

## **CHAPTER I**

### **INTRODUCTION**

A balanced physical education program provides each student with an opportunity to develop into a physically-educated person. One who learns skills necessary to perform a variety of physical activities, is physically fit, participates regularly in physical activity and knows the benefits of physical activity and also how it contributes to a healthy lifestyle. For all students to become physically educated, instruction is designed with special consideration for students who need help the most, less skilled students and students with disabilities. Students who are skilled and blessed with innate ability have many opportunities to learn. All students must feel successful if they are expected to enjoy and value physical activity. The activity is the basis of the program and offers opportunities for repetition and refinement of physical skills. Activities are success oriented and students are motivated to continue. Physical education prepares students to participate in activities they can perform when they are adults. The physical education program will be of little value to the majority of adults if it is restricted to team sports. Participation in sport activities declines rapidly with age. Less than five percent of adults above the age 30 report playing a team sport. The assessment practices must support and guide the instruction of physical education and the learning of each student. The process of gathering evidence to make inferences about student learning, communicates to students and all those concerned about their learning in physical education how students are progressing toward certain goals (Jyoti, 2018).

Physical Education and physical activities are gaining more relevance and momentum in the current scenario in India. With more and more of the Indian population turning out obese and diabetic due to changes in life-style pattern and work style that is more static than dynamic. Life-style changes include changing food habits and hectic work schedules. Consumption of junk food and fast food that is packed with fats and calories and packaged food that is artificially flavoured and coloured have replaced the traditional food pattern of many Indians. This coupled with work that demands people to be desk bound has left a large group of the Indian population highly vulnerable to life-style disorders such as depression, obesity, heart disease and diabetes. Given this background, activities that help improve Physical fitness and thereby general health become indispensable.

Physical activity is strictly defined as any bodily movement produced by skeletal muscles that result in an expenditure of energy. It includes a broad range of occupational, leisure time, and routine daily activities like manual labour to gardening, walking, or household chores. These activities may require light, moderate, or vigorous effort and can lead to improved health if they are practiced regularly. Exercise is physical activity that is planned, structured, and repetitive bodily movement done to improve or maintain one or more of the components of health-related fitness (National Association for Sport and Physical Education, 2005).

Every physical activity session should incorporate a systematic approach not only to ensure safety but also to prepare the body for the rigors of physical activity. Properly warming up before and cooling down after the workout may also prevent injuries and aid in returning the body to a more rested state, respectively. The main

physical activity must also be conducted appropriately for student to feel and understand, through participation, the importance of being physically active. A warm-up is a low-intensity activity done before a full-effort and may serve multiple purposes and should be organized to meet specific goals of the planned activity. The main physical activity is the core of the workout intended to improve or maintain one or more of the health-related fitness components. A proper cool-down includes a period of light activity following exercise that allows the body to slow down and return to near resting levels (National Association for Sport and Physical Education, 2005).

The scope of physical activity is very vast. It includes all those activities and experiences which prepare the individual to engage himself in the activities for his own good and for good of the society of which he is an integral part. Participation in these activities creates a climate that would help to create feelings of “oneness”. It acts as antidote to separatist and divisive forces. It broadens the outlook, fosters a feeling of togetherness and nationalism, and a spirit of sacrifice and tolerance so that the narrow group interests are submerged in a larger interest of the country. It also inculcates a feeling of love and regard for the history, culture, religion, language and traditions of the nation (Ajmer Singh, 2009).

Sport plays a very prominent role in the modern society. It is important to individuals, a group, a nation and indeed the world. Throughout the world, sport has a popular appeal among people of all ages and both sexes. Much of the attraction of sport comes from the wide variety of experience and feeling that result from participation such as success, failure, exhaustion pain, relief and feeling of belonging.

Sport can bring money, glory, status and goodwill. However, sport can also bring tragedy, grief and even death (Uppal, 1992).

Sports and games propagate the feelings of nationalism and help in a creating a new generation of individuals with the feelings that the differences based on caste, community and religion have no meaning and faith in love and peace, in purity, in the feeling of goodwill and brotherhood serves to a greater extent towards humanity. Sports and games provide a common platform where sportspersons from different regions, professing different religions and faiths, speaking different languages, having different customs and traditions interact with each other in a harmonious and congenial atmosphere where they forget all their differences and emerge as a homogenous group. Such type of thinking, insight and mental approach can play positive role in national integration. Sports and games help in creating such understanding and can play a very decisive and pivotal role in bringing about national integration (Ajmer Singh, 2009).

## **1.1 TRAINING METHODS**

Sports training is a process of sports perfection directed by scientific and pedagogic principles and aims at leading a sportsperson to high and top level performance in a sport or an event by means of planned and systematic improvement of performance capacity and readiness of performance.

The word 'training', in its broad sense, refers to any organized and systematic instructional process, which aims at enhancing man's ability with regard to physical, psychological and intellectual aspects. In the field of sports, training is a process, which involves preparation of a sportsperson to attain highest level of sports

performance. To improve sports performance, one has to, regularly and systematically, perform a variety of exercises and participate in scientifically developed sports training programmes. Mere execution of an exercise does not ensure improvement of performance. Actual effect of exercise depends upon several factors of which the important ones are training load, means of recovery, assessment of loading and performance capacity, sports equipment, nutrition, psychological characteristics and methods adopted for imparting theoretical instruction. If these factors are disregarded, the usefulness of the physical exercise decreases and the sportsperson does not realize optimal benefit.

