

# CHAPTER - I

## INTRODUCTION

In this chapter, the introduction is presented in to two ways. The first part is related to health related physical fitness exercises and the second one is to therapeutic massage interventions. Within this understanding, the introduction of the study is set up as follows.

### 1.1. Background of the Study

The history of human being is witness to the fact that as long as man was busy in his day to day routine work in the absence of modern means of life. The development in the field of technology has provided by the numerous comforts to the modern man as compared to the ancient one. There is an increased efficiency in the work and also increase in leisure hours, remarkable increase in the production in the industrial as well as farming output, drastic changes in the communication system have been taken place, much improved transport system is available, unbelievable progress and development in the war gadgets, the advancement in the field of medicine and surgery have made possible for the nations to fight with dangerous diseases causing prolongevity in life and reducing death rate etc..On the other hand all these advancements have made the man most inactive and lethargic, creating problem of obesity and overweight, decrease in immunity, life relying on drugs and so on. The problem of obesity and overweight alone is the root cause of many physical problems of human beings. However ,the problem of obesity/overweight is not the result of only one specific factor, there are many contributing factors for example physical activity, comfortable lifestyle, dietary habits, genetics, social and psychological attitudes towards life and so on. In a nutshell, all these factors have contributed a lot to make man physically weak and responsible to attract diseases.

The course of life in terms of physical activity is affected by aging along with sociological constraints. If an active life style is to be continued in the later years, and a relatively high level of physical and physiological functioning is

retained as compared to the physically inactive, one has to do some physical activity .As a result of physical activity one can be engaged in vigorous activities safely and successfully. Apart from the positive effects of physical exercise in maintaining physiological functions, it now appears that physical activity is a protective measure against the dangers of coronary heart disease, although the precise mechanism for protection remains unknown. More specifically, the chances of death from heart attack, cardiac arrest and blockage of arteries are much less in physically active persons than sedentary ones. In case it happens with physically active persons, then the recovery process is very fast as compared to physically inactive one.

The scientists in the field of medicine and surgery and experts in the field of physical fitness and sports training strongly recommend regular participation in the vigorous physical activity program to keep away aging, obesity and overweight.

However, while formulating such a program the back ground and present activity routine along with a careful evaluation of the person's adoptability to a standard physical activity work must be known.

Man has made tremendous progress in almost every walk of life. Modern scientists and researchers have absolutely changed the life style. However, pollution of air; water, body and mind are also the results of science. Longing for material wealth has hardened the hearts of human beings .Human values are declining. Stress and strain are the cause of physical and as well as mental distraction.

### **1.1. 2. Education**

Man is a social animal and primary distinct from other animals is his ability to learn. He has been endowed with intelligence which enables him to modify his animal tendencies in accordance with the demands of the environment and the society. It is however, the education which enhances his intelligence and capabilities so as to ensure proper progress in life. Education is a process which enables a man to acquire knowledge through conductive attitude, which is essential for being a human being.

According to Prof. Drever “Education is a process in which and by which knowledge, character and behavior of the young are shaped and molded”. It is a constructive process leading to enlightenment and development of all the aspects of individual’s personality i.e. physical, mental, emotional, social, intellectual and spiritual. To sum up, education leads to his integrated, balanced and all-round development, making him civilized, mature and responsible member of the society possessing dynamic personality.

For a primitive man, food, shelter and clothing were his primary needs. These needs, however, increased with the progress of the society and among others education, health; recreation, etc. come to be added in his growing list. These human needs can be classified into biological, sociological, and psychological aspects of life.

Man has made a great progress in fulfillment of all these needs and education has played a great role in this ever continuing process of evolution of man from being primitive to the present, cultured and civilized human being. Education, into words of P.C.Benerji, “is the development of the power of adaptation to an ever changing social environment.” Education develops the overall personality of an individual and is then essential for the growth and development of the society as well.

It is generally assumed that education is mere transmission of knowledge.

However, education can never be measured in terms of transmitted knowledge alone because it is the behavior of the person that makes the real difference. Education, therefore, besides transmitting knowledge must also influence the behavior, as the ultimate test is not the knowledge alone but life performance. As stated by Kant, “Education is the development in the individual of all the perfection of which he is capable”.

### **1.1.3. Physical Education**

Evolution of human life started with the movement .Human beings have been very active and creative by nature and physical activity has been part of their life all along since evolution. For primitive man, search for food and shelter was the first activity. This first physical activity was necessitated by his instinct

for survival. Physical activity was also the first mode of communication; it was also a means of expression. As human beings evolved culturally, emotionally, and socially, physical activity also evolved. As the society became more and more complex leading towards the modern age, physical activity came to be recognized as an organized and supervised form of education, and was termed as physical education.

The importance of physical education and activity was recognized by Plato when he said, "Lack of activity destroys the good conditions of every human being, while movement and methodical physical exercise save it and preserve it". When human movement is combined with the universal drive of play, the combination forms one of the most powerful education media - the physical education.

Modern concept of physical education has given rise to a global perspective and has become one of the most viable factors in cross culture integration. Sports have its own language and can provide a medium for international understanding and goodwill among nations. It has assumed great importance not only for self actualization at the international level but for social maturation and survival at the global level.

In 21 century, physical education is no more a physical training only, or simply body building, or merely indulging in play activities or mass drills, or pertaining to physical fitness alone. It has emerged as a multidimensional discipline.

The new physical education emphasizes education through the physical as a philosophical basis for sports, fitness, and physical education, a philosophy in which activity is believed to contribute to physical, mental, social, and intellectual strength paving way for all-round, wholesome and harmonious development of an individual.

#### **1. 1.4. Sports**

Sports constitute a common heritage, which all men have experienced from times immemorial. Culturally, sports provide an international bond among humans wherever and whenever they live. One can hardly imagine what the world would look like and how it would be today without a "Sports dimension".

Sports elicit excitement, challenge, change of pace, expressive reaction, interpersonal communication, pride in achievement, aspiration towards ever-higher goals intense rivalry, and unaffected, natural, enthusiastic participation on the part of millions of persons in every corner of the world.

Sports are generally considered to be a subdivision of a broad category of human activities called physical activities. Sports activity usually has one or more commonly agreed upon characteristics.

A physical performance is involved in varying degrees of skill. Physical conditioning is a prerequisite to an acceptable level of performance, according to the inherent nature of the particular sport under consideration.

There is a recognizable pattern of motor performance. Sports skills are now believed to be highly specific and are determined genetically and through experience, practice and competition.

Sports are conducted with an understanding and agreement that standard recognizable rules are to be followed by all concerned. Such rules not only control all physical movements of the contestants but also serve to standardize the plying area, the equipment and facilities, the time limits, the scoring system and other essential factors, which affect the outcome.

Opposition of some type of customarily established procedure is involved in most sports. This opposition may take any of the several forms as shown by the following examples. One player may compete against another with the winner being determined by some type of scoring system to determine the winner. A team may contest with another team with a scoring system to determine the winner. In some sports a natural obstacle may be the opponent, as in mountain climbing. The opponent to the hunter or fisher man is the wild animal or bird, or a fish in its natural habits.

#### **1.1. 5. Test and Measurement in Physical Education and Sports**

With the promotion of civilization, human approach has become more scientific in nature. Consequently, better and more accurate base of measurement has been developed. The history of measurement of man is quite old and dates back to ancient civilization.

Subsequently, many types of measurement techniques like Anthropometry, Muscular strength and endurance, cardiovascular measurements, were put to use in physical education and sports.

### **1) Anthropometry**

A French mathematician, Quetelet coined the term 'anthropometry' (anthropos means man and metry means measurement). In ancient India as well as in Egypt, the earliest anthropometric studies were undertaken to find one part of the body which would predict or become a common measurement of all other body parts. For example, the length of middle finger was considered a common measure of body proportion in Egypt. Thus, a proportional body was considered to have five finger lengths up to knee, ten finger lengths up to pubic arch etc.

Hippocrates was the first Greek expert in test and measurement who introduced a 'method of anthropometry in which the human beings were divided into two body types: Phthesis dominated by vertical dimension and Apoplectic dominated by horizontal dimension. Hippocrates studied human physical types for medical purposes while Greek sculptors were doing so for their interest in physical perfection. Rostan, a French man developed a classification method of dividing all humans into three physical types namely Digestive, Musculataire and Cerebral which became fore-runners of Sheldon's three somatotype components.

A review of literature reveals that anthropometry was the first technique of measurement used in physical education. Anthropometry was first introduced in physical education by a physician, Dr. Edward Hitchcock who occupied the first chair of physical education created in U.S.A. in 1861 at Amherst College. Thus, the history of measurement in physical education is not more than 151 years old. Dr. Edward Hitchcock measured height, weight, girths, breadths, vital capacity and some strength variables of physical education students to evaluate progress and gain in health. To the work of Hitchcock was added that of D.A. Sargent who started a measurement programme at Harvard University (USA) in 1878 and published a manual on measurement and testing.

All early leaders in physical education belonged to the field of medicine and human biology who believed that proper exercise is a form of preventive medicine (Barrow and McGee, 1971; Clarke and Clarke, 1987). In a famous meeting of pioneer physical educators held in 1885 at New York, measurement was one of the major topics for discussion, when Association for the advancement of Physical Education was founded. This Association and Young Men Christian Association (YMCA) adopted the Sargent's system of measurement for use in schools and colleges.

## **ii) Muscular Strength and Endurance**

In the last quarter of the 19<sup>th</sup> century, there has been a marked shift in the emphasis of measurements away from anthropometry to strength testing.

D.A.Sargent in 1880 along with W.T.Brigham devised a strength test battery in which the legs back, hand's grip and arms strength as well as vital capacity were measured. During the periods 1880 to 1920, strength and endurance testing was very popular and inter collegiate competitions were held in Sergeant's strength tests. Hitchcock and Sargent did extensive work on muscular endurance of the arms and shoulders of college boys during the last quarter of the nineteenth century. In 1884, Mosso, an Italian physiologist, invented the ergo graph and showed that fatigue of one set of muscle group affects other muscle groups as well. He also established the relationship between muscular activity and physical fitness. Mosso's ergo graph was modified by Kelso-Hellebrandt in 1922, to make it more suitable for the measurement of muscular endurance on its smoke drum. In 1894, the Universal Dynamometer was developed by J.H.Kellogg, which could test the isometric strength and endurance of many muscle groups. In 1915, a resistance strength test was developed by E.G. Martin to measure the strength and endurance of muscles with flats-faced type of spring balance. Then F.R.Rogers refined the inter-collegiate strength test in 1925 and also proved that this strength test may be validity used to measure the general athletic ability. He also created a physical fitness Index (PFI) for determining one's status of physical achievement with respect to population norms. Later Dr.C.H.McCloy of the state University of Iowa (USA) improved the strength test battery by including muscular endurance test items in place of vital

capacity (which is not a strength measure). In 1928, Edwin R. Elbel reported that strength could be increased by short static contraction exercises but these results could not attract the human attention for the isometric exercises until 1953 when Hettinger and Muller experimented extensively on isometric strength training. The publication of the results of their experiments ushered in a new era in strength training. Both muscular strength and endurance have been tested with the help of chin-ups and dips in many present days' physical fitness test batteries.

### **iii) Cardiovascular Measurements**

In the beginning of the 20<sup>th</sup> century, the interest of measurement and evaluation experts swayed away from anthropometry, muscular strength and muscular endurance to athletic ability testing and the cardiac function tests.

Moss's invention of ergo graph helped physiologists to study the effects of fatigue and the relation of muscles to the circulatory system. Consequently, physical educators became interested in testing the cardiovascular efficiency in light of the reported relationship between the body movement and condition of heart and circulatory system. Crampton in 1905 published the first test of cardiac function which was followed by the development of many new similar tests (McCurdy, Meylen, Foster and Barach, etc.) However these tests did not prove much useful and were considered dissatisfactory. It was only in 1920 when Schneider devised a cardiovascular rating as the measure of physical fatigue and efficiency. The Schneider's test was widely used to assess physical fitness of men for military recruitments during World War I.

In 1917, Campbell developed a test based upon breath holding and recovery after exercise which was later converted to Campbell Pulse-Ratio Test. The use of this test was shadowed by the improvements in Campbell pulse-ratio test made by W.W. Tuttle in 1931. The Tuttle pulse Ratio Test dominated the cardiovascular testing till 1943, when L. Brouha developed the Harvard Step Test (HST), a simple method of measuring physical fitness for muscular work. This test has been extensively applied for measuring cardio respiratory condition of physical education students. Depending upon individual local requirements of the researchers, the HST has been modified by a number of



investigators working in the field of measurement and evaluation in Physical Education.

In 1970, Dr. Kenneth Cooper developed a field test for cardiovascular endurance measurement. After observing the importance of long duration activities like running, cycling, swimming, walking, etc. in cardio respiratory endurance, Cooper developed a simple 12-minute Run-walk test to evaluate individual's cardiovascular endurance. With the recent development in instrumentation, a large number of sophisticated machines have been developed for the measurement of aerobic power (Cardiovascular fitness) in laboratory conditions.

## **Part - I: Introduction to Health Related Physical Fitness Exercise**

### **1.2. Physical Fitness Exercise**

Fitness is such a broad term and a complex subject which can include health and skill related fitness. Health related fitness is often divided into several other components which form our overall health status. The following are major parts of health related fitness exercise.

**(a) Cardiovascular fitness (Aerobic fitness):** This is also sometimes known as stamina and is the ability of your body to continuously provide enough energy to sustain sub maximal levels of exercise. To do this the circulatory and respiratory systems must work together efficiently to provide the working muscles with enough Oxygen to enable aerobic metabolism.

This type of fitness has enormous benefits to our lifestyle as it allows us to be active throughout the day. If we have good cardiovascular fitness then our health is also good as it helps with Fat metabolism, improved delivery of Oxygen, faster removal of waste products, and decreased levels of stress.

**(b) Strength:** Strength is defined as the ability of a muscle to exert a force to overcome a resistance. Strength is vitally important, not only in sports but in day-to-day life. Strength is important for our health as it enables us to avoid injuries, maintain good posture, and remains independent (in older age).

**(c)Flexibility:** Flexibility is the movement available at our joints, usually controlled by the length of our muscles. This is often thought to be less important than strength, or cardiovascular fitness. However, if we are not flexible our movement decreases and joints become stiff. Generally, flexibility helps to prevent injuries, improve posture, reduce low back pain, maintain healthy joints, and improve balance during movements.

**(d)Muscular Endurance:** Muscular endurance, unlike strength, is the ability of a muscle to make repeated contractions over a period of time. This is used in day-to-day life in activities such as climbing stairs, digging the garden and cleaning. Muscular endurance is also important in sports, such as football (repeated running and kicking), tennis (repeated swinging of the arm to hit the ball) and swimming (repeating the stroke).

**(e)Body Composition:** Body composition is the amount of muscle, fat, bone, cartilage etc that makes up our bodies. In terms of health, fat is the main point of interest and everything else is termed lean body tissue. The amount of fat we carry varies from person to person and healthy averages vary with gender and age. A healthy amount of fat for a man is between 15&18% and for women is higher at 20-25%. It is important to maintain a healthy percentage of body fat as excess body fat can contribute to developing a number of health problems such as heart disease and diabetes and places strain on joints, muscles and bones, increasing the risk of injury.

In addition, healthy diet is very important. Your plan including any physical activity may render useless if you do not conform your lifestyle altogether. You are trying to become healthier, so eat proper and balanced healthy food. Your training will let you excrete the toxins in your body, but if you replace the flushed toxins with another unhealthy food, you are then wasting your time, because you will either take a very long time before you get a result, or might not be able to get a positive one in the end.

Also, it is best if you consult with your doctor or dietitian first. They can come up with a diets plan that will work best for you. Especially if you have a certain health condition, it is best to ask for recommendations to make sure your diet plan will not cause another health problem.

As suggested above, cardiovascular training plus strength training plus healthy eating is the definition of health related fitness. Movement and diet must complement each other, in short, opt for healthy lifestyles.

(<http://ezinearticles.com/?Definition-of-Health-Related-Fitness&id=1844989>).

### **1.2.1. Definition of Physical Fitness**

Physical fitness is to the human body what fine-tuning is to an engine. It enables us to perform up to our potential. Fitness can be described as a condition that helps us for better look, pleasant feel and do our best. More specifically, it is “the ability to perform daily tasks vigorously and alertly, with energy left over for enjoying leisure time activities and meeting emergency demands. It is the ability to endure, to bear up, to withstand stress, to carry on in circumstances where unfit person could not continue and a major basis for good health and well-being”.

According to Fleishman (1964) “scientific evidence has been advised to make it clear that the general health and physical health of the people depend mainly on their physical fitness level”.

According to Johnson et al (1968) the sub minimal level for physical fitness is characterized by physical efficiency and quiet often by some degree of emotional instability. He is easily “fatigued, often edgy: and unable to meet physical or emotional challenges heard on with confidence, determination and a reasonable state of success.

