supply to the stomach is restricted and can lead to excess gastric acid and peptic ulcers.

Stress affects many components of the neuroendocrine system of hormones and nerves. As a result, secondary changes take place in the activity and function of most of the body’s organs.

Further the term personality refers to a peculiar blend of characteristics that make a person unique. We usually think of
personality as being made up of certain traits. These traits are outward
signs or dynamic forces that act and interact in an infinite number of
ways. It is not a mere collection of various traits, but a particular
organisation of the same. That is why the integration of these traits, or
personality, is never the same in any two individuals. Personality is
unique. ⁹

Personality is a product of biological and cultural heritage. A
child is born with some biological heritage, while the cultural
environment moulds and shapes his personality. Personality is in fact a
product of the interaction of a biological organism with the social
environment. In other words, personality helps an individual to adjust
with his external environment, it is the way of responding to the
environment. Therefore, the key to personality development is
socialization where biology and culture merge.

The human personality is a marvellously intricate structure,
delicately woven of motives, emotions, habits, and thoughts into a
pattern that balances, however precariously, the pulls and pushes of
the world outside. Personality is the total sum of his ‘being’ and
includes physical, mental, social, emotional, and intellectual aspects.

One’s personality reflects his perception, imagination, attitude, instincts, habits, values, interests, and sentiments about himself and his self-worth. Intelligence, achievement, motivation, modes of adjustment... all these and much more constitute human personality.

These problems are mainly due to ever growing demand for this materialistic world. Whatever these problems may be related to, but these problems, no doubt, are leaving bad affect on mind and body and over the personality of an individual.

Now a days, there is a growing emphasis on looking good, feeling good and living longer. Increasingly, scientific evidence tells us that one of the keys to achieving these ideals is fitness. Getting fitness is a challenge because today physical activity is a small part of our daily lives. There are fewer jobs that require physical exertion. We have become a mechanically mobile society, relying on machines rather than muscles to get around; as a result we welcome different life taking diseases.\(^{10}\)

Since many youths and adults do not able to understand and appreciate the importance of health and fitness, a tremendous responsibility rests on the shoulders of educators. Education for fitness

\(^{10}\) Singh et al, "Essentials of physical Education," p.275.
is essential if a nation wants to keep her citizen physically, mentally, spiritually, emotionally and socially fit.\textsuperscript{11}

Education assumes great importance in helping out the man in the ever increasing demands and challenges which he is facing. Education must deal with these changes which our complex life style imposes; by developing programmes which can provide some safe guards from an over exposure to the complexities, stress and pressures that man is facing in this technological age. To build up a new generation committed to the process of modernization, an appropriate training and motivation, that arouses, sustains and promotes interest in the change and the growth processes is inevitable.\textsuperscript{12}

Though education is only mean to bring about positive changes in lifestyle, the education for fitness needs to srart with young children to college students to make them aware of their bodies and values of physical fitness to their emotional and physical well-being. In addition, public communication through literature, television and radio should endeavor to educate adults, so that they may take positive steps in improving their physical fitness.\textsuperscript{13}

\textsuperscript{11} Singh et al, "Essentials of physical Education," p. 242
\textsuperscript{12} Ibid., p.9.
\textsuperscript{13} Bucher, "Foundation of Physical Education," pp.265.
One of the greatest deterrents to physical fitness is the general life style of our modern age. Many people are eating junk food and drinking and smoking excessively. In many cases excessive affluence is detrimental to physical fitness which directly affects diet and promotes a sedentary life.\(^{14}\)

Changes and challenges are the twin laws of nature and they affect every aspect of human life. Changes are taking place all around us and because of these changes new challenges present themselves. Man is constantly trying to meet these challenges and excel his previous performance every time.\(^{15}\)

Motor learning has been recognized as an essential for all children and important to their emotional and social life. It helps the individual to become independent. It plays a part in one's intellectual development. Through motor skills the child acquires concepts of size and balance. From an emotional standpoint, motor skills help children to solve problems that would otherwise enrage and stump them.