This complex nature of sports training, in order to be effective and beneficial, requires knowledge and assistance from other sports science disciplines like sports medicine, exercise and sports physiology, sports sociology, sport psychology, sports bio-mechanics, sports nutrition, sports biochemistry and so on. As the performance of a sportsperson improves, the extent of utilization of knowledge from these sports sciences also increases (Uppal, 2009).

## **1.2 STRETCHING**

Stretching is a form of physical exercise in which a specific muscle or tendon is deliberately flexed or stretched in order to improve the muscle's felt elasticity and achieve comfortable muscle tone. The result is a feeling of increased muscle control, flexibility and range of motion. Stretching is also used therapeutically to alleviate cramps. In its most basic form, stretching is a natural and instinctive activity; it is performed by humans and many other animals. Stretching often occurs instinctively after waking from sleep, after long periods of inactivity or after exiting confined

spaces and areas. Increasing flexibility through stretching is one of the basic tenets of physical fitness, it is common for athletes to stretch before and after exercise in an attempt to reduce risk of injury and increase performance. Stretching should be done carefully, otherwise it will be dangerous when performed incorrectly.

Stretching exercises can be classified as ballistic, static and contract-relax stretching techniques. Ballistic stretching method uses the momentum generated from repeated bouncing movements to stretch the muscle. Although effective, most experts do not recommend this technique because it may overstretch the muscle and cause muscle soreness or injury.

Static stretching is an extremely popular and effective technique and it involves gently and slowly moving into the stretch position and holding it for a certain period of time. Movement should take place through the full range of motion until a little tension or tightness is felt in the muscle or muscle group. As the muscle relaxes, the stretch should be extended and held again. Stretching should not be painful. Care must be taken to not force the joint to move too far, which could cause an injury.

Contract-relax stretching technique when performed the muscles involved are relaxed. Muscles are arranged in pairs; when one contracts, the opposing muscle in the pair relaxes (e.g., when the quadriceps muscles contract, the hamstring muscles relax). To use this technique to develop flexibility, the muscle opposite the one to be stretched is contracted for at least 5 seconds. This results in the muscle to be stretched relaxing. Then the static stretch is performed on the desired muscle. To apply this technique to the development of hamstring flexibility, an individual would contract the quadriceps muscles, thus relaxing the hamstrings. Then a static hamstring stretch

is employed. This technique allows the stretch to be performed through a greater range of motion (Deborah A. Wuest, 1992).

### **1.3 PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION (PNF) STRETCHING**

PNF is a static stretch using combinations of the active and passive stretching techniques. This is a specialized static stretch that uses a contraction-relaxation combination of movements, “taking advantage of reflexes and neuromuscular principles to relax the muscles being stretched” (Knudson, 2000).

In the active stretch, the person stretching provides the force of the stretch. In the passive stretch, a partner provides the force of the stretch. A static stretch is a slow sustained stretch that is held for 10 to 30 seconds. The person stretches the muscle-tendon unit to the point where mild discomfort is felt and then backs off slightly at a point just prior to discomfort. This is generally considered a safe stretch and does not rely on cooperation from a partner (National Association for Sport and Physical Education, 2005).

PNF stretching is currently the fastest and most effective way known to increase static-passive flexibility. PNF is an acronym for proprioceptive neuromuscular facilitation. It is not really a type of stretching but is a technique of combining passive stretching and isometric stretching, in order to achieve maximum static flexibility. Actually, the term PNF stretching is itself a misnomer. PNF was initially developed as a method of rehabilitating stroke victims. PNF refers to any of several post-isometric relaxation stretching techniques in which a muscle group is

passively stretched, then contracts isometrically against resistance while in the stretched position, and then is passively stretched again through the resulting increased range of motion. PNF stretching usually employs the use of a partner to provide resistance against the isometric contraction and then later to passively take the joint through its increased range of motion. It may be performed, however, without a partner, although it is usually more effective with a partner's assistance. Most PNF stretching techniques employ isometric agonist contraction/relaxation where the stretched muscles are contracted isometrically and then relaxed. Some PNF techniques also employ isometric antagonist contraction where the antagonists of the stretched muscles are contracted. In all cases, it is important to note that the stretched muscle should be rested for at least 20 seconds before performing another PNF technique (Kabat, 1940).

PNF often yields the greatest improvements in flexibility. PNF has also been shown to be more difficult to teach, more difficult to perform, and to yield greater muscle soreness. This type of stretch should not be performed by children 6 to 10 years old, but it can be performed by pubescent or post pubescent children or those who developed a solid base of training and are undergoing formal athletic conditioning with help from a qualified coach. Safety, proper instruction and responsibility are key issues in performing this type of stretch (Fredette, 2001).