Clarke (1987) defines physical fitness as “the ability to carry out daily tasks with vigor and alertness without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies. He further indicated that physical fitness is the ability to last or to bear up and to preserve under difficult circumstances where unfit person would give up. It is the opposite of being fatigued from ordinary efforts to lacking the energy to enter zestfully into life’s activities and to becoming exhausted from unexpected, demanding physical exertion”.

Carl E. Willgoose (1961) defines ‘physical fitness’ as capacity for activity. The greater the physical fitness, the greater the endurance and precision of

movement. The greater the physical fitness, the longer a person will be able to perform more efficiently at greater speed and recuperate “faster from fatigue”.

Physical fitness refers to the organic capacity of the individual to perform the task of the daily living without undue tiredness, fatigue and still have a reserve of strength and energy available to meet satisfactory sudden emergency demands placed up on him.

Any level of fitness can be maintained with less effort than is required to reach it. Regular vigorous activity, at least two to three times a week is necessary for the maintenance of fitness. Many persons find it more enjoyable to continue a daily program of activity and can maintain their fitness with somewhat less intensity to work than those who exercise intermittently.

Karpovich (1953) defines physical fitness as “A fitness to perform some specified task requiring muscular effort”.

Physical fitness is in the state which characterizes the degree to which a person is able to function efficiently .Fitness is an individual matter; it implies the ability of each person to live most effectively within his potentialities. It can be said that the physical fitness is the ability to last to bear up and to preserve under difficult circumstances where unfit person would give up .It is the opposite of being fatigued from ordinary efforts, to lacking the energy to enter best fully into lives and to be exhausted from unexpanded exercise demanding physical exertion.

Physical fitness is a positive quality extending on a scale from death to” abundant life”. Another concept regards a physical concept as his “Distance from physical well being is nothing but physically fit. Physical fitness is generally taken as the mean capacity to carry out physical tasks. Physical education and sports, being an integral part of education have also experienced the impact of scientific advancement. Now the sports men have been able to produce outstanding performance because of involvement of new scientifically substantiated training methods and means of execution of sports exercises such as sports techniques and tactics ,improvement of sportswear’s and equipments, as well as other components and conditions of the system of sports training.

Physical educators have been concerned with promoting and developing the quality of “physical fitness “among the population. This subject has received considerable attention from both researchers and teachers .Although no single definition of physical fitness has ever been universally accepted, many exercise physiologists have come to consider the oxygen transport capacity or maximal oxygen consumption to represent a factor of major importance within any definition of physical fitness .There has been a large amount of research devoted to understanding the changes in maximal oxygen consumption resulting from physical training .It has been recognized that activities which tax the oxygen transport system such as running ,walking, swimming, cycling or Nordic skiing generally provide an adequate physiological stimulus to elicit a training effect.

Physical fitness is not only one of the most important keys for a healthy body, but it is also the basis for dynamic and creative activity. Totally fit person is physically and has social and emotional maturity for his or her age. Fitness is constantly changing and is influenced by many factors. Fitness is based up on a solid foundation of good health. Healthful living implies freedom from disease, enough strength, endurance, skill, agility, capacity to meet the daily demands and sufficient reserves to meet extra ordinary stresses without undue fatigue, besides mental development and emotional balance according to the maturity level of the individual.

Physiologically, fitness which may be termed as training which is achieved through exercise or activities that promote the use of oxygen to burn fuel in working muscles. The components of physical fitness are strength, cardiovascular endurance, speed, agility, power, flexibility, balance and co-ordination.

Physical fitness involve the performance of the heart and lungs and the muscles of the body, and since what we do with our bodies also affects what we can do with our minds, fitness influences to some degree qualities such as mental alertness and emotional stability.

As you understand your fitness program, it is important to remember that fitness is an individual quality that differs from person to person.

### **1.2.2. Concepts of Physical Fitness**

Ability to withstand severe pressures without breaking down such body efficiency implies the possessions of qualities like speed, strength, agility, flexibility and endurance.

1. A spirit that keeps alive human kinship and endows the individual with ideals of service and devotions to humanity in all its trials and privations.
2. An efficient and strong mind capable of use without strain in all normal tasks of life.
3. Freedom from disease and from inherited or acquired abnormalities.
4. A keen and alert mind, which is responsive to rapidly changing situations and is also so poised that it is free from tension, worry or fear and can relax without difficulty.

The present concept of physical fitness is not only free from disease but also have enough strength, speed, agility, flexibility, endurance co-ordination and skill to meet the demand of daily life and sufficient reserves to withstand stress and strain.

Acquiring and maintaining physical fitness is a fundamental right of all citizens and it should become a way of life. Physical fitness is very desirable quality to possess. Physical fitness will contribute for general health and outstanding sports performance.

Physical fitness to develop into muscular co-ordination by the worthy use of leisure time through physical activity. It also focuses at personality development and good citizenship.

Certain human traits are basis to excellence in performance, while the absence of an adequate amount of these traits will restrict the performance ability. Among those several traits are strength, endurance, power, flexibility, agility, balance and co-ordination, each of these traits can be improved considerably by correct training methods.

The modern concept of assessing physical fitness is a functional one which recognizes the fact that there are certain factors which aid or hinder this functional performance.

The concept of physical fitness in general athletic term means the capability of the individual to meet the varied physical and physiological demands made by sporting activity without reducing the person an excessively fatigue.

A vital principle or moral view that keeps alive human relationship, provide with talented ideas of service and devotions to humanity in all its distinguishing qualities and comforts through hardship.

### **1.2.3. Components of Physical Fitness**

#### **(i) Muscular Strength**

One of the basic components to success in all movements is muscular strength.

It may be defined as the force or tension a muscle or a muscle group can exert against a resistance in maximal strength. It can be measured by observing the maximum amount of weight lifting with a specific movement for one repetition.

The strength of a muscle or group of muscles is dependent on its size and quality. Muscles grow in size and quality in relation to general growth, nutrition, and amount of exercise. Varing degrees of strength needed in muscles is dependent upon the type of work or activity which is to be done beyond the ordinary daily needs.

Physiologically the muscle will increase in strength only if it is called upon to increase its workload beyond what is ordinarily required of it. This is called the principle of load. Muscle strength is just maintained, not increased, if no additional effort or intensity is added to exercise or activity .Further, the development of strength is specific to the muscle or muscles involved in a particular activity.

## **(ii) Power**

Power is the ability of the body to release maximum force muscle contraction in the shortest possible time. Power indicates/stands for explosive movements, a release of maximum force in the shortest possible time at a maximum speed. It is understood that power is highly dependent upon the elements of speed and strength. Power is one of the most important factors to success in performance of jumping, kicking for distance, throwing for distance, charging an object or opponent, sprint starts or sudden bursts of speed, the dunk in basketball, the knock-out punch in boxing etc. It can be improved through gains of muscular strength.

## **(iii) Muscular Endurance**

The duration for which the muscle groups may perform work maximally is known as muscular endurance. Muscular endurance, depending upon the category of muscular work, is also divided into two types. The endurance of isometric muscle (when tenseness of muscle changes without changing the metric length of muscle) is usually referred to as isometric endurance, while the working ability (in duration) of isotonic muscles (when some tone/tenseness is maintained by changing the length of muscles) is called the isotonic muscular endurance.

## **(iv) Speed**

The rapidity of muscle movement or the rate of change of body movement is known as muscular speed. Literally, speed is measured by dividing distance by time in short runs. However, in sports, time of sprint of 60yd dash itself is considered as a measure of one's speed instead of converting it into meters per second. It is recorded as seconds per 60 yd. or per 30M etc.

## **(v) Agility**

It is the ability of the person to change direction while moving at or near full speed. More specifically, agility is the ability of a person to change direction or body position quickly (as fast as he can) and regain body control to proceed with another movement. Agility is highly dependent upon or interrelated with speed, strength, balance and co-ordination. It is developed through practice.



and confidence in movement. The acquisition of agility is not only important to success in games and sports requiring quick changes and dodging objects and opponents, for e.g. Gymnastics, football, basketball, hockey, judo etc. but also to safety outside of the play situation. Therefore to develop agility, the daily physical activity program should include fast starts, stops and changes of body direction at a speed.

#### **(vi) Flexibility**

The range of movement in a joint or sequence of joints known as flexibility.

For example, touching of fingers to toes while sitting or standing without bending knees.

There are two types of flexibility, such as:

**(a) Static Flexibility** refers to the range of motion around a joint. It can be measured most reliably with an instrument called flexometer.

**(b) Dynamic Flexibility** refers to the resistance or opposition of a joint to motion. In other words, it is considered with the forces that oppose movement over any range rather than the range itself. This type of flexibility is more difficult to measure; hence it has been given little attention in physical education and sports.

#### **(vii) Cardiovascular Endurance**

The ability to perform muscular work at sub maximal level by moderate contractions for a long time is known as cardiovascular endurance. The direct testing of cardio-pulmonary endurance is made by measuring one's aerobic power or maximum oxygen uptake while indirectly it is measured with the help of long duration activities like middle/long distance running, cycling or swimming.

#### **viii) Body Composition**

Obesity is the excess accumulation of fat in the body which is related to many health problems like coronary heart disease, high blood pressure, diabetes, respiratory problems etc. Free from obesity is measured by finding body fat content with respect to one's body weight.

### **(ix)Balance**

The ability to hold the body position in comparatively less stable position is known as body balance. Balance is of two types: static balance and dynamic balance.

**(a) Static Balance:** It may be defined as the ability of the body to maintain body in a static position. For example, start stand position, balance or standing on one foot.

**(b)Dynamic Balance:** It may be defined as the ability of the body to maintain the position of the body while moving over a lesser stable surface or over less broader surface, for example, moving over a rope, leaping from stone to stone, moving over a beam etc.

### **(x)Reaction Time**

The interval between presentation of stimulus and the first response is called reaction time. In other words, it is the time taken in responding to a visual or auditory stimulus. It may also be divided in to two categories-Visual reaction time and Auditory Reaction time.

**(a)Visual Reaction Time:** The interval between a visual signal and its response is known as visual reaction time, for example, switching off/on a button on a visual stimulus.

**(b)Auditory Reaction Time:** The interval between an auditory signal and its response is known as auditory reaction time.

## **1.2.4. Benefits of Physical Fitness**

Exercise on fitness is not just for Olympic hopefuls or supermodels. In fact, you are never too unfit, too young or too old to get started regardless of your age, gender or role in life, you can benefit from regular physical activity. If you are committed, exercise in combination with a sensible diet can help to provide an overall sense of well-being.

Some of tremendous benefits of physical fitness are mentioned below.

### **(a) Benefits of Cardiovascular Fitness**

- Enables you to handle the seemingly endless daily activities required to get you through the day

- Strengthens the heart
- Conditions heart and lungs by increasing oxygen available to the body and enables heart to use oxygen more efficiently
- Helps to increase resistance to fatigue
- Gives extra energy
- Tones muscles
- Decreases tension
- Sleep better
- Decreases depression and anxiety
- More able to handle stress
- Reduces risk of coronary heart disease and some forms of cancer
- Strengthen bones
- Increases lung capacity
- Decreases blood pressure
- Decreases body fat percentage (lose weight)

**(b)Benefits of Flexibility**

- Helps to better cope with daily activities
- Essential to protecting joints and keeping them healthy
- Helps to strengthen your back to prevent low back pain
- Reduces the appearance and effects of arthritis
- Reduces muscle tendon injuries
- Improves your posture
- Increases range of motion around joints
- Decreases the chance of muscle strains and pulls and ligaments tears
- Maintains body balance
- Helps to recover from sports injury
- Get out of bed without being stiff and sore
- Decreases muscle soreness (from exercise or activities)

### **(c)Benefits of Body Composition**

- Body composition is useful in determining health risks
- Doing the right types of exercises will help you decrease fat and increase or maintain muscle
- Excessive body fat detracts from the other fitness components, reduces performance, detracts from appearance, negatively affects your health
- When the body fat ratio is high, you are considered overweight or even obese
- A high fat ratio is a sign of a greater chance of developing coronary heart disease, diabetes, joint and back pains, arthritis and higher risk of tendon muscular accidents and injuries due to inactivity.

### **(d)Improves Your Body Working System**

Probably the biggest benefits of physical fitness is how it improves the way your body functions especially your heart and lungs. Exercise improves the amount of oxygen you take in which in turn improves the flow of blood to your heart.

Unfortunately this only happens when your heart rate is elevated which requires cardiovascular and physical type activities or exercises. This type of activity raises your metabolism and helps you burn fat and tone up that trouble zones .It also raises your energy level improving your ability to tackle your favorite physical activities.

Exercising on a regular basis will help you maintain your proper weight level and a healthy life style.

## **1.2.5. Factors Influencing Physical Fitness**

### **I. Age**

Age is the major factor influencing physical fitness. Usually maturity can be defined by chronological, skeletal, and physiological age. The period of life is generally divided into infancy, childhoods, adolescence, adulthood and seniors. So children and adolescence must not be regarded as miniature versions of adults. They are unique at each stage in their development. Their physiological and physical performance in terms of physical fitness mainly depends on the growth and development of their bones, muscles, nerves and other organs. As children size increases, their functional capacity along with physical fitness also improves.

The child is physiologically distinct from the adult and must be considered differently while planning fitness program. The training can improve the fitness of the child. Generally youngsters, adapt well to the same type of training used by adults. But training program for children and adolescents should be specifically prepared for each age group, keeping in mind the developmental factors associated with the age.

### **II. Sex**

Prior to adolescence boys and girls do not differ substantially in height, weight, growth, and bone width and body composition. But at maturity they differ significantly on various parameters. These physical, physiological, and anthropometrical differences also affect the physical fitness of male and female. Thus the sex differences affect the type of exercise frequency of participation, duration, and intensity of the exercise for developing physical fitness. Due consideration should be given to these factors while preparing a training program for males and females.

### **III. Body Composition**

Body composition is the proportion of the lean body mass and depot fat and it is one of the most important morphological features characterizing human organization. Obesity is defined as the percentage of body fat that begins to increase the chances for cardiovascular disease. Ideal body fat levels for men

are 12% to 17% and 18% to 22% for women. Body fat is essential for certain bodily functions.

Sometimes body type, determined genetically, prevents an individual from achieving unrealistic body shaping goals; there are basically three body types. The Endomorph is characterized by a large block shaped body. The Mesomorph is characterized by a solid muscular structure. The Ectomorph is characterized by a frail, slight build and very little fat.

Body composition assessment has revealed that athletes generally have physique characteristics unique to their specific sports. For example, field event athletes have large quantities of lean tissue and a high percent body fat whereas long distance runners have the least amount of lean body and fat weight. Now a days, composition is considered one of the components of fitness as it plays important role in developing fitness .For athletes, weight gain must be in the form of lean body weight i.e., muscle mass. Strength training seems to increase muscle mass and strength effectively. Actually, individual, physiologic variations, and training factors affect weight gain. Because of this body weight and body fat should be monitored on a regular basis and training program should be developed accordingly.

#### **IV. Diet and physical Exercise**

Diet plays an important role in maintaining physical fitness level. The key to weight control is keeping energy intake (food) and energy output (physical exercise) in balance. When we consume only as many calories as our body needs, our weight will remain constant. If we take in more calories than our body needs, we will put on more fat. If we expend more energy than we take in we will burn excess fat. Diet requirement varies from training to training and from individual to individual. An athlete required good diet while he is undergoing vigorous training and from individual to individual. An athlete required good diet while he is undergoing vigorous training schedules. While planning a physical fitness program, diet factor must also be given due consideration.

### **1.3. Mobility of Muscles**

Together, muscles and bones comprise what is called the musculoskeletal system of the body. The bones provide posture and structural support for the body and the muscles provide the body with the ability to move (by contracting, and thus generating tension). The musculoskeletal system also provides protection for the body's internal organs. In order to serve their function, bones must be joined together by something. The point where bones connect to one another is called a joint, and this connection is made mostly by ligaments (along with the help of muscles). Muscles are attached to the bone by tendons.

Bones, tendons, and ligaments do not possess the ability (as muscles do) to make your body move. Muscles are very unique in this respect.

#### **How Muscles Contract**

The way in which all these various levels of the muscle operate is as follows: Nerves connect the spinal column to the muscle. The place where the nerve and muscle meet is called the neuromuscular junction.

When an electrical signal crosses the neuromuscular junction, it is transmitted deep inside the muscle fibers. Inside the muscle fibers, the signal stimulates the flow of calcium which causes the thick and thin myofilaments to slide across one another. When this occurs, it causes the sarcomere to shorten, which generates force. When billions of sarcomeres in the muscle shorten all at once it results in a contraction of the entire muscle fiber.

When a muscle fiber contracts, it contracts completely. There is no such thing as a partially contracted muscle fiber. Muscle fibers are unable to vary the intensity of their contraction relative to the load against which they are acting. If this is so, then how does the force of a muscle contraction vary in strength from strong to weak? What happens is that more muscle fibers are recruited, as they are needed, to perform the job at hand. The more muscle fibers that are recruited by the central nervous system, the stronger the force generated by the muscular contraction.