\(^{14}\) Kamlesh and Sangral, "Principal and History of Physical Education," p. 52.
\(^{15}\) M.S. Panner, "Course in Physical Fitness Journal of Physical Education and Recreation" (Convention show Issue, 1981), p. 3.
Vigorous activity is basically meant for increasing the efficiency of the body and human beings need to be fit and efficient throughout their lives.

The cell is considered to be the basic unit of organism; it is the set of life; it is the basis of life as well. It, like other organism, breathes, eats and eliminates waste products. When cells gain strength and power, we say, they have become efficient. The efficiency of the cell can only increase when it gets abundant supply of oxygen and food. This supply is made available to the cell by the ‘transpiration system’ (circulatory system). The central organ involved in blood supply is heart, which is made of a special muscle. During exercise there is more demand for oxygen and food by the cells. In fact, the cells are the storerooms for energy. Thus the circulatory and the respiratory systems are brought into full operation. The law of use and disuse indicates that the organs can only develop efficiency when a greater demand is made on them. Only then, they will make supreme effort. Thus the heart and the blood vessels become capable of doing more work. The stroke volume of the heart is increased, while the rate of beating slows down so that the trained heart has more rest than the untrained one. In the same way, the respiratory system adopts itself to
the situations making greater demand of oxygen on it. Regular training
could also lessen the physical stresses of daily life through an increase
in the reserves of strength and power and a diminution in the dead
weight fat.\textsuperscript{16}

Some people would believe that all exercises make you sweaty,
mess up your hair, take time out of your day, and produce a pile of
dirty laundry. These people are making excuses for not being active,
and many have not ever stayed with a programme long enough to
experience the benefits.\textsuperscript{17}

The famous Darwin’s statement of survival of the fittest
highlights the need and importance of fitness to survive actively and to
enjoy the life.

If an individual has to keep himself ‘fit’ and healthy, it is
necessary that he must do some activities daily. No research in
physiology has been able to make it clear as to how much amount of
vigorous physical exercise does a man need daily. However, it will be
absurd also to reduce the period of activity to some numerical hours.
The type of activity changes from person to person, age to age and its

\textsuperscript{16} Bucher, \textit{"Foundation of Physical Education,"} p. 250.
\textsuperscript{17} Jan Galen Bishop, \textit{"Fitness through Aerobics"} (Boston: A Viacom Company, 1999), p.3.
need from person to person. For example, in childhood, free play is the best medium of child development. Since children have no other serious business in life, they should be given maximum opportunity of utilizing these play periods through planned experiences in activity pursuits, which are mainly based on the development of child is as vigorous as other games and sports. In the youth period, planned vigorous activity is essential for building up vigor and complete fitness. Here again, the activity plan will differ from person to person depending upon his occupation, his need for exercise and availability of time and good diet.\(^\text{18}\)

The development and maintenance of physical fitness can be brought about through a variety of exercise programmes of which a person may adopt any one or more, depending upon the purpose, need, time and the facilities available.

Physical training is the key for improving physical performance. The personality of a person has several dimensions, e.g., physiological, psychological and physical. These several dimensions can be improved through physical training.

\(^{18}\) Kamlesh and Sangral, "Principal and History of Physical Education," p. 219.
Apart from the various forms of orthodox physical training methods namely, interval training, circuit training, fertlek training, etc, the hatha yoga, aerobic dance, combination of hatha yoga and aerobic dance, calisthenics and light apparatus drills etc. also are assumed as the effective measures to develop physical fitness in the present era.

The veracity of modern medical science is based on controlled clinical trials. Seeking and establishing the same in a scientifically unknown area is indeed a challenging responsibility. Adopting a new system in life is very difficult. Indians had adopted Yoga as a life-style since the beginning of civilization. The practice of Yoga become less popular during middle ages but the present Yoga revolution is like reviving the past, as millions of people are again practicing and getting its benefits. Yoga is indeed an easy, simple and most effective method of meeting one's material as well as spiritual objectives. It arouses the dormant inner vision within us. 19

Mind is the king of the senses. One who has conquered his mind, senses, passions, through and reason, is a king among men. That man

is fit for hatha yoga, the royal union with the universal spirit. One who has conquered his mind has complete mastery of his self.\textsuperscript{20}