Proprioceptive Neuromuscular Facilitation (PNF) stretching techniques are commonly used in the athletic and clinical environments to enhance both active and passive range of motion (ROM) with a view to optimizing motor performance and rehabilitation. PNF stretching is positioned in the literature as the most effective



stretching technique when the aim is to increase ROM, particularly. In respect to short-term changes in ROM. With due consideration of the heterogeneity across the applied PNF stretching research, a summary of the findings suggests that an active PNF stretching technique achieves the greatest gains in ROM, e.g. utilizing a shortening contraction of the opposing muscle to place the target muscle on stretch, followed by a static contraction of the target muscle. The inclusion of a shortening contraction of the opposing muscle appears to have the greatest impact on enhancing ROM. When including a static contraction of the target muscle, this needs to be held for approximately three seconds and not more than 20% of a maximum voluntary contraction. The greatest changes in ROM generally occur after the first repetition and in order to achieve more lasting changes in ROM, PNF stretching needs to be performed once or twice per week. The superior changes in ROM that PNF stretching often produces compared with other stretching techniques has traditionally been attributed to autogenic and/or reciprocal inhibition, although the literature does not support this hypothesis. Instead, and in the absence of a biomechanical explanation, the contemporary view proposes that PNF stretching influences the point at which stretch is perceived or tolerated. The mechanism(s) underpinning the change in stretch perception or tolerance are not known, although pain modulation has been suggested (Westerterp, 1999).

Literature concerning the theoretical role of spinal reflex circuits and their sensor motor signals in proprioceptive neuromuscular facilitation (PNF) muscle stretching techniques was examined. Reviewed data do not support the assertion commonly made in PNF literature that contraction of a stretched muscle in prior to further stretch, of contraction of opposing muscles during muscle stretch, produced

relaxation of the stretched muscle. Further, following contraction of a stretched muscle, inhibition of the stretch reflex response lasts only one second. The studies pertained to examination suggested that decreases in the response amplitude of the Hoffmann and muscle stretch reflexes following a contraction of a stretched muscle are not due to the activation of Golgi tendon organs, as commonly purported, but instead may be due to presynaptic inhibition of the muscle spindle sensory signal. The current view on the complex manner by which the spinal cord processes proprioceptive signals was discussed. The ability of acute PNF stretching must be explained by mechanisms other than the spinal processing of proprioceptive information. The reviewed studies indicate that changes in the ability to tolerate stretch and/or the viscoelastic properties of the stretched muscle, induced by PNF procedures, are possible mechanisms (Otto, 2005).

### **1.3.1 How PNF Stretch Works**

During an isometric stretch, when the muscle performing the isometric contraction is relaxed, it retains its ability to stretch beyond its initial maximum length. Well, Proprioceptive Neuromuscular Facilitation tries to take immediate advantage of this increased range of motion by immediately subjects the contracted muscle to a passive stretch. The isometric contraction of the stretched muscle accomplishes several things. It helps to train the stretch receptors of the muscle spindle to immediately accommodate a greater muscle length. The intense muscle contraction, and the fact that it is maintained for a period of time, serves to fatigue many of the fast-twitch fibers of the contracting muscles. This makes it harder for the fatigued muscle fibers to contract in resistance to a subsequent stretch. The tension

generated by the contraction activates the golgi tendon organ which inhibits contraction of the muscle via the lengthening reaction. Voluntary contraction during a stretch increases tension on the muscle, activating the golgi tendon organs more than the stretch alone. So, when the voluntary contraction is stopped, the muscle is even more inhibited from contracting against a subsequent stretch. Proprioceptive Neuromuscular Facilitation stretching techniques take advantage of the sudden "vulnerability" of the muscle and its increased range of motion by using the period of time immediately following the isometric contraction to train the stretch receptors to get used to this new, increased, range of muscle length. This is what the final passive (or in some cases, dynamic) stretch accomplishes (Otto, 2005).

### **1.3.2 Benefits of Proprioceptive Neuromuscular Facilitation (PNF) Stretching**

Proprioceptive Neuromuscular Facilitation helps to improve muscle strength, increase endurance and improve coordination. It also results in the correction of muscular imbalances which results in increased holding power and promotes relaxation. The correction of incorrect postural and movement patterns also leads to improved health and wellbeing.

Proprioceptive Neuromuscular Facilitation when used as a rehabilitative therapy can be used to soothe chronic muscle pains and correct other ailments related to incorrect posture such as back and shoulder pain and restricted movement in the joints.

Some of the benefits of flexibility exercises are:

**Improves physical performance:**A flexible joint or muscle is capable of more motions or movements and needs less energy and stress to do so.

**Reduces the Risk of Injury:**The muscle's resistance to movement is reduced. This further reduces the chance of injury.

**Reduces muscular pain:**Gradual stretching exercise relaxes the muscles and reduces the pain felt after exercises.

**Improves overall posture:**Stretching tones the muscles in a natural and balanced manner. This also helps in correcting postural errors.

**Improves muscle co-ordination:**Stretching improves muscle co-ordination by allowing time to develop properly and thus endure stress better.

**Relaxes muscles:**Stretching relaxes and contracts muscles. Relaxing the muscles ensures that muscular stress is reduced. It also prevents accumulation of toxins and ensures that they are eliminated from the body.

**Improves blood circulation:** Stretching improves blood circulation, increases muscular temperature and the amount of joint synovial fluid.

#### **1.4 SURYA-NAMASKAR**

Yoga is a science of right living and it works when integrated in our daily life. It works on all aspects of the person: the physical, mental, emotional, psychic and

spiritual. The word yoga means 'unity' or 'oneness' and is derived from the Sanskrit word 'yuj' which means 'to join'.