### **1.3.1. Cooperating Muscle Groups**

When muscles cause a limb to move through the joint's range of motion, they usually act in the following cooperating groups:

#### **Agonists**

These muscles cause the movement to occur. They create the normal range of movement in a joint by contracting. Agonists are also referred to as prime movers since they are the muscles that are primarily responsible for generating the movement.

#### **Antagonists**

These muscles act in opposition to the movement generated by the agonists and are responsible for returning a limb to its initial position.

#### **Synergists**

These muscles perform, or assist in performing, the same set of joint motion as the agonists.

Synergists are sometimes referred to as neutralizers because they help cancel out, or neutralize, extra motion from the agonists to make sure that the force generated works within the desired plane of motion.

#### **Fixators**

These muscles provide the necessary support to assist in holding the rest of the body in place while the movement occurs. Fixators are also sometimes called stabilizers.

As an example, when you flex your knee, your hamstring contracts, and, to some extent, so does your gastrocnemius (calf) and lower buttocks. Meanwhile, your quadriceps are inhibited (relaxed and lengthened somewhat) so as not to resist the flexion. In this example, the hamstring serves as the agonist, or prime mover; the quadriceps serves as the antagonist; and the calf and lower buttocks serve as the synergists. Agonists and antagonists are usually located on opposite sides of the affected joint (like your hamstrings and quadriceps, or your triceps and biceps), while synergists are usually located on the same side of the joint near the agonists. Larger muscles often call upon their smaller neighbors to function as synergists.



The following is a list of commonly used agonist/antagonist muscle pairs:

- pectorals/latissimus dorsi (Pecs and lats)
- anterior deltoids/posterior deltoids (front and back shoulder)
- trapezius/deltoids (traps and delts)
- abdominals/spinal erectors (abs and lower-back)
- left and right external obliques (sides)
- quadriceps/hamstrings (quads and hams)
- shins/calves
- biceps/triceps
- forearm flexors/extensors

### 1.3.2. Muscle Contractions

The contraction of a muscle does not necessarily imply that the muscle shortens; it only means that tension has been generated. Muscles can contract in the following ways:

**Isometric Contraction:** This is a contraction in which no movement takes place, because the load on the muscle exceeds the tension generated by the contracting muscle. This occurs when a muscle attempts to push or pull an immovable object.

**Isotonic Contraction:** This is a contraction in which movement does take place, because the tension generated by the contracting muscle exceeds the load on the muscle. This occurs when you use your muscles to successfully push or pull an object.

Isotonic contractions are further divided into two types:

**Concentric Contraction:** This is a contraction in which the muscle decreases in length (shortens) against an opposing load, such as lifting a weight up.

**Eccentric Contraction:** This is a contraction in which the muscle increases in length (lengthens) as it resists a load, such as lowering a weight down in a slow, controlled fashion.

During a concentric contraction, the muscles that are shortening serve as the agonists and hence do all of the work. During an eccentric contraction the muscles that are lengthening serve as the agonists and do all of the work.

## **1.4. Benefits of Resistance Training in Strengthening Calf and Thigh Muscles**

### **(i) Increases Bone Mineral Density**

Bones are constantly remodeling, meaning the tissues break down at the same time they build up. The peak of remodeling takes place during puberty...However, as a person ages, our bone mineral density decreases as the remodeling is not as active anymore. This is especially a problem to post-menopausal women and the elderly, but does begin to happen in the early thirties.

### **(ii) Increases Strength**

In addition to increase in bone density and strength, muscles will grow stronger and become more developed as you progress.

### **(iii) Increases the Range of Activities**

When your body is strong enough to carry some considerable weight, then you will also be capable of doing more strenuous activities. An increase in exercise lifts the mood and you will be more interested in life and a more active life style. This will really create snowball effect on your life and activities.

### **(iv) Reduces the Body Fat**

Using and increasing the muscle mass (even a little bit) will increase the energy that is required by your body, even at rest. This also increases the energy needed by your body during activities. The more muscle, the more energy is needed to be broken down to supply your body to function properly. This translates to more fat calories and fat being burned each minute. Thus, with the decrease in body fat, you can expect the tone of the body to improve and you will become leaner.

### **(v) Improves State of the Elders**

For the elderly undergoing a resistance training program will help improve their health and decrease the risks brought about by the age. They can be

more independent, without needing to rely on other people for doing simple things. Being able to do so will also decrease the risk of injuries in the elders.

#### **(vi) Improves Heart Condition**

Regular resistance training can result in a lowered heart rate and lowered blood pressure, especially after exercise. Thus, the risk of heart disease is reduced.

This kind of training however must be properly done. It requires commitment and consistency. It will have to be done in a regular basis.

### **1.4.1. Strength**

Strength is a conditional ability i.e., it depends largely on the energy liberation processes in the muscles. Strength is also perhaps the most important motor ability in sports as it is direct product of muscle contraction. All movements of sports are caused by muscle contractions and therefore, strength is a part and parcel of all motor abilities, technical skills, and tactical actions. Strength and strength training, therefore, assume high importance of achieving good performance in all sports. The role of strength training for general health, good posture and for prevention of injuries is usually overlooked which in the long run can prove harmful Zimmermann(1989)has very highly pointed out the positive effects of strength training on muscles, bones, joints, heart, circulatory system, metabolism and nervous system.

Strength is the ability to overcome resistance or to act against resistance.

Strength should not be considered a product of only muscular contraction. It is, in fact, a product of voluntary muscle contractions caused by the neuro-muscular system.

In sports movements, strength always appears in some combination with the duration and speed of movement i.e., in combination with endurance and speed abilities. In each sports movement strength appears in a different form. When we attempt to generalize the forms in which strength finds expression in movements, the strength ability can be divided into three types as described below.

### **(i) Maximum Strength**

Maximum strength is not important in majority of the sports. It is important only in those sports in which very heavy resistances have to be tackled.e.g., weight lifting, throws etc. in many sports, however, there are phases of movement when the muscles must apply maximal or near maximal force.e.g.,cross position on Roman rings, start and acceleration phase in sprints, take off in jumps. In such sports maximum strength is important. The important of maximum strength lies in the fact that in majority of the sports it serves as the basis for good explosive strength and strength endurance.

### **(ii) Explosive Strength**

It is a combination of strength and speed abilities. It can be defined as the ability to overcome resistance with high speed. Depending on the nature of combination of strength and speed, the explosive strength can be further sub-divided into start strength, strength speed, (power) and speed strength.

Start strength, is the ability to develop maximal muscle force during the starting phase of the movement .e.g., sprint start, weight lifting etc.

Strength speed is the ability to overcome heavy resistances with high speed. e.g. Throws, jumps, etc.

Speed strength is the ability to overcome low resistances with high speed. e.g., team games, and combat sports (lower weight categories) .The explosive strength is of different nature in cyclic and acyclic movement. e.g, power.

### **(iii) Strength Endurance**

In all sports movements, whether fast or slow, movements have to be done under lesser or higher conditions of fatigue. Even for sprints some amount of strength endurance is required in the last phases or in heats. Strength endurance therefore is important in most of the sports.

In sports, depending on the nature of movements the above mentioned strength abilities can appear in complex form. In weight lifting and throws the strength required is a combination of maximum strength and explosive strength. This combination is also known as power. In volleyball, explosive

strength appears in combination with strength endurance and is popularly referred to as power endurance.

In sports where maximal resistances to be tackled under fatigue conditions, the strength required is a combination of maximum strength and strength endurance.

In sports, in addition to the above mentioned terms of strength, there are some more terms which are used. These are briefly described below.

#### **(iv) Static Strength**

It is the ability to act against resistance. It is also called iso-metric strength.

#### **(v) Dynamic Strength**

It is the ability to overcome resistance. It is also known by the name of iso-tonic strength.

#### **(vi) Relative Strength**

It is not strength ability. It is simply a ratio which we get by dividing maximum strength with body weight. In several sports, the strength ability of a sports man can be assessed better if it is considered in relation to his body weight.

This is relevant in sports in which during the competition the main resistance to be overcome is the body itself.

#### **(vii) General Strength**

It is also not separate strength ability. It is understood to be a complete product of all strength abilities needed for satisfactory tackling of normal resistance in sports. It is impossible to define general strength. This term, however, in general usage means general ability to tackle resistances not specific to any sport. It is also understood to be overall body strength generally needed for training and sports competitions.

### **(viii) Special Strength**

It is the ability to tackle resistance in a particular sport. It is not strength ability in itself. It can be any strength ability (maximum strength or explosive strength or strength endurance) required for a specific sport. The special strength in weight lifting is maximum strength. Similarly; special strength in long jump is Explosive Strength.

### **1.4.2. Improvement of Strength**

The training for improvement of strength is an important part of training for all sports. This is discussed as depicted below.

#### **(A) Physical Exercise**

Different types of physical fitness which used with or without additional resistance to improve and maintain strength. These exercises can be divided into two groups.

##### **(i) Physical Exercise with Additional Resistance**

Most commonly used and most effective exercise with additional resistance is the weight training exercises. These exercises form the principal means for the improvement and maintenance of strength.

##### **(ii) Physical Exercise with one's own Body Weight as Resistance**

There are innumerable exercises in which the body weight of the sportsman acts as resistance for improving the strength. e.g., all types of jumps, wall bar exercises for strength, pull ups, rope climbing, sit ups, etc.

These exercises if properly done are very effective for improving explosive strength and strength endurance.

#### **(B) Types of Muscle Contraction**

In sports movements the muscle contraction is of two types: static and dynamic. A third type is achieved by a combination of static as well as dynamic contraction.

### **(i) Static Muscle Contraction**

This is also called isometric muscle contraction. In this type of muscle contraction there is no significant in the length of the contracting muscle. As a result there is no external movement at the joint concerned. In sports there is movement of various limbs and body parts during a motor action, therefore, isometric or static contractions are not common types of muscle contraction in sports.

### **(ii) Dynamic Muscle Contraction**

This type of muscle contraction is also called iso-tonic or auto-tonic muscle contraction. In this type of contraction the muscle lengthens or shortens. During contraction the length of a muscle decreases and it is called concentric contraction and when the length increases it is called eccentric contraction.

### **(iii) Combination of Dynamic and Static Contractions**

This type of muscle contraction is also not very common in sports. But, in some sports like gymnastics, we can see this type of contraction. For example, in assuming 'L' Position on Roman rings or parallel bars, the abdominal muscles first contract concentrically to bring the legs in the proper position. Then this position is maintained for the required duration by the static contraction of the abdominal muscles. The gradual lowering of the legs from this position is made possible by the eccentric contraction of abdominal muscles. The combination of static contraction followed by dynamic (concentric or eccentric) is much rare.

From the above discussion about the type of muscle contraction it is clear that in sports as a rule, the movements are caused by a specific combination of two or more types of muscle contraction. A pure static or dynamic contraction rarely occurs.

While selecting exercises for the development of specific strength the type of muscle contraction should be used as a basic criterion. It should also be kept in mind that during a sports movement, especially whole body movement, the various muscle groups of the body contract in one way or the other to make the movement execution correct and effective.

In addition, to the types of muscle contraction, the nature and magnitude of tension developed by the muscles during the movement is also important for correct selection of exercises for the development of specific strength.

### **(C)Methods of Strength Training**

#### **I. Maximum Strength**

The methods used for the improvement of maximum strength are variations of repetition method. These methods can be classified according to the types of muscle contraction during the exercise as follows.

##### **(a)Dynamic Concentric Method**

In this method heavy resistances are overcome repeatedly. In order to overcome the resistance the muscles contract concentrically. Depending on the magnitude of a load or resistance this method has two variations which are described below:

##### **(i)Maximal Resistance Method**

In this method the resistance (intensity) is from 80-100% of the maximum.

There are 1-10 repetitions in a set and total number of sets is 3-10. Complete recovery is given between the sets. The speed of movement is from smooth to explosive.

This method is very effective for improving the maximum strength. If the movements are done with speed then this method also leads to improvement in explosive strength. The maximal resistance method is very effective in improving the inter and intra-muscular co-ordination. It also results in significant hypertrophy of muscles.

##### **(ii)Sub-Maximal Resistance Method**

This method is very effective for improving maximum strength and explosive strength at the same time. Due to sub-maximal resistances used this method does not lead to much hypertrophy of the muscles thereby not resulting in significant increase in body weight.



## **(b)Dynamic Eccentric Method**

In this method the muscles have to act against resistance by contracting eccentrically. It has the following variations:

### **(i)Slow Eccentric Method**

In this method the muscles are forced to contract eccentrically but with more than 100% of their force. The sports man is required to gradually lower a resistance which is more than his maximum strength ability.

### **(ii)Reactive Method**

In this method the muscles are first made to stretch against resistance before contracting them maximally. This method is very effective for the development of maximum strength and explosive strength.

For using reactive method for the muscles of trunk and upper extremities special equipment have to be designed which enable stretching of muscles against resistance before maximal contraction.

## **(c) Iso kenetic Method**

This method was first introduced by J.J.Perrine in 1968.This method involves a special type a muscle contraction called iso-kenetic contraction.In iso-kenetic contraction the muscle applies maximal force throughout the range of movement. In iso-tonic contraction the muscle applies maximal force only at a particular angle of its range of movement. The iso-kenetic contraction however is not a common type of muscle contraction in sports movements. This is a strong limitation of the iso-kenetic method. While doing the exercise the sportsman should consciously keep applying maximal force throughout the range of movement. In iso-kenetic method higher speed of contraction has been found to be effective for the improvement of maximum strength along with explosive strength(Hauptmann and Harre,1983).The other load factors should be similar to the method of using maximal or sub maximal resistance.

#### **(d)Static Method**

In this method iso-metric exercises are used for the development of strength.

As explained earlier iso-metric contractions are mostly unspecific to sports movements. As a result the strength improved through iso-metric exercise is usually not of much value in sports.

The iso-metric exercises are very monotonous. These exercises, in the case of children and untrained persons, lead to the building up of 'compression effect' with in the chest cavity during maximal exertion phase. This tends to stop or restrict the blood supply to and from the heart and lungs. This can have harmful effect on children and untrained persons.

#### **II. Explosive Strength**

Explosive strength unlike maximum strength is a highly specific motor ability. The explosive strength performance is always coupled with the specific load and movement structure of an exercise or motor action (Harre, 1984).As a result explosive strength is mainly developed through special and competition exercises.

The explosive strength performance depends largely on the muscle cross section, contraction, speed and inter and intra-muscular co-ordination. As explosive strength is highly movement specific, therefore, the role of technique or skill should never be under estimated.

Depending on the magnitude of resistance and the specificity of movements, the explosive strength has a different nature in different sports. In sports where high resistances are to be tackled the explosive strength depends markedly on maximum strength. In these sports, therefore, both these strength abilities have to be developed sequentially or parallel. An improvement in maximum strength automatically does not lead to an improvement in explosive strength.

### **(a)Using Special and Competition Exercises with Changes Resistance**

Due to the specific nature of explosive strength, this method is being used increasingly for improving explosive strength. This can take two directions.

(a)Using resistance which is more than the resistance tackled during the competition. (b)Using resistance less than the resistance tackled in the competition. In the first variation the stress is on improving strength element and in the second variation the stress is on speed element.

### **(b)Intensive Interval Method**

This method can be effectively used for team and combat sports. The exercises are special exercises which resemble partly with the structure of the competition activity.

## **III. Strength Endurance**

Strength endurance can be classified as endurance ability also. Like explosive training it is also a complex motor ability and is the product of strength and endurance.

Sports in which heavy resistances have to be tackled under conditions of fatigue. The strength endurance depends considerably on maximum strength.

### **(D)Organization of Strength Training**

The organization of strength training is crucial for prevention of injuries. Good organization should ensure the following:-

- Cleanliness and tidiness of the strength training room/hall.
- Proper placement and arrangement of equipment enabling risk free execution of movements.
- Proper discipline and atmosphere for training
- Presence of one or two helpers whenever required
- Checking of equipment for safety purpose before it is used.

### **1.4.3. Importance of Strength Training**

Strength training does not require expensive equipment. It can be accomplished through weightlifting, body weight exercise or resistance exercises with exercise bands. There are variable resistance machines and free weights.

Variable resistance machines are effective tools for building strength and muscle tone and are designed to work the target muscle in isolation, without the assistance of the surrounding muscles. Free weights (barbells, dumbbells, and machines that provide the same equal resistance to a muscle) allow one not only to target a particular muscle group but to engage other muscles that assist in the work. Lifting free weights improves the co-ordination by improving the neuromuscular pathways that connect the muscles to the central nervous system. A rationally designed strength training program begins with developing the core of the body and the stabilizing muscles.

There are numerous benefits of strength training when regularly done. It can be very powerful in reducing the signs and symptoms of numerous diseases and chronic conditions, among them: arthritis, diabetes, osteoporosis, obesity, back pain, depression etc.

**Strength training also contributes to:**

- Increase muscle density(not necessarily size)
- Increase muscle strength
- Increase bone density
- Increase tendon strength
- Increase ligament strength

Resistance /strength training will increase the muscle size (hypertrophy).Muscle growth depends on the muscle fiber type activated and the pattern of recruitment.