The scientific nature of the Yogic practice was first revealed when Late Swami Kuvalyanandaji started his scientific research in the field of Yoga in 1924. These research findings could remove several misconceptions about yoga and removed the mystical sheath over it. He showed that a logical and scientific explanation could be possible for traditionally described technique of various practices.\textsuperscript{21}

Only a yogi can control his mind, intellect and self, being absorbed in the spirit within him, as a lamp does not flicker in a place where there is no winds blow. The yogi by the grace of the spirit within himself finds fulfillment, when the restlessness of the mind, intellect and self is stilled through the practice of yoga. Then he feels the joy eternal which is beyond the pale of senses. He, who has achieved it, shall not be moved by the greatest sorrow. So we can say the real meaning of yoga is deliverance from contact with pain and sorrow.\textsuperscript{22}

\textsuperscript{20} Singh et al., \textit{"Essentials of physical Education,"} p.516.
\textsuperscript{22} A. Kumar, \textit{"Yoga for Healthy Body"} (New Delhi: Khel Sahitya Kendra), p.516.
Anger is a modification of desire in the mind. There is no modification in the Self the real “I” or Atman. A worldly man identifies himself with anger and so he becomes miserable. The body and the mind are mans instruments for growth and evolution. Identify himself with the big, infinite “I” by utilizing these two instruments your mind and body and become an understand the trick of this mischievous mind. It has played with man long master of these two. Man is the driver of this engine- body and mind. Attain complete mastery over it. Man can do this easily by the practice of yoga.23

After the first yoga class, people often report that they’ve slept better and feel taller. Yoga has helped people to lose weight, overcome fears, conquer habits like smoking, and develop better concentration, all of which help their performance in their daily tasks. Others feel improved Self-awareness, a deeper sense of well-being, developed compassion, enhanced relationship, greater self-acceptance, and a sensation of being at peace.24

The origins of hatha yoga have been traced back to the eleventh century A.D. The Sanskrit word ha means "sun" and tha means "moon" and thus hatha, or literally sun-moon yoga, strives to balance

23 Ibid., p.36.
opposing parts of the physical body, the front and back, left and right, top and bottom. Some yoga masters (yogis) claim that hatha yoga was originally developed by enlightened teachers to help people survive during the Age of Kali, or the spiritual dark ages, in which Hindus believe we are now living.\textsuperscript{25}

Hatha yoga consists of eight limbs of practices. They are not steps to be worked on one by one, but branches that can be explored many at a time.\textsuperscript{26}

As it has subsequently developed, hatha yoga has concentrated mainly on two of the eight paths, breathing and posture. Yogis believe breathing to be the most important metabolic function; we breathe roughly 23,000 times per day and use about 4,500 gallons of air, which increases during exercise. Thus, breathing is extremely important to health, and \textit{prana}, or life-force, is found most abundantly in the air and in the breath. If we are breathing incorrectly, we are hampering our potential for optimal health. \textit{Pranayama}, literally the "science of

\textsuperscript{25} Singh et al., "\textit{Essentials of physical Education}," p.275.
\textsuperscript{26} Kumar, "\textit{Yoga for Healthy Body}," p. 194
"breathing" or "control of life force," is the yogic practice of breathing correctly and deeply.\(^\text{27}\)

In addition to breathing, hatha yoga utilizes asana, or physical postures, to bring about flexibility, balance and strength in the body. Each of these postures has a definite form and precise steps for achieving the desired position and for exiting it. These yogis have scientifically developed to increase circulation and health in all parts of the body, from the muscular tissues to the glands and internal organs. Yogis claim that although hatha yoga can make the body as strong and fit as any exercise program, its real benefits come out because it is a system of maintenance and balance for the whole body.

Excepting yogic activities in modern time the aerobic dance is also becoming a popular and rewarding area of specialization for physical educators who wish to render a service by helping young person's to understand their bodies better and to express themselves through rhythmical activity. Aerobic exercise makes the muscle work hard enough to need lots of oxygen but not so hard as to exceed the ability of heart and blood to deliver it. It is the most efficient way to

remove the marbling fat, which in turn is the most efficient way to
declare our metabolism so one won’t get fat any more.28

Each of the systems in our body (cardiovascular, muscular,
respiratory and other) is influenced by exercise. Each system is
affected in a manner specific to the kind of exercise performed.
Aerobic exercise emphasizes improvement of the metabolic,
cardiovascular, respiratory, and muscular systems.