Yoga was developed and perfected over the centuries by philosophers and mystics in India. It is basically a method by which we increase the body's supply of energy and remove any interference to the transmission of energy throughout the body.

Yoga works on the mind and the body at the same time, as well as exploiting their interdependence. No other system does this. Western psychology studies the mind, western exercise physiology studies the effect of exercise on the body, but there is no emphasis on the interrelationship of the mind and the body.

Yoga asanas (postures) and breathing deal with the physical body, but due to their effect on the brain, they also affect the mind.

All the wonders of modern science will not bring happiness, peace of mind, health or a long life. Although wonders have been achieved in our external environment – space travel, computers, etc. - our internal environment has been neglected. Thousands of years ago the ancient yogis turned their minds inwards and discovered their true nature. This allowed them to work out a system of body and breathing exercises which results in vitality, rejuvenation and peace of mind.

Suryanamaskar combines Yogasanas and Pranayama. As such, it comes in between SithilikaranaVyayama and Yogasanas and brings about the general flexibility of the body preparing it for further Asanas and Pranayama. This is usually done both at sunrise and sunset, facing the sun (Vivekananda Kendra Prakashan, 2012).

Surya Namaskar is a yoga based exercise for overall personality development – body, mind and intellect – a gift of Indian heritage to the mankind. It is unique exercise. It is especially beneficial for students and children in growing age. It enables them to achieve (a) balanced physical growth, (b) healthy and efficient body, (c) balanced state of mind, (d) enhanced work efficiency through concentration, alertness memory development and emotional control.

"Surya Namaskar" is Sanskrit which means obeisance or prostrations (Namaskar) to the sun (Surya). It implies that one rise before sun rise in order to do this exercise or pay obeisance to the rising sun. This is around 5 to 5:30 AM. Of course, this exercise is good no matter what time you may use it, but it is best done while the stomach is empty, before eating. It is a yogic exercise which consists of ten particular postures, one following another, in a fixed, cyclic order to ensure improvement and good health in one's digestion, agility, rejuvenation, beauty and longevity. It will also help one lose weight and trim the waist. There is no equipment to buy, or membership to a gym or fitness club that must be purchased. You just need a little space in your apartment or home. If, however, you begin to feel short-breathed or dizzy, then take a break. Also, pregnant women should not practice it, but can continue it during their period because it can help digestion and the flow of energy and outflow of waste needed at this time.

It is considered as the best exercise for human body. Surya Namaskar consists of important Yogasanas and Pranayama. The Pranayama and thus its advantages are skillfully incorporated in Surya Namaskar. The Mantras (Bija Mantras), which are chanted before practicing, are also very useful.

In all this Surya Namaskar is an appreciated exercise among people of all age and categories from kids to old age people. Surya Namaskar or Sun Salutation is the best way to burn the calories and reduce weight. It is often recommended for obesity.

Surya Namaskar is included in the regular routine of prayer and worship. Means it must be practiced regularly. Its great importance has been described in the scriptures. As per the scriptures, a single day worship of the sun has virtues equivalent to the bestowal presentation of one lakh milk cows. Like worship, Surya Namaskara too has its own significance. Surya Namaskara means prayer (Vandana) of Lord Surya.

#### **1.4.1 Benefits and Importance of Surya Namaskar**

This asana is also known as Surya Namaskar Asana or Sun Salutation Asana. It is a combination of 12 postures and each posture provides its unique benefits. The essence of this asana is salutation of the Sun god, which is power source of all the energy in this world. So in process to salute the sun god it also helps our body. This asana becomes very important due to the valuable part it plays with our lives. The composition of these poses in its own different way helps in creating a fit and fine body for you. Also, suryanamaskar tones up the functioning of various systems in the body, such as sensory, respiratory, digestive, circulatory, muscular, and nervous systems.

In a gym, a cardio would include aerobics, skipping, and running, jogging and cycling. By doing Ashtanga Namaskar you will be able to derive all the benefits you

try to obtain by going to the gym. When you look at the flipside gym would turn out to be more expensive in comparison to your yoga pose.

It readily flexes your body by providing one of the greatest massages to your each and every curve in your body. In the process of internal massaging it also works out externally. Your body becomes the incubation ground for generating power source to your body. It also helps in the purification process of your body.

It becomes very beneficial to the heart and as it tones it immensely to help the cardiac muscles and arteries. Every step of this asana turns out to be one beautiful gift for your body. The synchronized way of breathing helps you to push out those toxins which are harmful for your body. The 12 poses have to be done in a specific manner. It includes a process of inhaling and exhaling which has to be followed strictly. Along with the poses you can chant some of the Mantras which may help to create synergy in your body.

The meditating mind creates awareness about the existence of the world. Your mind overflows with confidence which you be lacking for a very long time. The mind and body works together to help your soul to lighten up, which is very easily shown on your radiating face.

This exercise is not only about being physically fit but about creating an understanding about the inner chakras. It is the concentration level which helps this pose to attain its success. The particular mantra which is chanted along with the pose helps in creating that sense of concentration.



This is an elaborate asana and doing this would need lot of practice. So people who have good stamina, with no health problems like blood pressure, heart disease, hernia, intestinal tuberculosis and many other problems can do this pose. So anyone attempting the asana should consult your doctor and your yoga instructor.