Muscle growth is due to one or more of the following adaptations:

- Increased contractile proteins (actin and myosin)
- Increased number of and size of myofibrils per muscle fiber

- Increased amount of connective, tendinous and legamentous tissues
- Increased enzymes and stored nutrients

#### **1.4.4. Preventive Measures in Strength Training**

Serious and intensive strength training is always accompanied with a high risk of injury to muscle, bone, joint etc. It is, therefore, very important to know the means and methods to prevent these injuries. For this propose following suggestions are give.

##### **Proper Warm-Up**

A proper warm up, including general and special warm up, is perhaps the most important means for preventing injuries in strength training. It prepares the body physically and mentally for the training .When exercises with high resistances are to be done then one or two sets of this exercise with lower intensities should be done as an essential part of specific warm up for the exercise.

##### **Strength and Stability of the Muscular -Skeletal System**

Strong and stable joints, muscles, etc, is a primary prerequisite for tolerating the stress and strain of strength training. Therefore, before starting serious and intensive strength training the strength and stability of the musculo-skeletal system should be improved by doing general strength training with low intensity.

##### **Sequence of Exercises**

In a strength training session several exercises are to be done. It is always better to do these exercise in such a sequence that different muscle groups are exercised in rotation .It is preferable to exercise the agonists and antagonists' one after the other .e.g., sit ups followed by a back exercise.

##### **Loading Procedures**

In strength training several loading procedures are used. In some, the resistance has to increased or decreased from set to set. In such cases care

must be taken to gradually increase the resistance. Abrupt increase in resistance carries a high risk of injury.

### **Breathing**

Incorrect breathing or holding of breathe during iso-metric exercises or while lifting heavy weights lead to serious disturbances in the blood circulation. This can cause possible injuries of contusion. As a rule, during a strength exercise a sports man should continue breathing and if he has to hold breath and strain then this phase should be of a minimum duration possible.

### **Fatigue**

Strength training should preferably be done when the sports man is fresh. When he is tired his neuromuscular co-ordination is negatively affected. Excessive fatigue always leads to a faulty execution of movement thereby increasing the risk of injury. If strength training has to be done under conditions of fatigue then it should be one with exercises which have been mastered by the sports man and the resistances should be low.

### **Safety Equipment**

There are several types of safety equipment available which help in preventing injuries during strength training .e.g., belts, boots, wrist bands etc. The safety equipment should be used when it is necessary .But too much dependence on safety equipment can lead to the neglect of conditioning of musculo -skeletal system and careless movement execution. This should be avoided.

## **1.5. Detoxifying and Strengthening Exercises**

In <http://www.the-natural-path.com> briefly explained that exercise helps you detoxify your body. Walking, running, trampoline exercise, swimming, yogic exercises and other types of exercises are described in terms of detoxification and strengthening exercises.

Exercise detoxification is an effective method of cleansing many vital organs simultaneously and should become a regular part of your life.

In past generations, people had physically demanding jobs. Even the less demanding desk jobs required walking to do filing and going to meetings. With the progress of computers and telecommunications, many people can do their jobs today by sitting at their desk and using technology to do their filing and participate in meetings. Without benefit of exercise, this has made most of us much more sedentary.

One of the biggest benefits of exercise is the reduction of excess body fat. While many people want to reduce their body fat to look better, there are serious health risks to carrying around too much excess fat. Fatty tissues actually clog the arteries, increase blood pressure and put additional strain on the heart. Fat is also the preferred place that your body stores toxins. Most tumors start in fatty areas. Reducing these fat deposits through exercise detoxification inherently reduces toxin levels in your body and reduces the chance of getting tumors. A major benefit of exercise is in reducing fats stored in your body.

Another one of the key benefits of exercise is increased blood and lymph circulation. Your blood and lymphatic fluids distribute essential nutrients to your cells and remove metabolic waste and other toxic substances from your cells. Your cells can starve and choke on this metabolic waste without good circulation. Increased circulation is another exercise benefit and thus improves the health of your cells.

Finally, exercise helps control your blood sugar. Excess blood sugar or spikes in your blood sugar can be linked to a variety of maladies, including high cholesterol, Type II diabetes and Alzheimer's disease. Exercise will help to control your blood sugar. The next time you crave a dessert or sweet, take a 10 minute walk first. If you still want the sweet at the end of the walk, well, you have at least worked off some calories to compensate. Chances are that exercise's roles in regulating your blood sugar will satisfy your craving.

### **Types of Exercises**

Any type of aerobic exercise that gets your whole body moving and gets your body fluids circulating at an increased rate will benefit you. The basic message is that it is better to do some form of exercise that you enjoy, rather

than no exercise because we come up with excuses not to do it. To get the maximum benefit of exercise, you should exercise for 20 - 30 minutes per day. Cardiovascular exercises help by increasing your body temperature over a sustained period, thus making you sweat out toxins. Also, they help your heart stay healthy. Core muscle exercises help massage and stimulate your internal organs. Most forms of exercise increase your breathing, thus providing a form of oxygen therapy.

Each type of exercise has its own benefits and concerns. Choosing the best exercise for you is a matter of personal preference. However, looking at the various benefits of exercise may help you choose which exercise fits you the best.

### **(i)Bicycling**

Cycling also provides a good cardiovascular and muscular workout without the pounding associated with jogging. Increased body temperature, increased breathing and a good core muscle workout are among the benefits of cycling.

While many people think of cycling as only working out the legs, a good cycling workout will actually strengthen core muscles in your mid-section. Strengthening these muscles helps to keep the colon and other vital organs fit. However, if you cycle, make sure to avoid areas with heavy traffic. The major drawback to cycling is its efficiency - it takes a lot of time to get the same benefit of exercise that you can achieve with jogging or swimming. Of course, if you enjoy cycling and have the time, this is a great way to enjoy the outdoors.

### **(ii)Jogging**

Jogging became a popular form of exercise in the 1970s. Jogging helps exercise the cardiovascular system and the legs increases your body temperature and breathing. While jogging is an excellent exercise with plenty of benefits, jogging can be hard on the knees. If you jog regularly, try and jog on unpaved surfaces. If that is not an option, try and jog on asphalt, instead of concrete.



Running on soft surfaces will help reduce the jarring damage to your knees from the repetitive pounding motion. Taking such precautions helps you maximize the benefit of exercise.

### **(iii) Stomach Exercises**

In addition to cardiovascular exercise, exercise of the muscles in your stomach and mid-section; sometimes called your core, helps your key elimination organs (colon, kidneys, and liver) maintain good health. In addition to the colon cleanse routine, adding a variety of stomach crunches and twists helps to massage your colon and other elimination organs, and also helps strengthen the muscles around these vital organs.

There are a variety of ways to do stomach crunches and there are various types of abdominal exercisers to help do crunches.

Stomach crunches help massage the colon and help strengthen the muscles that help the colon move waste. Therefore, doing stomach crunches will help you cleanse your colon.

### **(iv)Swimming**

Swimming is one of the best exercises, as it provides a good cardiovascular and muscular workout, but does not create the pounding effect on your joints, as does jogging. Swimming increases your breathing and your body temperature, thus aiding in your internal cleansing.

As with many exercises, swimming has its own health drawbacks. Swimming pools are generally heavily chlorinated. Your body absorbs some amounts of chlorine when swimming in chlorinated pools and this increases the toxic load on your body. Shared pools can also contain viruses, bacteria and toxins that others have expelled from their body. These microorganisms can remain in the water and infect people that swim in the water at a later time. Try and swim in a pool that uses **ozone** to cleanse the water. Take a shower after swimming to wash off whatever foreign substances you can. This will help you maximize the benefit of swimming.

#### **(v) Trampoline Exercise**

Rebound exercise or trampoline exercise is one of the stars of the exercise in the world. Trampoline exercise is almost as convenient as walking, except that you need a trampoline. A major advantage over walking, however, is that you can do it in the comfort of your own home or office. In most forms of exercise, some muscles are exercised more than others. With trampoline exercise, your entire body is subjected to the effects of gravity.

#### **(vi) Twisting Exercise**

A chiropractor gives a twisting exercise. It is very helpful in stretching your core muscles, improving circulation to the joints in the spine, and also helping to massage your elimination organs (colon, kidney and liver). Doing stomach crunches and this twisting exercise in the morning helps bring on a strong bowel movement. Remember, that you still need to consume sufficient fiber and drink enough water to help with your cleansing. While not intended as a substitute for sufficient fiber and water, the benefit of this exercise is that it can help move things along. (<http://www.the-natural-path.com/benefit-of-exercise.html>).

#### **(vii) Walking**

Walking has also been gaining popularity recently. The ideal thing about walking is that you can do it almost anywhere. It is by far the most convenient and economical exercise. Although walking may be considered a mild form of exercise, it provides enough physical activity to help detoxify your body and provide other benefits of exercise. Walking rises your temperature so as to start to sweat, and your breathing rate increases after a brisk walk, especially in hilly areas. In cold climates, mall walking has become a popular form of exercise.

#### **(viii) Yoga Exercises**

A regular yoga practice helps boost antioxidants throughout your body, resulting in a stronger immune system and improved ability to heal quickly from disease or injury. Yoga can help you lose weight and maintain a healthy

weight throughout your life. Power yoga is a vigorous form of yoga that burns calories, resulting in weight loss.

Many women going through menopause report an easing of symptoms when they begin practicing yoga.

Yoga can rid you off tension, headaches and migraines because yoga circulates blood and oxygen to your head, which can often, prevent headaches from starting. Yoga can help cure insomnia, as regular yoga practice leads to better and deeper sleep.

Yoga can help fight fatigue and maintain your energy throughout the day.

Yoga is an effective treatment for a variety of autoimmune diseases because it can reduce the symptoms these diseases often cause, such as stiffness, malaise, fatigue, and weakness.

One of the greatest fitness benefits of yoga is improved flexibility. In fact, one study showed that just eight weeks of yoga can improve flexibility by 35%. As you move through yoga's many poses, you stretch your muscles in new, interesting ways. Stretching allows muscles to release lactic acid, which builds up during exercise and can cause stiffness and pain. Lactic acid is also the leading cause of muscle fatigue, so stretching can actually help you work out longer and harder. Plus, increased flexibility improves your range of motion. This means you can participate more fully in other exercises and limit your risk of injuries, especially those caused by hyperextension

Yoga is also a great way to strengthen your core muscles. As your body works to hold itself in various positions, your abdominal, lower back, and upper leg muscles work hard to keep you stable. This is especially true for yoga poses requiring balance, such as those where the participant stands on one leg. Over time, this can lead to improved muscle tone, which means a more impressive physique. Plus, a strong core leads to improved posture and decreased back pain over time. (<http://colemanhunt.lifeyo.com/blog/post/73704/benefits-of-yoga-for-health/>)

## **1.6. Genetics in Development of Children towards Exercises and Sport**

Certain changes occur as children grow and develop. These changes called stages of development-affect how a c child performs in sport. The stages of physical and motor development influence how well a child performs sport skills. The stages of emotional development dictate what kind of competition is most suitable.

Motor development often does not proceed at the same rate as physical development. Rapidly growing children often appear awkward. The child may not be ready to execute or refine a skill until his or her motor ability develops further.

These stages of development are predictable and all children pass through them, says physical Education professor Lyle Sanderson. However, the age at which the child enters each stages and the duration of each stage cannot be predicted.

A youngster's development al age can differ significantly from his or her chronological age by as much as two or more years in either direction.

### **Physical Development**

When children grow, they experience a change in hormone levels, in their muscles, bones and joints, their energy system s, and their cardiovascular systems(heart and lungs).Up to the on-set of puberty ,children grow at a steady pace, making regular gains in height and weight.

Coaches and parents must remember that there can be a wide variation in size among youngsters of the same age. In a topical elementary school classroom, height differences among children range from four to five inches.

### **Emotional Development**

As the body grows, children also develop emotionally and intellectually. They gain a stronger understanding of themselves and the relationships they have in the adult world. They improve their ability to interpret, analyze and think.

A very small child thinks of himself or herself as the center of the world. Once children reach school age, they pay more attention to other people. As they get older, they are more capable of understanding team play and the relationships involved in team activity. A good coach recognizes the importance of social and mental development within sport by using team games, cooperative skills, and fair play as the basis of activity.

## **Heredity**

Studies have shown that a person's performance level and response to training are strongly influenced by genetics. They have shown that children inherit not only physical characteristics, but also psychological qualities such as competitiveness and motivation as well. Heredity is therefore very important in determining how good an athlete a child can be.

Studies of identical twins show that approximately 50 percent of aerobic power and 70 percent of endurance performance are fixed by heredity.

Research

conducted at University, Laval by world - renowned genetics expert Dr. Claude Bouchard indicate that an individual's response to training is also genetically determined. This means that some athletes will show greater potential for improvement than others as a result of training, regardless of their initial level of fitness or how hard they work.

If a child does not have the genetic makeup required to excel in a particular sport, it is unlikely that he or she can perform at the highest level. Although genetics play a key role in determining one's potential for performance, it is clear that proper training is also critical. In fact, it is through training and hard work that genetic potential in sport can be realized.

Genetics play a big part in our ultimate level of achievement in sport, but everyone can and should be encouraged to participate. All children can benefit from the lifelong lessons sport can bring them, regardless of their level of performance. Eventually, if performance is important to the

child, it may be advisable to consider directing him or her to sports where the probability of success is highest.

### **Exercises for developing Strength**

Strength training refers to all the exercise and activities that develop strength and power. Until recently, strength training in pre-pubescent children was discouraged because it was thought to be ineffective and dangerous.

Today, new research shows that it is possible for pre-adolescents to increase strength with little risk of injury in properly supervised programs. In fact, by strengthening muscles that cross a joint, strength training may even offer some protection to the child already participating in sports such as athletics, alpine skiing, ice hockey, and figure skating which requires bursts of power and impose a lot of stress on young muscles and bones.

One of the main benefits of a well designed strength program is that it balances the strength of muscle pairs. This balance is an important aspect of injury prevention. Alpine skiers, for example, typically have very strong quadriceps and need to strengthen their hamstrings to prevent knee injuries.

For children strength training should be seen as only one of the many components of fitness. Lain Marion, a consultant with the Coaching Association of Canada, recommends that before resorting to weights, children should be directed to use body weight as the basis of strength training. This allows a more natural strength-building progression. Calf raises, push-ups, and chin-ups are all examples of strength-training methods using body weight.

Strength-training programs for pre-adolescent children must focus on low weights and relatively high repetitions. Heavy lifting and excessive repetitions must be avoided. A child should be able to perform 12 or 15 repetitions of each exercise when using resistance training equipment. If he or she can only lift a weight three to five times, it is far too heavy. Attempting to lift heavy weights is not an appropriate activity for children.

Without the supervision of a qualified instructor, children who lift weights can injure themselves. On their own, children may try to lift weights that are too heavy for them. A recent American survey showed that most injuries associated with strength training in children are the results of accidents in the home, as unsupervised youngsters attempt to lift heavy weights. For athletes who are beginning to train with weights, it is also important to first learn sound lifting techniques. This can only be done using relatively light weights. In general, the emphasis should be on techniques for approximately one year after the adolescent growth spurt.

### **Flexibility in Children**

Not every children can bend and stretch like a rubber band. Some children, like some adults, are just not flexible. But if they train, children will gain flexibility faster than adults.

The muscle tissue in children is as flexible as muscle tissue in adults. What is quite different is the connective tissue. Children can extend their ligaments and tendons farther than adults can, says, Dr. Keith Russel, associate professor of physical Education at the University of Saskatchewan. "What boggles my mind is how stiff some young athletes are. Coaches are not spending enough time stretching these kids. It is the best time of their life to do. You can get such good results with such little effort".

It is particularly important for children to work on flexibility as they head toward their growth spurt. During rapid growth, flexibility decreases. If a child is not naturally flexible, the best time to gain range is before the growth spurt. Increased flexibility may prevent injuries, and also improves an athlete's performance.

To improve flexibility, children should always perform a proper warm - up followed by stretching exercises. They should also stretch during their cool down. Effective stretching can improve performance, but over stretching can be harmful to the body by reducing the stability of joints.

## Prevention of Dehydration

The human body needs fluid to function. During exercise children and adults lose body fluids, primarily through sweat. This water must be replaced to avoid dehydration. Oded Bar-Or, a research physician at McMaster University in Hamilton, Ont., says most people underestimate how much fluid they need to replace. How thirsty you are does not tell you how much you need to drink.

When fluids are not replaced during exercise, body temperature starts to rise. And because body temperature rises faster in children than in adults, young athletes must drink enough fluid to prevent dehydration.

Children need to drink every 15 or 20 minutes when they are exercising or even just playing in the playground, says Bar-Or. If it is hot and humid, children should go to the sidelines regularly to take a few sips of cool water. On each of these occasions, they should drink until they are no longer thirsty. Then, if they are under 10 years of age; encourage children to drink another half -cup. If older than 10 years of age, children should drink another cup.

The amount of fluid each child needs depends on body size, how hot and humid it is, and how hard he or she is exercising. Teaching children to drink beyond thirst will prevent dehydration. Because physical activity suppresses the thirst mechanism, children need to be reminded to drink frequently, “says Bar-Or.