Aerobic fitness is a complex component of physical fitness. It
involves the interaction of numerous physiological processes in the
cardiovascular, respiratory, and muscular system, including the
capacity of the lungs to take up oxygen, the capacity of the blood in the
lungs to pick up oxygen, the capacity of the heart to pump this
oxygenated blood to the muscle tissues, and the capacity of the tissues
to extract the oxygen from the blood and use it to generate energy in
the form of ATP via the oxygen system. Thus, the combined
cardiovascular and respiratory system is the oxygen supply mechanism
for the muscles. As the energy demands increases in the muscles, so do
the demands on the cardiovascular and respiratory system.29

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29 Williams H. Melvin, “Lifetime Fitness and Wellness” (London: The Bantam
There are really two aerobic looks. One is toned, trim, and healthy. The other is stylish, fun and faddish. The second demands more immediacy.

Aerobic exercises have created a whole new fashion market. Today you can sweat in everything from classic grays to a form-fitting united.\(^3\)

Each aerobic training session should include a warm up session, aerobic training or exercise and a cool down period. Warm up gradually prepares the body for vigorous exercise. Without proper warm up, any resting heart, if instantaneously stressed, may show signs of insufficient blood supply. The warm up routine should be focused on easy and slow stretching exercise rather than strengthening or conditioning exercises, so that one does not begin the aerobic exercise with an oxygen debt. More over stretching helps to prevent injuries and other musculoskeletal problems. Then the tempo of exercise should be gradually increased in the exercise session to adjust the body to higher intensity effort. The warm up session is recommended as in between 5-20 minutes. And the aerobic exercises session should be at least 15-20 minutes continuously. A gradual five minutes cool down period not

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\(^3\) Jan Galen Bishop, "Fitness through Aerobics" (Buyeer: Linda Aox, 1999), p. 21.
only helps to avoid nausea and cramps; it is also an essential step in exercise routine to avoid more serious problems.31

If we are committed aerobic exercise in combination with a sensible diet it can help to provide an overall sense of well-being and it can even help to prevent chronic illness, disability and premature death. There are also many benefits of aerobic training like performance enhancement. Body composition changes, body heat transfer system improvement, personality development, avoid stress and anxiety etc.

Aerobics and dance play a very important role in physical education. They give an all round development and elasticity in muscle and enable one to show various movements with great co-ordination so as to switch off from one activity to another without any difficulty.32

Thereby a humble attempt was taken in this study to investigate the effect of Hatha yoga, Aerobic training and further more the combination of hatha yoga and aerobic training on selected Physiological, Psychological variables and Physical fitness of college level male students.

Statement of the problem

The main purpose of the study was to investigate the comparative effects of Hatha yoga, Aerobic training and combination of Hatha yoga and Aerobic training on selected physiological variables (Resting breathing frequency, Resting heart rate, Resting systolic blood pressure, Resting diastolic blood pressure and Vital capacity) and psychological variables (Stress, Anxiety and Personality) and physical fitness of the college male students.

Delimitations

The study was delimited to the following respects.

1. The samples under the present study were confined to (one hundred) nonresidential male college students of Aghorekamani Prakashchandra Mahavidyalaya, Subhasnagar, and Bengai. Dist-Hooghly. (W.B). India.

2. The study was further delimited to the ten weeks Hatha yoga training Aerobic training and combination of Hatha yoga and Aerobic training only.

3. The study was restricted to the selected Physiological variables, Psychological variables and Physical Fitness stated on the next page.
**Physiological variables**

1. Resting Breathing frequency
2. Resting heart rate
3. Resting Blood pressure
   a) Resting Systolic Blood pressure
   b) Resting Diastolic Blood pressure

**Psychological variables**

1. Stress
2. Anxiety
3. Personality.

**Physical Fitness**

1. American alliance for Health, Physical Education, Recreation and Dance (AAHPERD) Youth fitness test.

**Limitations**

1. As the subjects selected for this study were not the residents of a residential hostel or camp, the factors like diet, life style, and daily routine were not totally controlled.
2. Owing to the involvement of different technical persons in exercising training programme on different experimental groups, the pattern of handling training load, training processes and the
measurements taken are likely to be vitiated by approximation due to human perception and handling.