## **1.5 PHYSICAL FITNESS**

Fitness is a key to enjoy life. Exercise is an important of a total fitness programme. Modern living has taken all the exercise out of our lives and so in order to get fit and have to put it back again, regular exercise is necessary to develop and maintain an optional level of health, performance and appearance. It makes feel good, both physically and mentally. It gives psychological lift and strengthens a sense of accomplishment. Looking young is a reflection of good health. Regular physical exercise enhance the function of the joints; increase the sense of physical well-being and promotes a sense of feeling good; increases physical working capacity by increasing cardiorespiratory fitness, muscle strength and endurance and decreases the risk of serious diseases that could lead to early disability and death.

Increased physical fitness not only improves health but improves performance at work. Hundreds of American companies have back this idea financially by employing full time directors of fitness for their work.

Physical fitness is the capability of heart, blood vessels, lungs and muscles to function at optimal levels. Optimal efficiency means the most favourable health needed for the enthusiastic and pleasurable participation in daily tasks and recreational activities. Functional cardio-respiratory and muscular systems enable you

to carry out everyday activities efficiently. In other words, people who are physically fit, look better, feel better and possess the good health necessary for a happy and full life. Physical fitness can be defined in terms of health related physical fitness and performance related physical fitness (Ajmer Singh, 2005).

## **1.6 IMPORTANCE OF PHYSICAL FITNESS**

Every individual must know the need of physical exercises. Physical fitness is the capacity of a person to function steadily and smoothly when a situation arises.

Physical exercises makes one mentally sharpen, physically comfortable and ease with his body and better able to cope with the demands that everyday life makes upon him.

Increased physical fitness not only improves health but improves performance at work. Hundreds of American companies have back these idea financially full time directors of fitness for their work.

The following physical fitness variables, which are necessary for the day-to-day life, were considered for this study:

1. Muscular endurance
2. Flexibility
3. Muscular Strength
4. Agility

## 5. Cardio respiratory Endurance

### **1.6.1 Muscular endurance**

The ability of a muscle or muscle group to exert force repeatedly is known as muscular endurance. Muscular endurance also refers to the capacity of a muscle or muscle group to sustain a contractive state over a period of time. Muscular endurance is specific to each muscle or muscle group. Different muscles in the body can have different levels of endurance. Moreover, muscles that are used more frequently are stronger and have greater endurance than those muscles that are used less frequently. When muscles are not used, muscular endurance will also decrease(Deborah A. Wuest, 1992).

The working capacity of complete psycho-physical apparatus of an individual depends relatively on endurance capacity. It ensures high quality skill of movement execution which finds expression in accuracy, precision, rhythm and consistency. Endurance training results in the improvement of functioning of various organs and energy systems of the human body. This, in turn improves the ability to recover quickly, from training competition load and at the same time it resist fatigue. It is of high value for maintenance of good organic health, for increasing the general resistance against infection and for cure and treatment of various diseases and metabolic disorders (HardayalSingh 1991).

### **1.6.2 Flexibility**

Flexibility can be defined as the maximum range of motion possible at a joint, that is, the extent of movement possible about a joint without undue strain. Flexibility is specific to a particular joint, such as the knee, or to a series of joints, such as the spinal vertebral joints. This means that an individual can have a better range of motion in some joints than in others.

The extent of movement possible at a joint is influenced by the structure of the joint. Also soft tissues such as muscles, tendons and ligaments greatly influence the range of movement possible at a joint. Flexibility is affected by the length that a muscle can stretch. When muscles are not used, they tend to become shorter and tighter, thus reducing the joint's range of motion. Flexibility is essential to perform everyday tasks and is also a critical component in the performance of many sport activities. Physical activities such as gymnastics, yoga, swimming, karate and dance need more flexibility. Thus, the development of flexibility should not be neglected in designing a fitness programme (Deborah A. Wuest, 1992).

### **1.6.3 Muscular strength**

Muscular strength is the ability of a muscle or muscle group to exert a force against a resistance. Specifically, it is the maximum amount of force that a muscle or muscle group can apply against a resistance in a single effort. Muscular strength is specific to each muscle or muscle group. Different muscles in the body can have different levels of strength. Moreover, muscular strength is important to good health. They contribute to the maintenance of proper posture and the improvement of personal appearance. Because strong muscles provide better protection for body joints and also the risk of joint injuries is decreased (Deborah A. Wuest, 1992).

#### **1.6.4 Agility**

Agility is the ability to change direction of the body and its parts rapidly. Agility is a combination of several athletic trials including strength, reaction time, speed of movement, power and co-ordination. Agility is very important in all activities involving quick changes in direction. Agility either general or specific can be improved by increasing the athletic components (Phillip, 2001).

#### **1.6.5 Cardio respiratory endurance**

Cardio respiratory endurance is the ability of the body's circulatory and respiratory systems to supply fuel during sustained physical activity (ShamalKaloy, 2007).