You can tell if a child is dehydrated by checking the color of the urine. If the urine is dark and there is little of it, the child needs to replace lost fluids.

Studies conducted in Bar-Or’s laboratory show that children will drink 45 percent more water if it is flavored. He suggests that parents flavor the water if it means children will drink more. Be sure that any flavoring added to the water is low in sugar and salt content.

If fruit juice is consumed during activity, it should be diluted with water. Most juice has too much sugar and will not be absorbed very effectively unless it is diluted. A mixture of two or three parts of water to one part of juice has been found to be effective.



## **Part - II: Introduction to Therapeutic Massage Interventions**

### **1.7. Manual Massage Therapy**

Massage is a general term for pressing, rubbing and manipulating your skin, muscles, tendons, ligaments and joints typically using hands and fingers for relaxing muscle spasm, relieving tension, improving circulation and hastening the elimination of wastes. Besides these benefits, it also stretches connective tissues and improves circulation.

Massaging is actually the oldest form of medical therapy there has been practiced on the human body. There are actually various types of massage that are known to man. They are all derived from the most celebrated civilizations and traditional beliefs of the ancient Greeks, Romans,

It actually started way back from 2700 BC when the ancient Eastern Chinese cultures performed massage in order to heal an array of ailments, ranging from pain from labor right up to paralysis.

Tombs associated with ancient Egypt were also discovered with paintings and images of figures being massaged on the walls. Moreover, Ayurveda, which is known to be a traditional medicine in India, is a form of therapeutic massage that uses aromatherapy, spices and oils for healing properties.

Even known heroes from Greece and Rome such as the great Julius Caesar had massages performed daily on them in order to treat their nerve pain.

At present, massage techniques have already been modernized. They were enhanced so that they can be able to heal particular health conditions. For instance, those who were injured during the First World War underwent massage to remedy their nerve damage and also to relieve shell shock in the Western hospitals back in the 1930s.

To date, massages are still performed by many to treat a wide variety of ages. In fact, even babies and senior citizens can benefit from massages, despite being diagnosed under the intensive care, health clinics, health clubs, and other hospital settings.

According to medical research, massages can treat nerve damage, lumbar pain, paralysis, back pain, cancer, premature birth, stroke, heart attack, osteoarthritis, and fibromyalgia. (<http://www.tarunaoils.com/articles/history-of-massage.asp>).

### **1.7.1. Eastern Massage**

Eastern massage addresses energy flow and balance within the body, stimulating and soothing specific points along the energy meridians to create effects at other sites along those meridians. Instead of stroking and kneading, Eastern massage therapists use pressure, rolling, rocking, and striking, all of which can be more vigorous than Western massage.

Massage schools that operate from the Eastern perspective provide instruction in such Eastern massage modalities as Ayurvedic Massage, Tui Na, Thai Massage, Bu Huang, Shiatsu, and others. Eastern Massage combined with bodywork and movement therapy involves the systematic use of movement, breathing, and ritual to integrate the body and mind. (<http://www.spabeautyschools.com/article/v/8755/eastern-massage-or-western-massagewhich-should-you-study-/>).

The following are some of the Asian countries which experiencing their own massage styles and techniques

#### **1.7.1.1. India's Healing Massage - Ayurvedic Massage**

Ayurvedic Massage is a kind of healing treatment specifically used in trying to smooth out the release of toxins from inside the body. The massage has been used for ages spanning from several centuries. **Ayurvedic massage** is said to have originated in India. The massage uses the same ideas forwarded by other eastern massage therapies. In This idea the body has certain points or regions that massage can make the whole body feel better and heal sooner.

The massage is fast becoming popular in Western countries since it is great for relaxation and offers many types of health benefits.

Since ayurvedic massage uses several kinds of herbs and oils, it is recommended that people who plan to undergo such treatment inform their therapist of any kind of skin irritation or allergies. Also, recent injuries or health

condition should also be communicated for the therapist to adjust the treatment to better suit the client.

The massage usually takes about an hour or two depending on the type of massage used. Every treatment uses certain oils and herbs.

### **Ayurvedic Massage Techniques**

Varying massage techniques are used and applied in different pressure points in the body. There are times when two or more therapists do the treatment.

### **Health Benefits of Ayurvedic Massage**

In ancient India and even up until today, *Ayurvedic massage* is used as a means to treat several health illnesses. The massage is said to be great in flushing out toxins from inside the body.

Some health benefits of Ayurvedic massage are as follows.

#### **(a) Helps in Delaying Signs of Aging**

In manipulating several pressure point of the body through different types of massage technique, the ayurvedic massage helps in the proper functioning of the body. It helps in the improvement of the circulation of hormones, blood and lymph. By doing so, ayurvedic massage boost the performance of the immune system, which in return delays old age.

#### **(b) Removes Fatigue**

Fatigue is often caused by muscle strain or several stressors that result to mental strain. There are ayurvedic massage techniques that are great in relaxing and rejuvenating the body. Ayurvedic body massage restores the energy and improves the flow of energy inside the body. While ayurvedic head massage techniques are helpful in removing fatigue that is caused by mental strain. (Ayurvedic Massage: India's healing massage, [http://massagetherapymag.com/ayurvedic-massage /](http://massagetherapymag.com/ayurvedic-massage/)).

### 1.7.1.2. Chinese Massage - Tui Na

Chinese Massage is an ancient tradition, being part of Traditional Chinese Medicine. This effective and comprehensive therapy is also closely related to Herbal Medicine, Acupuncture and Acupressure.

#### Techniques of Chinese Massage

The Chinese Massage comes in different forms. As mentioned earlier, not all types can help with the specific ailment that you have. Besides that, each type has its own technique as well. Here are some of the most common traditional ones:

- **Reflexology:** The theory behind this is that your hands and your feet are all connected to each other. Here, a part in your sole will be massaged because the nerve or blood vessel there has a direct connection to that organ.
- **Acupressure:** The principle behind this is very much like acupuncture, except needles are not used. There are pressure points in the whole body which can be triggered so that the energy will be released, helping the person feel relief from the pain or relaxed.
- **Tui na:** Very similar to other kinds of traditional Chinese therapies, this also targets the Chi or energy within the body. It is believed that diseases and other ailments are caused by blocked or diminished Chi.

#### Health Benefits of Chinese Massage

Advocates of the Chinese Massage swear that this can yield positive effects to the person who needs it.

- Like most types of massage, this can be done primarily for relaxation.
- Helps and promotes good sleep daily.
- Makes you feel good about yourself.

But those are not the only benefits of this sort of massage. However, to ensure that the results will truly be effective, the Chinese Massage must be done by experts in the field only since there are a lot of complexities in the process.

- This can help alleviate symptoms of diseases that cannot be treated by Medicine.
- Cures ailments like migraines, tension headaches, dysmenorrhea (menstrual pains) and even toothache.
- Prepares expectant mothers for their labor pains
- Treats some chronic diseases and body ailment. (<http://massagetherapymag.com/chinese-massage/>).

### **1.7.1.3. Thailand's Massage -Thai Massage**

Experts in Thai massage believe that this kind of massage has been developed by a physician to Buddha named Jivaka Kumar Bhaccha, over two thousand and five hundred years ago in India. It somehow was able to make its way to Thai traditions, where Ayurvedic massage techniques were slowly becoming influenced by traditional methods of Chinese medicine. This type of massage was once performed by monks in healing rituals and is part of traditional Thai medicine which also combines meditation; nutritional counseling and herbs which are both taken internally and applied on the body with heated oils.

#### **Benefits of Thai Massage**

According to the results of medical and scientific research, Thai massage actually has some of the following benefits.

- benefits related to reducing stress,
- relaxation,
- improvement in the circulation,
- increase in flexibility,
- improvement in the ROM or range of motion,
- Focus on the mind and the body.

(<http://bettermassagetherapy.com/thaimassage.php>).

#### **1.7.1.4. Korean Massage - Bu Huang**

A Korean massage typically lasts for over two hours, and if done in the traditional form, can be painful. The first hour of a Korean massage is a dry massage. A Korean massage parlor will provide clothing; however, the routine in the beginning incorporates a minimalistic vibe. The dry massage is a deep-massage that is not meant to be relaxing, but instead beneficial. The dry massage portion loosens up the blood and frees up the muscle from tightness. Following roughly an hour of the dry massage, the practitioner will incorporate oil into the procedure. The oil massage is similar to the dry massage, although it is much more soothing and soft. The oil is applied to the parts of the body that are susceptible to aching and fatigue. Following the oil portion of the massage, the practitioner will utilize various Asian techniques including a Shiatsu-style massage. It is common for the practitioner to get on top of the massage table, and use his/her feet and toes for a deep tissue massage.

The Korean massage is meant to be felt, both inside the mind and in the body itself. Another typical method incorporated into many Korean massages is what is referred to as "Bu Huang." Basically this means cupping; it is a technique used in Korean medicine. Bu Huang is the art of pricking ones skin with small needles to increase blood flow. A suction device is used to raise the skin before the needles are applied. Although this sounds like a frightening prospect, the Korean massage is one of the oldest and most effective forms of therapeutic medicine.

(<http://disease.disease.com/Therapy/Therapy-Massage/korean-massage.html>38).

#### **1.7.1. 5. Japanese Massage - Shiatsu Massage**

The philosophy underlying Shiatsu is that vital energy (known as Ki in Japanese) flows throughout the body in a series of channels called meridians. For many different reasons Ki can stop flowing freely and this then produces symptoms. Your Shiatsu practitioner will consider your state of health, the symptoms you are experiencing and, depending on your constitution and general energy levels, will use a variety of techniques to improve your energy

flow. These may include gentle holding, pressing with palms, thumbs, fingers, elbows, knees and feet on the meridians and, when appropriate, more dynamic rotations and stretches. As the quality of Ki changes, the symptoms associated with a lack of flow will gradually improve.

Shiatsu is a therapy that works on the individual as a complete being - not just the physical body but also on an emotional and/or mental level. Japanese massage or shiatsu massage is an ancient therapy in eastern cultures but it did not become popular in the West until the early part of the 20th century. This type of massage differs from traditional Western Massage (which is typically Swedish massage) because the emphasis is on a focused pressure in one spot rather than long light strokes throughout. Shiatsu uses palms and fingertips to apply pressure to one specific part of the body at a time. It can cover the whole body eventually but since it does it one area at a time this could take quite awhile. Like a lot of Eastern therapies, Japanese massage emphasizes energy points and attempts to correct imbalances in the body's energy.

Muscles can become knotted for a variety of reasons including stress and poor posture as well as straining your muscle or even injury. Your muscles become tense in order to protect themselves from further injury. This creates and knot in the muscle that hurts. Shiatsu applies pressure to these knots that causes them to be released and your muscle to get back into a healthy state. Using pressure with the thumb and fingertips as well as palms can help improve circulation and blood flow to the muscles. This can be both relaxing and stimulating at the same time. Usually the session of shiatsu massage lasts between 40 minutes to one hour.

### **Benefits of Shiatsu Massage**

- Reduction of stress
- Deep muscle relaxation
- Lessens disorders like anxiety, arthritis, leg cramps, depression, headaches, nausea etc.
- Relief from conditions like digestive dysfunction, insomnia, high blood pressure and muscle problems

- Increases flexibility
- Improves posture and breathing
- Reduces blood pressure
- Increases blood circulation
- Balances body's energy flow
- Helps in preventing diseases
- Promotes sleep
- Relief of carpal tunnel syndrome.

(<http://bettermassagetherapy.com/shiatsumassage.php>).

### **1.7.2. Western Massage**

Traditional European massage is based on Western concepts of anatomy, pathology, and physiology. Western massage works on various parts of body, such as the digestive system, the nervous system, and the musculoskeletal system, for the purpose of realigning and restoring the whole system. It combines five basic strokes: effleurage (gliding), friction, percussion (tapping), petrissage (kneading), and vibration.

Most massage schools offer instruction in Swedish massage - the most popular form of traditional European massage - which is used to promote general relaxation, improve circulation and range of motion, and relieve muscle tension. Western massage combined with bodywork and movement therapy has resulted in the Alexander technique, the Feldenkrais method, Heller work, Pilates, structural integration, and the Trager approach, to name a few. Thus, in connection with this, techniques and its benefits of contemporary Western massage are described below in the title of Swedish massage. (<http://www.spabeautyschools.com/article/v/8755/eastern-massage-or-western-massagewhich-should-you-study-/>).

#### **1.7.2.1. Swedish Massage**

Massage is an ancient therapeutic treatment. Countless civilizations throughout history have recognized the healing power of human touch, especially in Eastern cultures (Ancient Rome, Greece, China and Egypt).



Swedish massage gets its name from Per Henrik Ling, a Swedish doctor who, in the 1800s looked at Eastern and Western Massage traditions and developed his own scientific system of massage movements which forms the basis of many massage techniques today. This Swedish massage system includes long smooth strokes (effleurage), kneading (petrissage) and friction and tapping (tapotement) all of which work to relax tired and aching muscles whilst encouraging the flow of blood and lymph and enhancing skin tone.

Ideal for specific physical problems such as muscle tension and tendon and ligament problems, massage can be used to relax muscles after physical exertion or to warm and loosen them in preparation for exercise. Massage is also a great mental and emotional stress reliever. A treatment leaves clients feeling refreshed and rejuvenated.

As with all Complementary Therapies, an initial consultation is carried out before the first treatment. The area massaged first is usually the back because working muscles along the length of the spine helps to soothe the central nervous system and relax the client for the duration of the treatment session. A client's modesty is protected at all times by towels and a blanket if required. After care advice is given such as drink plenty of water, avoid alcohol and take time to relax if possible.

### **Health Benefits of Swedish Massage**

Swedish massage is a gentle, soothing full body massage technique. It promotes health and well being by affecting muscles, nerves and circulation.

Swedish massage has been found to have many benefits, including:

- Muscle relaxation (Reduction in muscle spasm, pain and tension)
- Release of endorphins, the body's natural painkillers
- Relaxation and therefore reduction in anxiety
- Improved blood circulation without increasing load of heart
- Improved lymphatic drainage
- Improved mobility
- Reduction of swelling caused by an accumulation of fluid in the tissues
- Balancing the overall flow of natural life energy through the body
- Inducing general feelings of relaxation and well-being through the comfort of human touch.
- Stimulation of the skin and nervous system

- Reduction of physical and emotional stress
- Stretching of the ligaments and tendons, keeping them supple
- Relief of carpal tunnel syndrome
- Another benefit of the Swedish massage is its ability to help you sleep. With sleep your mind will be able to rest and your immune system will be able to work properly once again.

(<http://swedishmassage.blogspot.com/swedish-massage-techniques/>).

### **1.7.3. Manual Massage Therapy**

Manual Massage Therapy is a hands-on manipulation of the soft tissues of the body including muscles, connective tissue, tendons, ligaments and joints. It is also an alternative health option to help alleviate the soft tissue discomfort associated with everyday and occupational stresses, muscular overuse and many chronic pain syndromes. It can also greatly reduce the development of painful muscular patterning, if employed early enough after accidents involving trauma and injury.

Massage therapists work to improve the circulation of blood through the body and to speed the removal of metabolic waste products from muscles. Their skilled kneading increases the flexibility of muscles, ligaments, and other soft tissues.

#### **Benefits of Massage Therapy**

**Reduces Body Pain:** It has been observed that rubbing the affected area can block the pain signals from reaching the brain. This idea is called the "Gate Control Theory". The path of travel of the pain signals starts from the affected area, to the spinal cord and then ultimately to the brain. When the affected area is rubbed, other impulses also reach the brain via the same nerve. This clogs the pain signal and the pain impulse gets reduced. A study conducted in 2003 showed that massage worked better than acupuncture or spinal modification for persistent low back pain, reducing the need for painkiller by 36 percent.

**Reduces Stress:** Massage includes giving the right pressure at specific points to allow the senses to relax. The system of nerves is interconnected and so when a pressure point blocks a nerve, other nerves in the system get affected as well. Massages help in the release of these pressure points making you feel stress free. Also, several studies show that massage reduces the levels of the stress hormone cortisol by up to 50 percent while boosting the feel-good hormones serotonin and dopamine. This can help relieve depression and anxiety.

**Relaxes Muscles:** Body pain is a common condition observed due to pressure of work life, incorrect posture and tension of daily life. Tension in the muscles and reduced circulation of blood can lead to body pain. Reduced blood circulation cuts the supply of oxygen in the muscles and this condition supports the development of body pain. A body massage increases blood circulation and helps release tension from the muscles. This facilitates the supply of oxygen in the muscles and may help them heal faster. This leads to a reduction in the body pain.

**Adds a healthy glow to the skin:** Massaging improves the blood circulation of the body and this influences the availability of vital nutrients to all the cells. This in turn, adds a healthy glow to the skin. Additionally, during the process of massaging, the dead skin gets removed and the skin assumes a fresh appearance. The stress releasing effect of body massages also contributes towards glowing skin.