**Hypothesis**

It is hypothesized that the effect of ten weeks’ hatha yoga training, aerobic training and combination of hatha yoga and aerobic training programmes would not show significant differences on any of the physiological variables (resting breathing frequency, resting heart rate, resting blood pressure, resting diastolic blood pressure and vital capacity), psychological variables (stress, anxiety and any of the sixteen personality factor) and physical fitness undertaken in this study among three experimental groups and one control group of selected college male students in pre, post and adjusted post test phases.

**Definition and Explanation of Terms**

**HATHA YOGA**

According to Sanskrit texts, ‘Ha’ means ‘sun’ ‘tha’ means ‘moon’ and the word ‘yoga’ ‘to link’ join or Unite.\(^{33}\)

It is said that the sun controls the breath flowing through the right nostril, while the flow through the left nostril is controlled by the

\(^{33}\) Singh et al, "Essentials of physical Education," p.519.
moon. Yoga, used in this context, means the union of the two breaths the basis of the whole body system.\textsuperscript{34}

The following yogic activities were selected for this study.


4. Mudra: - Maha Mudra

5. “OM” kar recitation, b. Maha Bandh

6. Meditation

\textit{Asana}

Asana are not movements, but postures to be developed and held; most of them are relaxing rather than demanding effort; refreshing rather than causing fatigue. They are non-competitive, they require no special equipment or clothing, and they can be performed by men and women and person in all age group.\textsuperscript{35}

\textsuperscript{34} Kumar, \textit{“Yoga for Healthy Body,”} p. 194.

\textsuperscript{35} James Hewitt, \textit{“The Complete Yoga Book”} (London: Rider and company, 1985).P.20
Kriya

It is a special type of yogic practice call as the cleansing process. In the study the kapalabhati ‘kriya’ has been taken into consideration. Here the ‘kapala’ means forehead and ‘bhati’ means strokes. So kapalabhati is such a practice where special type of strokes should be felt at forehead level with the manipulation of lungs.

Pranayama

“Prana” is a Sanskrit word which means “vital force”. It also signifies ‘life’ or breath. ‘Ayana’ means the control of the Prana so pranayama means the control of the vital force (Prana) by concentration and regulated breathing.36

So pranayama is the cessation or cutting of inspiratory and expiratory phase of breathing, thus technically speaking the holding of breath is pranayama.

Mudra

A mudra is a kind of bandha. It involves the contraction of certain muscles to unlock the pranic vital energies so it can be directed upward.37

36 Singh et al, “Essentials of Physical Education,” p.536
Meditation

Meditation involves a whole peculiar and special process of absorption in which the individual turns his attention or awareness to dwell upon a single object, sound, concept or experience.\textsuperscript{38}

AEROBIC

Aerobic is a (continuous, rhythmic activities using large-muscle groups) use carbohydrate and fat for fuel.\textsuperscript{39}

Aerobic exercises use carbohydrate and fat for fuel. Aerobic dependent on the presence of oxygen. Aerobic system the supplies energy to cells through the breakdown of glucose, glycogen, fats, and amino acids In various components.

Physiological Variables

Physiology deals with the phenomenon of life and methods of evaluation of functions in the living organism. It is a tripod-science consisting of Mathematics, Physics and Chemistry together with a

\textsuperscript{38} M.L.Gharote, "Guidelines for Yogic practices" (Lovana: Medha publication, 1982).P.15.
\textsuperscript{39} Jan Galen Bishop,"Fitness through Aerobes" (Boston: A Viacon Company, 1999), p.11.
broad tested knowledge in Anatomy, both macroscopic and microscopic.\(^{40}\)

The following physiological variables were undertaken for this study.