The functional capacity of the cardio respiratory system, heart, lungs and blood vessels are described through aerobic capacity of an individual. It is a function both of cardiorespiratory performance and the maximum ability to remove and utilize oxygen from circulating blood. To measure cardio respiratory capacity a subject will undergo progressively more strenuous exercise from an easy walk through to exhaustion. The higher the measured cardiorespiratory endurance level, the more oxygen has been transported to and used by exercising muscles, and the higher the level of intensity at which the individual can exercise. More simply stated, the higher the aerobic capacity, the higher the level of aerobic fitness. The Cooper test can be used to assess functional cardiorespiratory endurance (ShamalKaloy, 2007).

### **1.7 PHYSIOLOGY**

The meaning of human Physiology is the study of body function. In physiology we study how our organs, systems, tissues, cells and molecules within cells work and how their functions are put together to maintain our internal environment. Physiologists study the various characteristics of living things. Their studies range from the most basic unit of organism, the cell, to the more complex organs and organ systems such as the brain and respiratory systems.

Exercise Physiology is the study of how body's structures and functions are changed as a result of exercises. Sports physiology is derived from exercise physiology. It applies the concept of exercise physiology to training the athlete and enhancing the athlete's sports performance (Ajmer Singh, 2009).

### **1.8 IMPORTANCE OF PHYSIOLOGY ON KEY HEALTH PARAMETERS**

High level of performance in sports and games might be dependent upon the physiological make up and it was recognized that physiological proficiency was needed for the high level performance.

For specific physiological systems of the body to be fit, they must function well enough to support the particular game that the player is playing. Since different games make different demands up on the organism with respect of neurological, respiratory, circulatory and temperature regulating functions physiological fitness is specific to the activity. Physiological systems are highly adaptable to exercise (Gianetti, et al. 2008).

The following physiological variables, which are necessary for the day-to-day life, were considered for this study:

1. Breath holding time
2. Resting Pulse rate
3. Respiratory Rate

### **1.8.1 Breath holding time**

Breath holding time is defined as the duration of time through which one can hold his/her breathe without inhaling and exhaling after a deep inhalation. Endurance type of training will improve the breath holding time. Breath holding time also plays a vital role in the sports performance (Strukic, 1981).

### **1.8.2 Resting pulse rate**

Resting pulse rate which is the number of beats felt exactly in one minute. The average rate of the pulse in a healthy adult is 72 beats per minute. There may be a variation of upto five beats per minute within the normal range. The pulse rate or heart rate varies greatly among different people and in the same person under different situations. The American Heart Rate Association accepts as normal range from 50 to 100 beats per minute. The average rate is 72 beats per minute but the rate can accelerate to 220 beats per minute. The lesser resting pulse rate has given good performance for all the sports and games (Strukic, 1981).

### **1.8.3 Respiratory rate**

Respiratory rate which is number of breath inspired and expired in one minute. It indicates our lungs capacity. The lesser respiratory rate given good performance

for all the games and sports. Regular participation in endurance activity such as jogging, cycling and distance swimming can be done to reduce the respiratory rate (Yadav& Das, 2001).

## **1.9 PSYCHOLOGY**

The word “psychology” is the combination of two terms – study (ology) and soul (psyche), or mind. The derivation of the word from Latin gives it this clear and obvious meaning: The study of the soul or mind.

Psychology is the science of mind and behavior. Its immediate goal is to understand humanity by both discovering general principles and exploring specific cases, and its ultimate aim is to benefit society. In this field, a professional practitioner or researcher is called a psychologist, and can be classified as a social scientist, behavioral scientist, or cognitive scientist. Psychologists attempt to understand the role of mental functions in individual and social behavior, while also exploring the physiological and neurobiological processes that underlie certain functions and behaviors (Rajesh Kumar, 2013).

Educational psychology is best defined as a science of education or in its most practical sense; it presents the application of the theory and practice of psychology in the field of education. In our school education set-up, it is mainly concerned with equipping the aspiring as well as practicing teachers with the necessary knowledge and skills, interests and attitudes helpful in playing their roles as effective teachers (Mangal, 2010).



The word psychology came from the Greek word psycho, means mind or soul and logos mean science. So the word psychology is the science of the mind and soul. Psychology is the study of human nature science of the mind and soul. Psychology is the study of human nature scientifically and rather than formulate condition. Psychology plays a major role in sports and in closely associated with psychological components.

Sports psychology is defined as the scientific study of human behaviour in sport. Like the other discipline with in sports and exercise science, sports psychology can be applied to varied skilled movement physical activities and exercise programmes, such as corporate fitness, exercise rehabilitation and health oriented exercise programmes as well as traditional physical education and competitive athletics (Diane L. Cell, 1972).

Sports psychology is that branch of psychology that deals with the behavior of athlete on and off the ground. Sports psychology is the study of behavior of sports persons in training and competition periods. It is a subject which provides us the information about the influence of sports on sports person's behavior and his/her sports performance. This subject deals with the behavior of sports persons in various situations with an aim of enhancing his/her sports performance (Rajesh Kumar, 2013).

#### **1.10 IMPORTANCE OF PSYCHOLOGY IN PRESENT ERA**

The subject psychology is nowadays becoming more and more popular. In comparison to other subjects a larger number of students are opting for it at the senior secondary and degree levels. Even in the most prestigious competitive examinations

like the IAS and the allied examinations or the Provincial Civil Service examinations, the number of students opting for psychology, for the preliminary and mains is increasing every year. The reason for its popularity lies with its body of knowledge, which is quite interesting, and its wide use and applications in almost all the walks and spheres of life (Mangal, 2010).