**Improves Quality of Sleep:** Regular sessions of therapeutic massage bring a peace of mind and this improves the quality of sleep. While getting a massage therapy, the body assumes a peaceful and a relaxing position. This allows the systems of the body to unwind completely. Additionally, according to a study conducted at the Touch Research Institute, massage increases the delta waves in your brain which are linked to deep sleep. That's why it's easy to drift off on the massage table.

**Enhances Range of Motion:** Massage therapies increase the range of motion and bring down the risk of injuries. Frequent sessions bring flexibility to the tight muscle tissues by improving blood circulation.

**Boosts Energy:** Regular massages lead to the rejuvenation of the body's energy. The body relaxes as if it is in the sleep mode during the process of body massaging. This relaxation process boosts up the power of the body for the entire day. Also, the increased blood circulation due to massage increases the flow of nutrients in your body which can have an overall impact on your energy level.

**Stress Relief:** The most obvious reason why men and women get a massage is to relieve their stress. A massage is a great physical and mental stress relief in your body. A good massage will reduce the stress in your body. It should also help lower your anxiety levels. Many doctors recommend message therapy to their patients because of the wonderful health benefits.

**Nervous System:** Many men and women suffer from pain in their body because of their nervous system. The human body nervous system can provide lots of tension and pain in your body when it is not acting right. One of the health benefits of massaging is relieving the pain that can be caused by the nervous system. Massage can help relax and calm your nervous system. This helps with the tension in your body.

**Muscular System:** Getting a good massage done will ease your muscle tension. This can ease pain in your muscles and joints. This will aid in your body relaxation. It will also help increase your muscle tone.

**Blood Circulation:** Message therapy can really help with your blood circulation. It will help your blood circulation flow better. For example, a man or women with diabetes may really notice the difference after having message therapy. Massage helps carry the oxygen through your body better. This is great for your heart too. It may help your heart work better because your blood is circulating healthier in your body.

**Respiratory System:** You might find that you can breathe better after having massage therapy. Massaging can help you if you suffer from asthma. It helps settle coughing in your body. A massage may help you when you are feeling under the weather because your respiratory system is out of whack. Massage lets you breathe better and feel more relaxed when you have respiratory issues.

**Immune System:** You may find that if you are sick a good massage may help you to feel better. Massage therapy helps strengthen your immune system. It helps to build up your protective cells in your body.

**Helps Cancer patients:** Studies have shown that massage can promote relaxation and may help reduce pain, anxiety, nausea, fatigue, or symptoms of depression. It may even help improve the function of your immune system. A study conducted on 86 women with breast cancer found that women who received two half-hour massages twice a week reported a remarkable decrease in fatigue, mood disturbances, and physical discomfort. Another 3 year study conducted on 1,290 cancer patients at Memorial Sloan-Kettering Cancer Center in New York City found that patients who received regular massage therapy reported 52 percent drop in their anxiety level, 40 percent drop in pain, 41 percent drop in fatigue, 31 percent drop in depression, and 21 percent drop in nausea.

Getting a body massage should never be confused with investing in a luxury. In fact, it is an alternative form of treatment. It is a great idea to go for a body massage session once in every week. It is a great way to boost up stamina and energy.

(Benefits of Body massage [http://serenebodytherapy.com/Documents/Benefits\\_of\\_Massage.pdf](http://serenebodytherapy.com/Documents/Benefits_of_Massage.pdf)).

(Massage Therapy (2006-09-01).[http://massagenetwork.com/massage\\_therapy.html](http://massagenetwork.com/massage_therapy.html)) and “Massage Therapy as CAM”. The National Center for Complementary and Alternative Medicine (NCCAM). Retrieved 2007-09-26.)

#### **1.7 .4. Techniques of Massage**

There are various massage techniques to address different problems of the anatomy and help us de-stress. Here is a little touch of history that will help us understand better the strokes and pressure that make a massage technique. In the 19th century, the many different strokes of massage and their unique physical and psychological benefits were rationalized by Swedish Professor

Henry Ling. Ling's classical strokes define massage as a combination of three movements: Effleurage, Petrissage (Kneading), and Percussion.

However, the techniques (strokes) of massage are the following ones.

**(i)Effleurage (Stroking):** Soothing, long, gliding strokes made with the entire flat surface of the hands that may be deep or superficial. The major purpose of this movement is to heighten circulation and increase depth of relaxation.

**(ii)Petrissage (kneading):** Firmly but gently grasping the skin and surface muscles with thumb and fingers, and rolling, squeezing, or wringing them, and dropping them back into place. It allows detailed work on the body.Petrissage is recommended on children and older adults.

**(iii)Percussion:** Stimulating, rapid alternate movements using both hands in:

a) Tapping - using fingertips;

b) Hacking -using chop movements with stretched fingers;

c) Cupping - using cupped hand movements;

d) Slapping - using flat, open palms;

e) Pounding - using both fists;

f) Tapotement (rhythmic tapping)- the lightest percussion-using drumming movements with fingertips .It is stimulating to the muscles and may be stimulating or calming to the nerves.

**iv)Friction(cross fiber)** May be long, slow, firm stroking movements or rolling circular movement in which the hand is kept in contact with the skin and the superficial tissues are moved over the deeper underlying ones. Used in treatment of joints and around bony prominences to break down adhesions, clear out congestion and toxic waste build-up. It raises local temperature and should be followed by effleurage.

**v) Vibration: (shaking):** Very rapid back and forth shaking or trembling movements performed by the whole hand or the fingers; used on the upper

back, buttocks and thighs. Has a stimulating effect upon the nervous system by acting on the nerve centers or terminal nerve branches.

**Pressure** can vary from light to moderate to heavy depending on the type of massage and the objective of the massage. (Techniques of Massage, <http://www.massagehealththerapy.com/strokes-and-pressures.html>).

### **1.7.5. Types of Massage**

There are many massage styles or types that will improve your health by acting directly on the circulatory, muscular, and nervous and immune systems. Given below are the top massage styles or types that have therapeutic affect and keep your body balanced, healthy and fresh.

#### **1.7.5.1. Acupressure Massage**

Acupressure is an ancient healing art that uses the fingers to press key points on the surface of the skin to stimulate the body's natural self-curative abilities. When these points are pressed, they release muscular tension and promote the circulation of blood and the body's life force (sometimes known as qi or chi) to aid healing. Acupuncture and acupressure use the same points, but acupuncture employs needles, while acupressure uses the gentle, but firm pressure of hands and feet. Acupressure continues to be the most effective method for self-treatment of tension-related ailments by using the power and sensitivity of the human hand. Acupressure can be effective in helping relieve headaches, eye strain, sinus problems, neck pain, backaches, arthritis, muscle aches, tension due to stress, ulcer pain, menstrual cramps, lower backaches, constipation, and indigestion. Self-acupressure can also be used to relieve anxiety and improve sleep. There are also great advantages to using acupressure as a way to balance the body and maintain good health. The healing touch of acupressure reduces tension, increases circulation, and enables the body to relax deeply. By relieving stress, acupressure strengthens resistance to disease and promotes wellness. In acupressure, local symptoms are considered an expression of the condition of the body as a whole. A tension headache, for instance, may be rooted in the shoulder and neck area. Thus, acupressure focuses on relieving pain and discomfort, as well as

responding to tension, before it develops into a disease—before the constrictions and imbalances can do further damage. The origins of acupressure are as ancient as the instinctive impulse to hold your forehead or temples when you have a headache. Everyone at one time or another has used their hands spontaneously to hold tense or painful places on the body. More than five thousand years ago, the Chinese discovered that pressing certain points on the body relieved pain where it occurred and also benefited other parts of the body more remote from the pain and the pressure point. Gradually, they found other locations that not only alleviated pain, but also influenced the functioning of certain internal organs.

#### **1.7.5.2. Aromatherapy Massage**

Aromatherapy massage is, massage therapy which uses highly concentrated plant oils, called essential oils for healing, energizing and relaxing. Aromatherapy massage helps in stress-related conditions or conditions with an emotional component. It also helps in, stress-reducing, balancing, insomnia and headaches. Lavender essential oil is one of the most common essential oils used in aromatherapy massage.

#### **1.7.5.3. Deep Tissue Massage**

A light massage might be great to be energized and get your muscles feeling relaxed, but if you have deep muscle knots and chronic pain in your muscles then you probably need a deep tissue massage. This type of massage goes deep into the muscle and kneads away at muscle knots and other problem areas.

Luckily, the massage world has come up with a few techniques to get the job done. These concentrate on massaging the muscle fibers using slow deeper strokes than the traditional effleurage massage. With a deep massage, the goal is to stretch out the muscle fibers and restore them to their natural balance.

In order to achieve this, the massage therapist will need to look for muscle fibers that are shortened. This happens a lot in the neck and shoulder areas and is a result of chronic tension that can happen if you sit in one position too long and is very common among computer users. In fact, anyone that sits in



an office probably has some sort of shortening of the muscle fibers due to improper posture as well as work-related stress. Another way that your muscles can become shortened or tense is as a result of injury. If you're muscle has had a trauma to it, it can tense up in order to protect itself from further injury. Sometimes this causes an adhesion which hinders circulation, therefore limiting movement in creating pain. Releasing this tension with massage can help restore your muscle back to health. A deep tissue massage focuses on these problem areas and uses higher pressure with more pinpointed "tools" such as fingertips and elbows as opposed to using the palm of the hand. It works over a smaller area producing a higher pressure in that one spot. Different people react to this differently, some like you to really dig in and work the spot while others want a lighter pressure because it can actually be quite painful. Using this deep massage, the affected area can be realigned and knots are literally worked out. This improves blood flow which helps to replenish nutrients in the muscle as well as remove toxins. It's amazing how quickly the affected area will feel better once than knot is "worked out". Deep tissue massage therapy has a different goal than classic massage therapy. The classic massage is used to relax the client but the deep tissue work is used for treating chronic pain. Many doctors now feel that a massage is an important part of health care and in fact, the deep tissue work is often used by people with osteoarthritis and fibromyalgia.

(Deep Tissue Massage, <http://www.3fatchicks.com/3-deep-tissue-massage-techniques/>)

#### **1.7.5 .4. Hot Stone Massage**

Hot stone Massage technique involves placing heated, smooth stones on certain points on the body to warm and loosen tight muscles and balance energy centers in the body. The massage therapist may combine a Swedish or Deep Tissue massage technique with the therapeutic properties of Hot Stones or hold stones and apply gentle pressure on them. The warmth of heated stones penetrates deeply into sore, achy muscles and help to relieve muscle tension and relax the body.

### **1.7.5.5. Myofascial Release Massage**

Myofascial release technique is a gentle and highly effective hands-on technique that helps to facilitate release of restrictions in your fascia that can cause tightness and pain. Fascia is a connective tissue that surrounds all body's organs, bones as well as muscles. It is a stretching technique that can relieve your discomfort or pain by just stretching the area.

### **1.7.5. 6. Neuromuscular Massage**

Neuromuscular massage technique is a form of deep tissue massage that is applied to individual muscles in order to balance the nervous system. Neuromuscular massage technique helps to increase blood flow, reduce pain and release trigger points and pressure on the nerves. It is also help to reduce headaches or shoulder pain.

### **1.7 .5.7. Reflexology Massage**

Reflexology massage therapy is a healing art by applying pressure using fingers (usually thumbs), on feet and hands (sometime in ear lobes) to activate reflex points of the organs in the body.

Reflexology showing positive impact on promoting self-healing and relieves illness, also alleviates the sources of illness.

Reflexology is the holistic alternative healing technique by massaging the areas in the feet and hands, which corresponds to the reflexes of the parts or organ. By precise massaging, reflexology can stimulate circulation, induce relaxation and enable homeostasis (remain stable). This encourages the person's own healing systems to maintain well being.

During development of reflexology, it was recognized that the reflexes on the feet and hands were an exact mirror image of the organs of the body. It is sufficient to say that it has stood the test of time and has helped thousands of people to have better health.

Literally, reflexology means “Reflex” is an involuntary or instinctive movement in response to a “stimulus” or in the sense of reflection or mirror image. The reflexes on our feet and hands act as mirror images of the body.

As per American Medical Association, 85% of illnesses are contributing by stress and tension. Reflexology can induce relaxation and clearing this nervous stress and tension and induce self-healing.

The origin of Reflexology was dating back as much as 5000 years ago by ancient Egyptians (2300 B.C.), as evidenced by inscriptions found in the physician’s tomb at Saqqara in Egypt. The Physicians Temple in Nara, Japan shows evidence of reflexology practiced in Japan until 690 A.D.

Reflexology spread across India, Japan, and China. Traditional East Asian foot reflexology formerly known as Zoku Shin Do in Japan. It is the foot massage technique practiced by Japanese. The roots of Zoku Shin Do go back to China over 5000 years ago.

Reflexology was further refined in the 1930s and 1940s by Eunice D. Ingham, a nurse and physiotherapist. Ingham described that the feet and the hands were more sensitive, and mapped the entire body into "reflexes" on the feet. (<http://healthy-ojas.com/systems/reflexology.html>)

#### **1.7.5.8. Relaxation Massage**

Relaxation massage is essentially the same as a gentle Swedish massage that uses smooth, gliding strokes. The primary purpose will be to help you relax, and the massage therapist will probably move at a slower pace and use light pressure.

During a relaxation massage there is less emphasis on working out serious adhesions or knots in the muscle tissue and the therapist won't push your pain limits in order to get the muscle to release. Sometimes people even fall asleep during a relaxation massage.

There are still substantial health benefits to a relaxation massage, including calming the nervous system, promoting a sense of well-being, improving blood circulation and stimulating the body's lymph.

(Types of Massage, <http://www.tarunaoils.com/articles/massage-styles-techniques.asp>).

## **1.8. Medical Massage**

Medicine has several branches such as "Preventive medicine" which focuses on preventing disease. Alternative medicine treats disease without the use of drugs. Complementary medicine combines traditional medicine with alternative medicine.

Thus that Massage is most effective when it is part of an integrative approach to disease treatment and prevention. Our approach looks at addressing the cause of the disease in addition to treating or simply masking the signs or symptoms of the disease. In this connection, the term "massage" has several origins. The most direct origin comes from the French word, *massage*, meaning "friction or kneading," or from Arabic *massa* meaning "to touch, feel or handle" or from Latin *Massa* meaning "mass, dough". An older etymology may even have been the Hebrew *me-sakj* "to anoint with oil". In distinction the ancient Greek word for massage was *anatripsis*, and the Latin was *frictio*.

In a more technical perspective, "Massage therapy or bodywork" means the science and healing art that uses manual actions to:

**1) Palpate:** Palpation is the assessment (usually with the hands of a healthcare practitioner) of a patient's or client's tissues to identify swelling or muscle tone, to assess range and quality of joint motion, and provoking or qualifying pain with pressure or stretching.

**2) Manipulate:** Massage use various pressures (deep to light, structured to unstructured, stationary, or moving) and techniques (tension, motion, or vibration, done manually or with mechanical aids) to act on and manipulate the body. The massage is applied with the hands, fingers, elbows, forearm, and feet.

**3) The Soft Tissue:** Soft tissue includes tendons, ligaments, fascia, fibrous tissues, fat, and synovial membranes, and muscles, nerves and blood vessels of the human body.

**4) To create a positive outcome for the client.** The immediate outcomes improve circulation, reduce tension, relieve soft tissue pain, or increase flexibility.

Medical massage combines advanced soft-tissue techniques with patient-specific treatment plans. Best Massage therapists also integrate relaxation massage, and use the session to reduce stress, thus maximizing the client's ability to heal.

After completing a functional assessment and using the intake form and initial interview to assess the client's health, the effective massage practitioner uses a variety of proven modalities to treat the patient or client.

It is critical to realize that invoking a relaxation response is just as medically important as is using other techniques such as:

- myofascial release
- neuromuscular therapy
- scar tissue mobilization
- neuromuscular re-education
- Proprioceptive Neuromuscular Facilitation (PNF) stretching.

It is wise to treat the whole body. The body seeks balance and will do whatever it has to function properly, if it means creating less than optimal posture or walking patterns or throwing the muscles out of whack to create the illusion of balance.

Furthermore, since every part of the body is somehow affected by every other part of the body (like ankle pain affecting lower back pain and shoulder and neck pain), full-body treatments are often the best approach to achieving results.

At times, the massage therapist focuses primarily on areas that are specific to injury or disease.

Consequently the length of the session may last from 15 minutes up to two hours. Three or four hour sessions are also possible, especially where Myofascial release is part of the massage therapy regimen.

These shorter sessions use massage therapy to treat specific injuries, such as whiplash, or specific regions, such as the lumbar-pelvic region.

Cumulatively, repeated massage sessions can help relax the muscles, increase and maintain range of motion, decrease stress and tension, increase circulation, and prevent and breakdown scar tissue formation.

