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INTRODUCTION
CHAPTER - I

INTRODUCTION

Human beings are products of a highly technological era, surrounded by machines designed to serve every imaginable purpose. But, when a machine breaks down, it does not have the capacity to repair itself, no matter how advance or well-designed it may be. We must either replace the item, or seek out the help of someone with specialized knowledge to fix the faulty machine. But one machine does exist that comes with its own built-in and highly specialized repair mechanism: The Human Body.

The human body is an amazing creation. Countless events are occurring simultaneously in perfect coordination, allowing complex functions such as seeing, hearing, smelling, tasting, breathing and thinking to continue without a conscious effort.

The body's functions are ultimately its cells' functions. Survival is the body's most important business. Survival depends on the body's maintaining or restoring homeostasis, a state of relative constancy, of its internal environment.

The body ceaselessly carries on many activities adapting to varying intensities and types of physical activities with efficiency and effectiveness. It has specialized systems for body support, protection and movement. The regulation of body activities, the supply and distribution of nutrients, the
removal of waste materials; and many more systems that are involved during exercise makes the body an incredible machine.

There are many types of movement within the body. On the cellular level, molecules move from one place to another. Blood moves from one part of the body to another. The diaphragm moves with every breath and the muscle fibers shorten to produce movement. To keep the body hale and healthy an individual should incorporate in his daily life, a set of physical activity in any form be it physical exercise or yoga.

**Yoga and its meaning**

The beauty of Yoga is in its versatility, allowing practitioners to focus on the physical, vital, mental, emotional, psychic and spiritual. Yoga is an education that completely provides human beings good health for better living. Yoga is a science of right living and as such, is intended to be incorporated in daily life.

Developed in India, Yoga is a psychological discipline with roots going back about 5,000 years. Today, most Yoga practices in the West focuses on the physical postures called “Asanas”, breathing exercises called “Pranayama” and “Meditation”. However, there is more to it than that, and the deeper you go the richer and more diverse the tradition becomes. The word “Yoga” means union. Linguistically, it is related to the Old English “yoke”.

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Traditionally, the goal of Yoga is union with the Absolute, known as Brahman, or with Atman, the true self. These days the focus is often on the more down-to-earth benefits of Yoga, including improved physical fitness, mental clarity, greater self-understanding, stress control and general well being, allowing practitioners to focus on the physical, psychological or spiritual or a combination of all three.

Health is the motto of Yoga. Yoga does not mean twisting and bending of the body. It is a comprehensive method of culturing and nurturing the body. Yoga is the cheapest and the most scientific method of ensuring the soundness of the body and the richness of the mind. Yoga provides strength and indirectly aids attitude training. A vigorous approach to life is built and strengthened by a practice carried out daily.

Yoga is said to be an integral subjective science. Its division into spiritual, mental and physical cannot be separated from each other. Yoga is equanimity, serenity and control of the senses and the mind. It is all embracing, all-inclusive and Universal in its application and utility. Yoga is not a religion nor is it a mystic cult. Yoga is a spiritual technique, a way, a path, a method that has something to offer to everyone, religious and the non-religious, men and women irrespective of age and faith. Yoga is a way to a healthier, happier and harmonious life.
There are four paths of Yoga: 1) Jnana, the path of knowledge or wisdom; 2) Bhakti, the path of devotion; 3) Karma, the path of action; and 4) Raja, the path of self control.

George Feuersteing, (1989) says that according to Patanjali the eight fold steps of Yoga are

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<td>Universal moral commandments.</td>
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<td>Niyama</td>
<td>Self purification by discipline.</td>
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<tr>
<td>Asana</td>
<td>Posture</td>
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<tr>
<td>Pranayama</td>
<td>Rhythmic control of the breath</td>
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<tr>
<td>Pratyahara</td>
<td>Withdrawal and emancipation of the mind from the domination of the senses and exterior objects.</td>
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<td>Dharana</td>
<td>Concentration</td>
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<td>Dhyana</td>
<td>Meditation</td>
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<tr>
<td>Samadhi</td>
<td>Ecstasy. State of super consciousness brought about by profound meditation in which the individual aspirant becomes one with the object of his Meditation.</td>
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**Yogasana**

The third fold step of Yoga is Asana. Here all the possible movements by the body are practiced to form different type of poses.
Types of Yogasana Poses

Seated Poses

Seated poses are useful for practicing breathing exercises and relaxation or meditation techniques. Performing seated poses can help improve the posture and open the hips.

Standing Poses

Standing poses are often used as warm up or as a starting point for other poses. Standing poses are beneficial for strengthening the legs, opening the hips and improving the sense of balance.

Inversions

Inversions are excellent poses that improve the blood circulation, quiet your mind and improve your overall health. Inversions are also believed to reverse the ageing process and reduce the effect of the gravity on your body.

Relaxation and Restorative Poses

To relax the body and mind and to allow the energy to move freely throughout the body, relaxation and restorative asanas are practiced.

Counter Poses

A counter pose is a pose that stretches the spine in the opposite direction from a previous pose or returns the spine to a neutral position.
Twists

Twists are performed to stretch and strengthen the back and abdominal muscles, increase the flexibility of the spine and improve the circulation of blood. Twists improve the functioning of the internal organs by providing them with a fresh supply of blood.

Balancing Poses

Balancing poses are great for improving the balance and coordination as well as developing the ability to remain grounded in a pose. Keeping the body balanced encourages one to focus and balance the mind.