Psychological factors also affect physical activity behaviors. Researchers have studied the relationship of many cognitive and psychological variables to physical activity participation in children and adolescents. For adults, knowledge about the benefits of physical activity has been recognized as a powerful influence on exercise behaviors. But, knowing that it's healthy to be physically active does not always influence the physical activity levels of adults, and for children, this knowledge is even less of an influence. Children place more importance on the value of an activity and on whether or not they feel competent and satisfied during the activity (National Association for Sport and Physical Education, 2005).

The following psychological variables were considered for this study:

1. Self confidence
2. Anxiety

#### **1.10.1 Self-confidence**

Sports psychologists define self-confidence as the belief that one can successfully perform or desired behaviour. The desired behaviour might be kicking a soccer goal, staying on an exercise regimen, recovering from a knee injury, serving an ace or hitting a home run. But the common factor is that one believes that he will get the job done. Specifically, some evolving and recent research has revealed that like many other current personality constructs, self-confidence may be multi-dimensional, consisting of several aspects such as one's ability to execute physical skill, one's ability of utilize psychological skill, one's level of physical fitness and one's level of learning potential (Koole and Pelham, 2003).

### **1.10.2 Anxiety**

Anxiety is a subjective feeling of apprehension accompanied by a heightened level of psychological arousal. Psychological arousal is an autonomic response that results in the excitation of various organs of the body. Examples of this phenomenon seen in athletes are sweaty hands, frequent urge to urinate, increased respiration rate, increased muscle tension and elevated heart rate. Anxiety is commonly classified in two ways. They are trait anxiety and state anxiety. Trait anxiety is an integral part of an individual's personality. It refers to the individual's tendency to classify environmental events as either threatening or non-threatening. State anxiety is an emotional response to a specific situation that results in feelings of fear, tension or apprehension. The effects of both state and trait anxiety on motor performance have been studied by sport psychologists (Deborah A. Wuest, 1992).

## **1.11 REASONS FOR SELECTION OF TOPIC**

Adults will express and act on preferences among the many physical activities available. Any physical activity is done to improve their basic physical fitness, physiological performances and psychological behavior which in turn help them to be physically active. Physical activity improves the general physical abilities like, strength, endurance, flexibility and agility. It also improves physiological and psychological performances. Thus everybody needs physical activity to lead a better life.

There are various training methods like continuous training, plyometric training and resistance training that are adopted by athletes as well as other individuals for general fitness. Many common methods practiced in gymnasiums fall under the resistance training category. This kind of training is prone to injuries especially if there is an overload and also when done in the absence of proper supervision. To minimize the injuries that can be caused by traditional training methods, PNF stretching and SuryaNamaskar training can be used. Various studies have been carried out by researchers in the PNF stretching training mostly indicate a positive effect on muscular strength and flexibility.

The present study titled “Isolated and Combined training of PNF technique and Suryanamaskar” has been intended to study the effect of these training methods on selected Physical, Physiological and Psychological parameters in addition to minimizing injuries due to overload of traditional training methods.

The objective of this research is to assess the effect of PNF, Suryanamaskar and combined effect of PNF and Suryanamaskar on selected Physical, Physiological and Psychological variables of college men and to compare these effects with control

group to determine whether these training produce significant changes in the physical, physiological and psychological variables. If so, which of the training is better than the other one? Whether a combination of PNF and Suryanamaskar would contribute for better physical, physiological and psychological performances? Thus, the current research focuses on the effects of PNF, Suryanamaskar and combined training on selected physical, physiological and psychological variables of college men. The selected physical fitness variables are muscular endurance, flexibility, muscular strength, agility and cardio respiratory endurance and Physiological variables are breath holding time, resting heart rate and respiratory rate and Psychological variables are self-confidence and anxiety.

### **1.12 STATEMENT OF THE PROBLEM**

This experimental study was designed to find out the isolated and combined effect of proprioceptive neuromuscular facilitation technique and suryanamaskar on selected physical physiological and psychological variables among college men.

### **1.13 HYPOTHESES**

In light of the preceding discussion and for the purpose of the present investigation the following hypotheses were framed:

1. It was hypothesized that there might be significant improvement on selected physical fitness variables such as Muscular endurance, Flexibility, Muscular strength, Agility and Cardio-respiratory endurance due to the influence of

isolated and combined training of PNF technique and Surya Namaskar than control group among college men students.

2. It was hypothesized that there might be significant improvement on selected physiological variables such as Resting pulse rate, Respiratory rate and Breath holding time due to the influence of isolated and combined training of PNF technique and Surya Namaskar than control group among college men students.
3. It was hypothesized that there might be significant improvement on selected psychological variables such as Self-confidence and Anxiety due to the influence of isolated and combined training of PNF technique and Surya Namaskar than control group among college men students.
4. It was hypothesized that the combined trainings of PNF technique and Surya Namaskar might significantly improve the selected physical fitness variables such as Muscular endurance, Flexibility, Muscular strength, Agility and Cardio-respiratory endurance than that of isolated training of PNF technique and Surya Namaskar among college men students.
5. It was hypothesized that the combined trainings of PNF technique and Surya Namaskar might significantly improve the selected physiological variables such as Resting pulse rate, Respiratory rate and Breath holding time than that of isolated training of PNF technique and Surya Namaskar among college men students.