1. Resting breathing frequency
2. Resting heart rate
3. Resting blood pressure
   a. Resting systolic blood pressure
   b. Resting diastolic blood pressure
4. Vital capacity

**Resting breathing frequency**

Resting breathing frequency is the number of breaths per minutes.\(^{41}\)

**Resting Heart rate**

The distention of the arterial walls at the beginning of systolic ejection of blood is not confined to aorta but travels down the arteries as a wave followed by a wave of recall. The arteries that life close to the body such as the radial artery of the wrist, the arrival of the wave of


\(^{41}\) Ibid., p. 347.
distance and subsequent record may be felt as a distance throb the pulse which offers a convenient method of counting the resting heart rate.\textsuperscript{42}

**Resting blood Pressure**

Resting blood pressure is the pressure exerted on the wall of the arteries as the heart pump the blood through the body.\textsuperscript{43}

Under resting blood pressure resting systolic and resting diastolic blood pressure were studied.

**Resting Systolic Blood Pressure**

The pressure in arteries rises steadily distancing the arterial walls, until the increased velocity of flow through the arterioles in great enough to balance the inflow into the arterial. The maximum level of arterial blood pressure is called the systolic pressure.\textsuperscript{44}

**Resting Diastolic Blood Pressure**

The fall in arterial pressure as forces of the recoil is gradually spent continuous until it is checked by the next systolic ejection of

\textsuperscript{42} Morehouse and Miller, *Physiology of Exercise* (St. Louis: Questia Media America, 1953), p. 6.
\textsuperscript{44} Ibid., p. 68
blood. The lowest level reached by the arterial pressure in this decline is referred to as the diastolic pressure.\textsuperscript{45}

**Vital Capacity**

Vital Capacity is defined as the largest volume of air that can be exhaled after deepest possible inhalation.\textsuperscript{46}

**Psychological Variables**

Psychology is the study of the human behavior and human relationship.\textsuperscript{47}

Sports psychology is an area which attempts to apply psychological facts and principles to learning performance and associated human behavior in whole field of sports.\textsuperscript{48}

Psychological variables are the variables which are related to the human mind. The study was restricted to the following selected psychological variables.

1. Stress
2. Anxiety
3. Personality

\textsuperscript{45} Ibid.
\textsuperscript{48} Ibid.
Stress

Stress is defined as "a substantial imbalance between demand (physical and/or psychological) and response capability, under conditions where failure to meet that demand has important consequences". 49

Anxiety

Anxiety is a negative emotional state with feeling of nervousness worry and apprehension associated with activation (or) arousal of the body. 50

Personality

Personality is a dynamic organization within the individual of those psychological systems that determine his unique adjustment to the environment. 51

Personality is the sum of those characteristics that make a person unique. 52

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50 Ibid., p.81.
51 Ibid., p. 28
52 Ibid.
Physical fitness

"Physical fitness is defined as the ability to carry out daily tasks with vigour or alertness, without undue fatigue and with an ample energy to enjoy leisure time pursuits and meet emergencies". 53

AAHPERD youth fitness test was adopted to study physical fitness ability.

Significance of the Study

It is in common view that lacks of physical fitness, various types of tensions, stress, anxiety and physiological ailments leads to poor personality and life style. The youths of our country are more or less suffering in these regards, and the same may be identified as incoming dangers of our society.

To get rid of such dangers, the philosophers, physical education teachers, scientists etc. are in search of some effective solutions in respect to the development of total fitness through various forms of physical training technique and thus an attempt was being undertaken in this study to investigate the influence and the significance of aerobic training, hatha yoga and the combination of hatha yoga and aerobic

training for the development of active life through the improvement or upliftment of health related physiological (heart rate, breathing frequency, blood pressure and vital capacity etc.), psychological variables (stress, anxiety and personality) and physical fitness of college male students.

Therefore, the result of the study may assist physical education teachers, coaches, scientists, sociologists, etc. to learn the effect of aerobic training, hatha yoga and the combination of hatha yoga and aerobic training, on health oriented physiological and psychological variables and physical fitness which are assumed to be very much essential to lead active life style and to enjoy pursuit of life.

Furthermore this study also highlights the degree of effectiveness of aerobic training, hatha yoga training and combination of hatha yoga and aerobic training undertaken in this study in respect to the betterment of the selected physiological and psychological variables and the development of physical and motor fitness ability for all-round development of wholesome personality of the individual.