Massage therapy allows us to treat pain quickly and without drugs (and the side effects that many prescription or over-the-counter drugs deliver). There are so many positive, documented benefits to receiving massage on a regular basis

### **Physical Benefits of Medical Massage**

- Helps relieve stress and aids relaxation
- Helps relieve muscle tension and stiffness
- Alleviates discomfort during pregnancy
- Fosters faster healing of strained muscles and sprained ligaments;
- reduces pain and swelling;
- reduces formation of excessive scar tissue
- Reduces muscle spasms
- Provides greater joint flexibility and range of motion
- Enhances athletic performance; Treats injuries caused during sport or work
- Promotes deeper and easier breathing
- Improves circulation of blood and movement of lymph fluids
- Reduces blood pressure
- Helps relieve tension-related headaches and effects of eye-strain
- Enhances the health and nourishment of skin
- Improves posture
- Strengthens the immune system
- Treats musculoskeletal problems

- Rehabilitation post operative
- Rehabilitation after injury

### **Mental Benefits of Medical Massage**

- Fosters peace of mind
- Promotes a relaxed state of mental alertness
- Helps relieve mental stress
- Improves ability to monitor stress signals and respond appropriately
- Enhances capacity for calm thinking and creativity

### **Emotional Benefits of Medical Massage**

- Satisfies needs for caring nurturing touch
- Fosters a feeling of well-being
- Reduces levels of anxiety
- Creates body awareness
- Increases awareness of mind-body connection

(Medical Massage, <http://www.milwaukeebestmassage.com/medical-massage.html>).

## **1.9. Sports Massage**

Massage has become an integral part of the new athletic regimen from sports medicine clinics, to college training rooms, to professional locker rooms to Olympic training. Growing number of trainers believe that massage can provide an extra edge to the athletes who participate in high performance sports. Massage has become a necessary ingredient for a complete workout. More and more people are realizing that a complete workout routine includes not only the exercise itself, but also caring for the wear-and-tear and minor injuries that naturally occur with strenuous movement. The physiological and psychological benefits of massage make it an ideal complement to a total conditioning program.

Anyone who routinely stretches their physical limits through movement such as running, cycling, hiking, swimming, dancing, tennis and other racquet

sports, strength training and aerobics can benefit from a massage. There are others who do strenuous activities in a day that is not normally classified as exercise. Examples are mothers with small children, gardeners, and others who use their bodies strenuously in their work.

Incorporating massage in your conditioning program has many benefits. It helps you get into good shape faster, and with less stiffness and soreness. It helps you recover faster from heavy workouts, and relieves conditions which may cause injury.

Regular exercise increases vigor and promotes a general sense of well-being. If done in moderation, it can help relieve the effects of stress, and has been linked to decrease in psychological depression.

Regular exercise produces positive physical results like increased muscular strength and endurance, more efficient heart and respiratory functioning, and greater flexibility.

These positive physical changes occur as the body gradually adapts to the greater demands put on it by regular exercise. The body improves its functioning to meet the challenges placed on it.

Conditionings involve three steps or phases:

**Tearing down phase-** when one pushes the physical limits.

**Recovery Phase** - Important for the rebuilding phase and to obtain the full benefits of a conditioning program.

**Buildup Phase** - when the system adapts to the new demands placed on it.

The 'tearing down' phase of the adaptation process often involves stiffness and soreness, especially when the amount of movement is significantly increased from what the body has been used to in the past.

Delayed muscle soreness (24-48 hours after exercise) may be caused by any of a number of different factors. Some possible causes are minor muscle or connective tissue damage, local muscle spasms that reduce blood flow or a buildup of waste products (metabolites) from energy production.



Trigger points or stress points may also cause muscle soreness and decreased flexibility. These points are specific spots in muscle and tendons which cause pain when pressed, and which may radiate pain to a larger area. They are not bruises, but are thought by some to be small areas of spasm. Trigger points may be caused by sudden trauma (like falling or being hit), or may develop over time from the stress and strain of heavy physical exertion or from repeated use of a particular muscle.

Heavily exercised muscles may also lose their capacity to relax, causing chronically tight (hypertonic) muscles, and loss of flexibility. Lack of flexibility is often linked to muscle soreness, and predisposes you to injuries, especially muscle pulls and tears. Blood flow through tight muscles is poor (ischemia), which also causes pain.

### **Techniques of Sports Massage**

Each sport and athletic event uses muscle groups in a different way. Sports massage therapists must be familiar with each muscle, the muscle groups and how they are affected by the specific movements and stresses of each sport. They also are trained in the appropriate uses of hydrotherapy and cryotherapy.

Traditional western (e.g. Swedish) massage is currently the most common approach used for conditioning programs. It is frequently supplemented by other massage therapy techniques including deep tissue massage, trigger point work, acupressure, compression massage, cross-fiber massage, lymphatic massage, trigger point/tender point massage.

### **Benefits of Sports Massage**

We can benefit from the regular sports massage as indicated below.

- Reduce the chance of injury, through proper stretching and event preparation, and through deep tissue massage
- Improve range of motion and muscle flexibility, resulting in improved power and performance
- Shorten recovery time between workouts

- Maximize the supply of nutrients and oxygen through increased blood flow
- Enhance elimination of metabolic by-products of exercise.

In addition, the followings are some its immersive benefits.

**Recovery:** Therapeutic massage helps the body recover from the stresses of strenuous exercise, and facilitates the rebuilding phase of conditioning. The physiological benefits of massage include improved blood and lymph circulation, muscle relaxation, and general relaxation. These, in turn, lead to removal of waste products and better cell nutrition, normalization and greater elasticity of tissues, deactivation of trigger points, and faster healing of injuries. It all adds up to relief from soreness and stiffness, better flexibility, and less potential for future injury.

In addition to general recovery, massage may also focus on specific muscles used in a sport or fitness activity. For example, areas of greater stress for runners and dancers are in the legs, for swimmers in the upper body, for tennis players in the arms. These areas are more likely to be tight, lose flexibility, and develop trigger points.

**Over-training:** Adequate recovery is also a major factor in avoiding the over-training syndrome. Over-training is characterized by irritability, apathy, altered appetite, increased frequency of injury, increased resting heart rate, and/or insomnia. It occurs when the body is not allowed to recover adequately between bouts of heavy exercise. Therapeutic massage helps you avoid over-training by facilitating recovery through general relaxation, and its other physiological effects.

**Trouble spots:** You may also have your own unique trouble spots, perhaps from past injuries. A massage therapist can pay special attention to these areas, monitor them for developing problems, and help keep them in good condition. An experienced massage therapist can also compliment treatment received from other health care professionals for various injuries. You may also have your own unique trouble spots, perhaps from past injuries. A massage therapist can pay special attention to these areas, monitor them for

developing problems, and help keep them in good condition. An experienced massage therapist can also compliment treatment received from other health care professionals for various injuries.

## **Areas of Sports Massage**

Sports massage may involve prevention and maintenance programs, on-site treatment before and after an athletic event, and rehabilitation programs for those who are injured during the program. There are three areas of Sports Massage as mentioned below.

### **I. Maintenance Massage**

An effective maintenance program is based on the massage therapists' understanding of anatomy and kinesiology, combined with an expert knowledge of which muscles are used in a given sport and which are likely candidates for trouble. By zeroing in on particular muscle groups and working specific tissues, the sports massage therapist can help the athlete maintain or improve range of motion and muscle flexibility. The overall objective of a maintenance program is to help the athlete reach optimal performance through injury-free training.

### **II. Event Massage**

a) **Pre-event:** Pre-event sports massage is given within the four hours preceding an event to improve performance and help decrease injuries. It is used as a supplement to an athlete's warm-up to enhance circulation and reduce excess muscle and mental tension prior to competition. It is normally shorter (10-15 minutes) than a regular conditioning massage, and focuses on warming-up the major muscles to be used, and getting the athlete in a good mental state for competition. It also improves tissue pliability, readying the athlete for top performance. Certain massage techniques can help calm a nervous athlete, and others can be stimulating. Pre-event sports massage is given within the four hours preceding an event to improve performance and help decrease injuries. It is used as a supplement to an athlete's warm-up to enhance circulation and reduce excess muscle and mental tension prior to competition. It is normally shorter (10-15 minutes) than a regular conditioning

massage, and focuses on warming-up the major muscles to be used, and getting the athlete in a good mental state for competition. It also improves tissue pliability, readying the athlete for top performance. Certain massage techniques can help calm a nervous athlete, and others can be stimulating.

**b) Inter/Intra-event:** Inter- and intra-event massage is given between events or in time-outs to help athletes recover from the preceding activity, and prepare for the activity coming up. It is also short, and focuses on the major muscles stressed in the activity. Inter- and intra-event massage is given between events or in time-outs to help athletes recover from the preceding activity, and prepare for the activity coming up. It is also short, and focuses on the major muscles stressed in the activity.

**c) Post-event:** Post-event sports massage is given after a competition and is mainly concerned with recovery. It is geared toward reducing the muscle spasms and metabolic build-up that occur with vigorous exercise. Recovery after competition involves not only tissue normalization and repair, but also general relaxation and mental calming. A recovery session might be 15 minutes to 11 or 12 hours in length. Post-event sports massage is given after a competition and is mainly concerned with recovery. It is geared toward reducing the muscle spasms and metabolic build-up that occur with vigorous exercise. Recovery after competition involves not only tissue normalization and repair, but also general relaxation and mental calming.

### **III. Rehabilitation Massage**

Even with preventive maintenance, muscles cramp, tear, bruise, and ache. Sports massage can speed healing and reduce discomfort during the rehabilitation process.

Soft tissue techniques employed by sports massage therapists are effective in the management of both acute and chronic injuries. For example, adding lymphatic massage to the "standard care" procedure in the acute stage of injury will improve control of secondary, hypoxic injury and enhance edemous fluid removal throughout the healing cycle. Trigger point techniques reduce the spasms and pain that occur both in the injured and "compensation"

muscles. Cross-fiber friction techniques applied during the sub acute and maturation phases of healing improve the formation of strong and flexible repair tissue, which is vital in maintaining full pain-free range of motion during rehabilitation.

(Sports Massage, [http://www.holisticonline.com/massage/mas\\_sports.htm](http://www.holisticonline.com/massage/mas_sports.htm)).

### **1.10. Statement of the Problem**

The overall purpose of this study was to assess the role of combinations of health related physical fitness exercises and therapeutic massage in maximizing strengths of calf and thigh muscles of students ranging between the age of 19 and 23 years.

Particularly, the study focuses on the following factors to be assessed.

1. The purpose of the study is to find out the effect of health related physical fitness exercises and therapeutic massage intervention on the selected physical fitness variables in maximizing strengths of calf and thigh muscles of college students.
2. The physical fitness components are compared with the health related physical fitness exercises and therapeutic massage to find out whether there are significant differences that exist among students with respect to their age group.
3. Different training methods and massage techniques are commonly used to improve the physical fitness and the standard of performance of the subjects took part in the experimental research work.
4. Systematic and regular training program caused modifications in physiological and physical functioning of different systems of body and promote high performances.

### 1.11. Objectives of the Study

The overall objectives of the present study were to explore the impacts of health related physical fitness exercises and massage therapy in maximizing strengths of calf and thigh muscles of the College students of Visakhapatnam city.

Specifically, the study seeks the following factors to be assessed.

1. To find out the effects of combinations of health related physical fitness exercises and massage therapy on selected physical fitness variables in maximizing strengths of calf and thigh muscles of the subjects involved in these both interventions.
2. To find out the effect of health related physical fitness exercises (without combination of therapeutic massage) on selected physical fitness variables in maximizing strengths of calf and thigh muscles of the subjects involved in this particular intervention.
3. To compare the **Experimental Group - A students** involved only in health related physical fitness exercises with **Control Group students** who never engaged in exercises and massage interventions on the selected physical fitness variables in maximizing strengths of calf and thigh muscles of the subjects.
4. To compare the **Experimental Group - A students** involved only in health related physical fitness exercises with **Experimental Group - B students** involved in combinations of health related physical fitness exercises and therapeutic massage interventions.
5. To compare the **Experimental Group - B students** involved in combinations of health related physical fitness exercises and therapeutic massage interventions with **Control Group students** who never engaged in exercises and massage interventions on the selected physical fitness variables in maximizing strengths of calf and thigh muscles of the subjects

6. To determine the most effective interventions between combinations of health -related physical fitness exercises and therapeutic massage and that of only health related physical fitness exercises.

7. To suggest tangible measures in maximizing the level of strengths of calf and thigh muscles of the subjects.

### **1.12. Research Questions**

In the course of the study, efforts were made to seek answers to the following basic questions.

1. Do the combinations of health related physical fitness exercises with therapeutic massage experience any effect on strengths of thigh and calf muscles?

2. What would be the effect of health related physical fitness exercises in maximizing strengths of thigh and calf muscles?

3. What would be the impact of therapeutic massage for maintaining healthy performance of thigh and calf muscles?

### **1.13. Hypotheses of the Study**

On the basis of available literature, experts' opinions, and the scholar's own understanding of the problem, the following hypotheses were formulated in connection with exploring the impacts of health related physical fitness exercises with therapeutic massage on the selected physical variables in maximizing thigh and calf muscles of the College students of Visakhapatnam city. Hence the following thirty seven hypotheses were formulated for the present study.

1. There is no significant difference between Pre-tests and Post-tests of Control Group students with respect to Explosive Strength in Long Jump from stationary position towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

2. There is no significant difference between Pre-tests and Post-tests of Experimental Group - A students with respect to Explosive Strength in Long Jump from stationary position towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
3. There is no significant difference between Pre-tests and Post-tests of Experimental Group - B students with respect to Explosive Strength in Long Jump from stationary position towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
4. There is no significant difference between Pre-tests and Post tests of Control Group students with respect to Speed-Strength in Shuttle Run towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
5. There is no significant difference between Pre-tests and Post-tests of Experimental Group - A students with respect to Speed-Strength in Shuttle Run towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
6. There is no significant difference between Pre-tests and Post-tests of Experimental Group - B students with respect to Speed-Strength in Shuttle Run towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
7. There is no significant difference between Pre-tests and Post tests of Control Group students with respect to Speed-Strength in 50 Meters Dash towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.



8. There is no significant difference between Pre-tests and Post tests of Experimental Group - A students with respect to Speed-Strength in 50 Meters Dash towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
9. There is no significant difference between Pre-tests and Post tests of Experimental Group - B students with respect to Speed-Strength in 50 Meters Dash towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
10. There is no significant difference between Pre-tests and Post tests of Control Group students with respect to Speed, Explosive-strength and functional performance of Right Leg from Hop Steps with Right Leg in a given distance of 20 meters towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
11. There is no significant difference between Pre-tests and Post tests of Experimental Group - A students with respect to speed, explosive-strength and functional performance of Right Leg from Hop Steps with Right Leg in a given distance of 20 meters towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
12. There is no significant difference between Pre-tests and Post tests of Experimental Group - B students with respect to speed, explosive-strength and functional performance of Right Leg from Hop Steps with Right Leg in a given distance of 20 meters towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.
13. There is no significant difference between Pre-tests and Post tests of Control Group students with respect to Speed, Explosive-strength and functional performance of Left Leg from Hop Steps with Left Leg in a given distance of 20 meters towards the Effect of Health Related Physical Fitness

Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

14. There is no significant difference between Pre-tests and Post-tests of Experimental Group - A students with respect to Speed, Explosive-strength and functional performance of Left Leg from Hop Steps with Left Leg in a given distance of 20 meters towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

15. There is no significant difference between Pre-tests and Post tests of Experimental Group - B students with respect to Speed, Explosive-strength and functional performance of Left Leg from Hop Steps with Left Leg in a given distance of 20 meters towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

16. There is no significant difference between Pre-tests and Post tests of control Group students with respect to Speed - endurance and strength of calf and thigh muscles from 800 Meters Run towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

17. There is no significant difference between Pre-tests and Post tests of Experimental Group - A students with respect to Speed - endurance and strength of calf and thigh muscles from 800 Meters Run towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

18. There is no significant difference between Pre-tests and Post tests of Experimental Group - B students with respect to Speed - endurance and strength of thigh and calf muscles from 800 Meters Run towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

19. There is no significant difference among the students based on their test groups i.e., Control Group, Experimental Group - A and Experimental Group - B with respect to Explosive Strength in Long jump from stationary position towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

20. There is no significant difference among the students based on their test groups i.e., Control Group , Experimental Group -A and Experimental Group - B with respect to Speed-Strength in Shuttle Run towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

21. There is no significant difference among the students based on their test groups i.e., Control Group , Experimental Group - A and Experimental Group - B with respect to Speed-Strength in 50 Meters Dash towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

22. There is no significant difference among the students based on their test groups i.e., Control Group, Experimental Group - A and Experimental Group - B with respect to Speed, Explosive-strength and functional performance of Right Leg from Hop Steps with Right Leg in a given distance of 20 meters towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

23. There is no significant difference among the students based on their test groups i.e., Control Group, Experimental Group - A and Experimental Group - B with respect to Speed, Explosive-strength and functional performance of Left Leg from Hop Steps with Left Leg in a given distance of 20 meters towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

24. There is no significant difference among the students based on their test groups i.e., Control Group, Experimental Group - A and Experimental Group - B with respect to Speed - endurance and strength of calf and thigh muscles from 800 Meters Run towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

25. There is no relationship between different test items (variables) of Control Group students towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

26. There is no relationship between different test items (variables) of Experimental Group - A students towards the Effect of Health Related Physical Fitness Exercises with Therapeutic Massage on the College Students of Visakhapatnam City.