6. It was hypothesized that the combined trainings of PNF technique and Surya Namaskar might significantly improve the selected psychological variables such as Self-confidence and Anxiety than that of isolated training of PNF technique and Surya Namaskar among college men students.

#### **1.14 SIGNIFICANCE OF THE STUDY**

The present investigation would contribute significantly to the field of physical education and sports in the following ways.

1. The results of the study would be of great interest to exercises physiologist and physical educators.
2. The findings of the study would be of great value in designating and administrating Porprioceptive Neuromuscular Facilitation technique program and Surya Namaskar programs for those who need such special attention.
3. The results of the study would provide an additional knowledge in the area of research.

#### **1.15 DELIMITATION**

The following were delimitations of the study:

1. Sixty male students were selected randomly as subjects from Dr.MGR Educational and Research Institute.

2. The selected subjects age were ranged from 18 to 20 years.
3. The experimental treatment was restricted for a period of twelve weeks.
4. To test the hypothesis the following independent and dependent variables were included in the study.

### **1.15.1 Dependent Variables**

#### **Physical Fitness Variables**

- i) Muscular endurance
- ii) Flexibility
- iii) Muscular Strength
- iv) Agility
- v) Cardio respiratory Endurance

#### **Physiological Variables**

- i) Breath holding time
- ii) Resting Pulse rate
- iii) Respiratory Rate

#### **Psychological Variables**

- i) Self confidence



ii) Anxiety

### **1.15.2 Independent Variables**

1. Proprioceptive Neuromuscular Facilitation (PNF) training Group (Experimental Group I).
2. Surya Namaskar training Group (Experimental Group II).
3. Combined training of PNF and Surya Namaskar Group (Experimental Group III).
4. Control Group (Experimental Group IV).

### **1.16 LIMITATION**

Uncontrollable factors associated with the study were accepted as limitation and the following are considered as limitations of the research study:

1. Certain factors rational habits, life style, daily routine works, food habits were not taken into consideration.
2. The climatic condition was not taken into consideration.
3. Their socio-economic status was not considered for this study.

### **1.17 OPERATIONAL DEFINITIONS OF IMPORTANT TERMS**

The operational definitions of important terms used in this study were explained below.

#### **1.17.1 Proprioceptive Neuromuscular Facilitation (PNF) Stretching**

PNF stretching is currently the fastest and most effective way known to increase static-passive flexibility. PNF is an acronym for proprioceptive neuromuscular facilitation. It is not really a type of stretching but is a technique of combining passive stretching and isometric stretching, in order to achieve maximum static flexibility (Kabat, 1940).

### **1.17.2Surya-Namaskar**

Suryanamaskar combines Yogasanas and Pranayama. As such, it comes in between SithilikaranaVyayama and Yogasanas and brings about the general flexibility of the body preparing it for further Asanas and Pranayama. This is usually done both at sunrise and sunset, facing the sun (Vivekananda Kendra Prakashan, 2012).

### **1.17.3Muscular Endurance**

Muscular endurance is the ability of a muscle or muscle group to exert a submaximal force repeatedly over a period of time and it is the ability of the muscle to continue to perform without fatigue(Corbin, 2000).

### **1.17.4Muscular Strength**

Muscular strength is the ability of a muscle or muscle group to exert a maximal force against a resistance one time through the full range of motion (National Association for Sport and Physical Education, 2005).

### **1.17.5Flexibility**

Flexibility is the ability to move a joint through its complete range of motion(ROM). Optimal flexibility allows a joint or group of joints to move freely and efficiently; however, too much laxity in a joint is not healthy and may lead to injury (National Association for Sport and Physical Education, 2005).

#### **1.17.6Agility**

Agility is the ability to change the entire position of the body in space. In other words, agility is the ability of the body or parts of the body to change direction rapidly and accurately (Yobu, 2010).

#### **1.17.7Cardio Respiratory Endurance**

According to Morehouse and Miller “Cardio respiratory endurance is the ability to carry a workload for a relatively prolonged period.

Cardio respiratory endurance is the ability of the heart, lungs, and blood vessels to deliver essential nutrients, especially oxygen to the working muscles and to remove waste materials from the body (Laurence E. Morehouse and Augustus T. Miller, 1968).

#### **1.17.8Breath Holding Time**

Breath holding time is defined as the duration of time through which one can hold his breath without inhaling or exhaling (Laurence E. Morehouse and Augustus T. Miller, 1967).

#### **1.17.9Resting Pulse Rate**

The time from the end of one contraction to the end of the next contraction is a complete heart beat or pulse or cardiac cycle (Eva Lurie Weinerb, 1984).

#### **1.17.10 Respiratory Rate**

Respiratory rate is the number of breaths per minute (Ajmer Singh, 2009).

#### **1.17.11 Self confidence**

Self-confidence is an attitude which allows individuals to have positive yet realistic views of themselves and their situations (Marie Reid, 2000).

#### **1.17.12 Anxiety**

Anxiety is a state of emotional and physical disturbance included in a person by real or imagined threat. In psychology the term refers to disturbance caused by threats that are only apparent to the individual and causing to behave in a way that is not relevant to the true situations (Robin S. Vealey, 1977).