27. There is no relationship between different test items (variables) of Experimental Group -B students towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

28. There is no relationship between Control Group, Experimental Group -A and Experimental Group - B students in their health related physical fitness test items towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

29. There is no relationship between Pre-tests and Post - tests of Control Group in different test items towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

30. There is no relationship between Pre-tests and Post- tests of Experimental Group - A in different test items towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

31. There is no relationship between Pre-tests and Post tests of Experimental Group - B in different test items (Variables) towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

32. There is no relationship between different test items (Variables) of Control Group pre-test students of variables towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

33. There is no relationship between different test items (Variables) of Control Group post-test students of variables towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

34. There is no relationship between different test items (Variables) of Experimental Group - A pre-test students of variables towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

35. There is no relationship between different test items (Variables) of Experimental Group - A Post-test students of variables towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

36. There is no relationship between different test items (Variables) of Experimental Group - B pre-test students of variables towards the Effect of Health Related Physical Fitness Exercises with Therapeutic Massage on the College Students of Visakhapatnam City.

37. There is no relationship between different test items (Variables) of Experimental Group - B post -test students of variables towards the Effect of Health Related Physical Fitness Exercises and Massage Therapy in maximizing strengths of Calf and Thigh Muscles of the College Students of Visakhapatnam City.

### **1.14. Significance of the Study**

Some of the significances of this study are mentioned below.

1. The study will help to find out the effect of combinations of health related physical fitness exercises with therapeutic massage in maximizing strengths of calf and thigh muscles of male college students between the age group of nineteen and twenty three years.
2. This study will also help to understand whether the combinations of the health related physical fitness exercises with therapeutic massage workouts have got better effects on the selected physical variables among the students of all groups taking part in the study.
3. Health related physical fitness is an essential aspect for every individual to cope up with the rigors of the daily activities or to keep oneself fit and healthy. As the use of the possession of high levels of health related physical fitness are multifaceted, this aspect is to be inculcated into the young minds so that they can develop the attitude of physical culture throughout their life.
4. Remedial measures may be identified to plug the loopholes in the fitness status of the students by suitable fitness and massage workout programs.
5. The study will help to prepare an exercise program for the development of each fitness component and types of massage workouts for a continuous training program.
6. This study helps to find out the status of participants to maintain their strengths of calf and thigh muscles always active.
7. The study could bring a change on minimizing mental and physical stresses of participants in the study.
8. The study helps to find out the degree level of fitness and satisfactions among subjects taking part into this study.
9. The results may be useful to the coaches, fitness trainers, Physical Education teachers and body masseurs/ masseuses for further development.
10. The finding of this study would add to quantum of knowledge in the area of methods of sports and fitness training and massage work out techniques.

11. Different Colleges and Universities would use the findings of this research to make necessary adjustments in their training programs.

12. The outcome of this research study may be useful for various commissions to bring out recommendations to develop physical fitness and health statuses in the community/society.

### **1.15. Delimitations of the Study**

The scope of the study entirely focuses on assessing the following points of delimitations.

The scope of the study entirely focuses on assessing the following points of delimitations.

1. This study is restricted to students from four Degree Colleges namely, Dr. Lankapalli Bullayya College, Prism Degree College, B.V.K. Degree College, and Gayatri Vidya Parishad Degree College. All Colleges are located in Visakhapatnam City and affiliated to Andhra University.

2. The number of subjects is restricted to 45 students from each college i.e.,  $45 \times 4 = 180$  (N=180).

3. The study was confined to only male college students with the age groups of 19 and 23 years during the academic year 2011-2012.

4. The subjects were randomized into three Experimental groups i.e., Control Group, Experimental Group - A and Experimental Group - B.

5. The Experimental variables were limited to Explosive- strength of calf and thigh muscles thereby some variables like speed-endurance, flexibility and balance were also worked out.

6. For Experimental Groups of A and B continuous strength training was given for a period of twelve weeks, which was considered adequate to indicate changes on physical fitness variables.

7. The study was entirely delimited to the effects of two dimensions of interventions such as effects of combinations of health related physical fitness exercises with therapeutic massage and effects of only health related physical fitness exercises.

8. The study was delimited to an Experimental research which uses both quantitative and qualitative methods to collect the data conducted in different test measurements.

9. No special motivations were provided to the subjects and testers.

10. The researcher used all the six physical fitness items basing on AAHPER youth fitness testing manual to conduct the experiment.

### **1.16. Operational Definitions and Explanations of Terms**

For the purposes of this study the following definitions and explanations are used briefly.

**AAHPER:** It is a short name for American Association for Health, Physical Education and Recreation which is used for youth fitness test manual to conduct various experiments with respect to health-related physical fitness exercises.

It is a service giving organization founded on November 27; 1885. The primary mission of the AAHPER is to promote healthy lifestyles by supporting quality programs in physical fitness and health education, physical education, recreation, dance, and sports in American elementary, middle and high schools and colleges. The Headquarter of AAHPER is located in Reston, VA, Virginia, USA.

(AAHPER youth fitness test manual. (Book, 1958) [WorldCat.org]).

**Ayurvedic Massage therapy:** 'In Sanskrit, 'Ayurveda' means 'life science' or 'life health.' Ayurvedic Massage has been practiced for thousands of years. It is a popular form of massage, especially in India, where it originated. Most of the places offering Ayurvedic treatments in India are located in the southern state of Kerala, due to the pleasant climate and abundant supply of medicinal



plants and herbs found there. Oils are an important factor in Ayurveda massages. (<http://klurbauer.hubpages.com/hub/A-Brief-Introduction-to-Ayurvedic-Massage-Therapy>).

**Body Mass Index (BMI):** It is a statistical measure of an individual's scaled weight according to his/her height. It is a simple index of weight-for-height and is widely used by medical, health and fitness professionals to classify underweight, overweight and obesity in adults. (<http://www.buzzle.com/articles/average-weight-for-height.html>)

**Calf Muscles:** The large calf muscle that bulges in the back of your lower leg is called the gastrocnemius muscle. It is most commonly known for painful contractions called having a "Charley horse". The "calf" is made up of several other muscles. The muscles of the calf ,from most superficial to deepest are Gastrocnemius; Soleus; Plantaris; Politeus; Flexor Digitorum Longus; Flexor Hallucious Longus; Fibularis Longus; Fibularis Brevis; Tibialis. The muscle type in all of these muscles is simply skeletal muscle. This is the type that is under voluntary (your own) control. ([http://www.theflexibilitycoach.com/articles/8\\_10\\_ways\\_to\\_stretch\\_tight\\_calf\\_muscles.htm](http://www.theflexibilitycoach.com/articles/8_10_ways_to_stretch_tight_calf_muscles.htm)).

**Delimitation:** In this study the term delimitation refers to the boundary of the study area, selection of subjects, number, sex and age group of subjects, length of time for practical interventions, selection of independent variables, etc.

**Exercise:** A subset of any physical activity requiring physical exertion done for the sake of health with the aim of improving cardio-respiratory or muscular fitness. Exercise is carried out in a more structured manner, and ranges from walking, yogic exercises, lifting weights and martial arts.

**Exercise Science:** It is the study of movement and the associated functional responses and adaptations. In this context, an exercise scientist must understand the scientific basis underlying exercise-induced physiological responses. The field of exercise science involves a range of disciplines similar to those in sports medicine; consequently, it is common for exercise science

professionals to work in sports medicine facilities. (American College of Sports Medicine, <http://www.acsm.org>).

**Health:** health is the level of functional or metabolic efficiency of a living being. In humans, it is the general condition of a person's mind, body and spirit, usually meaning to be free from illness, injury or pain as in "good health" or "healthy". The World Health Organization (WHO) defined health in its broader sense in 1946 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (<http://en.wikipedia.org/wiki/Health>).

**Immune System:** It is a system of biological structures and processes within an organism that protects against disease. In order to function properly, an immune system must detect a wide variety of agents, from viruses to parasitic worms, and distinguish them from the organism's own healthy tissue. Disorders of the immune system can result in autoimmune diseases, inflammatory diseases and cancer. Immunodeficiency occurs when the immune system is less active than normal, resulting in recurring and life-threatening infections. ([http://en.wikipedia.org/wiki/Immune\\_system](http://en.wikipedia.org/wiki/Immune_system)).

**Investigator:** This refers particularly to the person who conducted this study on College Students of Visakhapatnam City.

**Limitation:** This refers to the problems and weaknesses occurred in the research work when objectively and critically observed by the researcher after completing the whole work of the research.

**Manual Massage Therapy:** It is defined as a clinical approach utilizing skilled, specific hands-on techniques, including but not limited to manipulation/mobilization, used by the physical therapist as well as certified athletic trainers in order to improve mobility in areas that are restricted; in joints, in connective tissues or in skeletal muscles." ([http://en.wikipedia.org/wiki/Manual\\_therapy](http://en.wikipedia.org/wiki/Manual_therapy)).

**Muscle:** Muscle is the tissue of the body which primarily functions as a source of power. There are three types of muscle in the body. Muscle which is

responsible for moving extremities and external areas of the body is called "skeletal muscle". Muscle that moves internal organs, such as the bowels, and vessels, which are located at the walls of arteries and bowel, is called "smooth muscle." A type of muscle tissue that is found only in the heart and is distinguishable from the two other forms of muscle, smooth and skeletal muscles is called "Cardiac muscle". This Cardiac muscle is responsible for pumping blood throughout the body.

(<http://www.medterms.com/script/main/art.asp?articlekey=2629&http://medical-dictionary.thefreedictionary.com/muscle>).

**Muscle Contraction:** Muscle contraction is the response of a muscle to any kind of stimuli where generally involves shortening in length while exerting a force and performing work. (<http://www.enotes.com>)

**Muscle Fatigue:** According to Jack H. Wilmore and David L. Costill, (2004), authors of "Physiology of Sport and Exercise, there is a point in exercise when your body will not allow you to do any additional lifts at the same weight or intensity as before. Muscular fatigue may result from energy system depletion, lactic acid accumulation in the muscles, nervous system fatigue and failure of the muscle fiber contractile mechanism. (<http://www.livestrong.com>)

**Physical Activity:** Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure.

**Post-test:** It is a scientific procedure in experimental research administered after the independent variable is applied on subjects.

**Pre-Test:** It is a scientific procedure in experimental research administered at baseline prior to the experimental treatment.

**Reliability:** It is defined as the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials. In short, it is the stability or consistency of scores over time or across raters.

**Sports Massage:** This is similar to Swedish massage but is geared toward people involved in sport activities to help prevent or treat injuries.

**Sports Medicine:** It is the field of medicine concerned with injuries sustained in athletic endeavors, including their prevention, diagnosis, and treatment. The purpose of injury prevention and treatment is to maintain optimal health and maximize peak performance. (American College of Sports Medicine, <http://www.acsm.org>).

**Stadiometer:** It is a piece of medical equipment used for measuring height. It is usually constructed out of a ruler and a sliding horizontal headpiece which is adjusted to rest on the top of the head. Stadiometers are used in routine medical examinations and also clinical tests and experiments. (<http://en.wikipedia.org/wiki/Stadiometer>)

**Subjects:** These refer to the participants who took part into experimental work during the course of the study.

**Swedish Massage:** This is a gentle form of massage that uses long strokes, kneading, deep circular movements, vibration and tapping to help relax and energize you.

**Therapeutic Massage:** It is manipulation of the soft tissue structures of the body to prevent and alleviate pain, discomfort, muscle spasm and stress by systematic rubbing, stroking, kneading, or slapping. Massages can be administered manually or with mechanical devices. They are sought most often to relieve muscle stiffness, spasms, or cramps and to relieve anxiety and tension. Gentle massage has a soothing action on the sensory nerves. More vigorous massage quickens the circulation and aids the muscles in disposing of accumulated waste products. Some methods of massage cause the muscles to contract and thus exercise them when movement of the entire body is not possible or desirable, as in illness or paralysis. Today, any professional massage is therapeutic, with real health benefits. But the phrase "therapeutic massage" is also sometimes used to indicate that the massage will be a little more intense than a pure relaxation massage and perhaps deal with long-term or chronic issues. The most common examples would be a deep tissue massage or sports massage. The therapist uses more pressure and cross-fiber friction in order to get knots to release

Men and women who are trained in the art of massage are known as masseurs and masseuses, respectively. ([Http://encyclopedia2.thefreedictionary.com/ Therapeutic massage](http://encyclopedia2.thefreedictionary.com/Therapeutic+massage)).

**Thigh Muscles:** The thigh is comprised of quite a few muscles. The main muscles which usually refer to fall into two categories are the hamstring group and the quadriceps group. In the hamstring group (which is the back of the thigh) are the biceps femoris, semitendinosus, and semimembranosus. In the quadriceps group (front of thigh) are the rectus femoris, vastus lateralis, vastus intermedius, and vastus medialis. Some other muscles that are on the thigh are the sartorius, iliopsoas, adductor longus, adductor magnus, and gracilis. Generally the thigh has three sets of strong muscles: the hamstring muscles in the back of the thigh, the quadriceps muscles in the front, and the adductor muscles on the sides. ([http://wiki.answers.com/Q/What\\_is\\_the\\_name\\_of\\_thigh\\_muscles](http://wiki.answers.com/Q/What_is_the_name_of_thigh_muscles)).

**Trigger Point Massage:** This massage focuses on trigger points, or sensitive areas of tight muscle fibers that can form in your muscles after injuries or overuse. (<http://www.mayoclinic.com/health/massage/SA00082>)

**Vajrasana:** The term Vajrasana is derived from two Sanskrit words in which Vajra means Thunderbolt and Asana means pose. According to its literal meaning it is a pose that radiates blood supply and subtle energies to upper body([.http://www.astrogle.com/yoga/vajrasana-thunderbolt-pose-benefits.html](http://www.astrogle.com/yoga/vajrasana-thunderbolt-pose-benefits.html)).

**Validity:** It is the most important and fundamental characteristics of any measurement procedure which could be defined as the extent to which the instrument measures what it purport to measure. ([http://michaeljmillerphd.com/res500\\_lecturenotes/reliability\\_and\\_validity.pdf](http://michaeljmillerphd.com/res500_lecturenotes/reliability_and_validity.pdf))

**Yoga:** It is the Sanskrit word for "union", is a physical, mental, and spiritual discipline, originated in ancient India that uses posture and breathing techniques to induce relaxation and improve strength, and its health benefits may surpass those of any other activity. The practice of yoga makes the body strong and flexible; it also improves the functioning of the respiratory,

circulatory, digestive, and hormonal systems. Yoga brings about emotional stability and clarity of mind. Yoga is a practical aid, but not a religion.(<http://en.wikipedia.org/wiki/Yoga> & [http://yoga.org.nz/what-is-yoga/yoga\\_definition.htm](http://yoga.org.nz/what-is-yoga/yoga_definition.htm))

### **1.17. Organization of Chapters**

In the manuscript of the thesis, five chapters were organized as depicted below.

**Chapter- I:** Presents different components of the study including background of the study, health related physical fitness exercises, Mobility of muscles, benefits of resistance training, detoxifying and strengthening exercises, Manual Massage therapy including Eastern and Western Massage styles, types of massage, techniques of massage, deep tissue massage, massage therapy, medical massage, sports massage, statement of the problem, objectives of the study, research questions, hypotheses, significance of the study, delimitations of the study, definitions and explanations of operational terms, limitations of the study and organization of chapters.

**Chapter- II:** Describes the review of related literatures in connection with health related physical fitness exercises and therapeutic massage interventions.

**Chapter- III:** Reviews the Methodological approach of the study including sources of Data, Selection of colleges and subjects, Experimental design, Selection of variables, Instrument reliability, Competency of testers and reliability of tests, Orientation of the subjects, Pilot study, Frame of the training program, Exercise schedule, Test Administration, and Procedures of Data collection.

**Chapter- IV:** Describes the Data collected from the Experimental Group - A, Experimental Group - B and that of Control Group on selected health related physical fitness variables. The results of test administration examined by using SPSS soft ware for various statistical measures such as Means, Standard deviations, t'- Value, p-Value (analysis of variance), r-ratio, all statistical computations in tables and graphs, results and discussions were also presented in this chapter.

**Chapter- V:** presents Summary, Major findings of the study, Conclusions, Recommendations, Bibliography and Appendices.

### **1.18. Limitations of the study**

These refer to the weaknesses of the research work when objectively and critically observed by the researcher after completing the whole work of the study. In this section, some of the followings were observed as limitations of the study.

1. Heredity and environment factors, which might have influenced the result of this study could not be controlled or assessed.
2. The variations in climatic conditions such as temperature and humidity during the pre- tests and post- tests were not controlled and were recognized as a limitation.
3. Status of emotions and motivations of the subjects are accepted as a limitation.
4. Socioeconomic backgrounds of the subjects were not taken into consideration.
5. The day - to - day activities, rest period, food habits, and life style of the subjects could not be controlled.
6. Lack of sufficient financial support for facilitating the overall research work was registered as a limitation.