Forward Bends

Forward bends stretch the entire back of the body, especially the hamstrings. Forward bends are also often used to release tension, calm the mind and soothe the nervous system and help to keep the spine strong and supple.

Back Bends

Back bends are among the most challenging poses in yoga. Bending backward helps strengthen the back and keep the spine strong and supple. Back bends also open the front of the body, especially the chest.
Pranayama

Pranayama is “Control of Breath”. ‘Prana’ is breath or vital energy in the body. On subtle levels, prana represents the pranic energy responsible for life or life force and ‘Ayama’ means control. So pranayama is ‘control of breath’. One can control the rhythms of pranic energy with pranayama and acquire and maintain a healthy body and mind.

Yoga for better performance in sports

Many world-class sports persons have found that the practice of Yoga helps them to achieve greater skills in their sport. This is because Yoga not only works on the physical level but also has benefits for the mental and emotional energy levels. It enables them to realize ‘winning is not everything’ and that there is ‘more to life’ than sporting ‘highs’ and ‘lows’.

Ryan Giggs was voted BBC sports personality of the year. In his acceptance speech, he thanked his hatha yoga instructor for helping him maintain his standing as a leading football player.

Well known boxer Evander Holyfield has been practicing yoga for years, to keep him focused on his games and to help him concentrate in daily life.

Yogasana postures are the physical positions that coordinate breath with movement and with holding the position to stretch and strengthen different parts of the body. By their very nature, asanas affect major and minor muscle
groups and organs as they simultaneously import strength, increase flexibility and bring nourishment to internal organs. Although most poses are not aerobic in nature, they do in fact send oxygen to the cells in the body by way of conscious deep breathing and sustained stretching and contraction of different muscle groups.

- At the physical level asanas and pranayama stabilize and balance the lop-sided physical drills necessary for sporting activity.
- Most sporting activity is ‘on the feet’ and the exertion is made due to standing up for a long time. In Yoga, all possible body positions are explored and the body is exercised standing, sitting, lying down (front, side and back) and even upside down. This creates an acute awareness of the entire body, strengthens the body systems and develops flexibility of the body that is not present in most sports persons.
- Yoga is isometric and internal. It is a contest between our inherent inertia and the power of the will. Parts of the body are pitted against one another and a unique harmony of body, mind and breath is developed. This internal struggle when handled successfully deepens the consciousness of not only the working of the body but also of the mind and emotions.
- In the science of Yoga, body movement and breath must be synchronized. The body is lifted on the incoming breath and lowered on the outgoing breath. Bhastrikas or the ‘bellows breath’ activate the solar
plexus, which is an energy reservoir and strengthens the diaphragm thus producing strength, vitality and endurance. The practice of Pranayama can bring about revolutionary effects on the performance of the sports persons and improve their state of mind, emotions and all round health.

• Sports persons are prone to suffer from glandular imbalance due to their lifestyles and activities both on and off the field. Yoga stimulates and strengthens the endocrine system and it counteracts the body stiffness.

• Yogic concepts such as ‘non attachment to the fruits of one’s labour’ and ‘equal mindedness in victory and defeat’ are important attitudes in sports. When sports persons go into the competition with such attitudes, they are free from anxiety and are confident that they have done their best and will be ready to accept the verdict. Such persons have a much better chance of success than one who looks upon the competition as a life and death situation. Only a ‘quiet mind’ and ‘controlled body’ can produce real ‘skill in action’.

• Yoga has a lot to offer to sports through the field of relaxation. In the sports world, all is PUSH, PUSH and PUSH. There is little room for relaxation in the arena. Yoga teaches us that there has to be balance. The concept is known as ‘spanda-nishpanda’ or ‘exertion-relaxation’ in an alternating rhythm. The art of relaxation as taught in Yoga can provide a counterfoil to the extreme stress of competitive pressures, fostering mental, emotional and physical health.
• The catabolic nature of sporting activities can be balanced by the anabolic activities of Yoga, retarding the ageing process and giving the sports person a longer professional life.

• A more conscious and aware outlook of the whole phenomenon of human life on earth will make the sports person a more valuable member of the human social unit.

Yoga has many benefits for the body and mind. Some of the benefits of yoga, be it physiological or psycho motor are listed below.

**Benefits of Yoga**

- Improve circulation, vital to proper functioning of the body.

- Nourish, stimulate and maintain the vital balance of the endocrine glands which govern growth and development.

- Improve functions such as digestion and respiration so that there is more energy available.

- Increase the supply of fresh blood to the brain thus enhancing the mental capacity.

- Promote proper structural development by working on the joints.

**Physiological Benefits**

- Pulse rate decreases.

- Respiratory rate decreases.
• Blood pressure normalizes (of special significance for hypo reactors).

• Galvanic Skin Response (GSR) increases.

• EEG-alpha waves increase (theta, delta and beta waves also increase during various stages of meditation).

• Cardio vascular efficiency increases.

• Respiratory efficiency increases (respiratory amplitude and smoothness increase, tidal volume increases, vital capacity increases, breath-holding time increases).

• Gastrointestinal function normalizes.

• Endocrine function normalizes.

• Excretory functions improve.

• Musculo skeletal flexibility and joint range of motion increase.

• Posture improves.

• Strength and resiliency increase.

• Energy level increases.

• Weight normalizes.

• Sleep improves.

• Immunity increases.

• Pain decreases.
**Psychomotor Benefits**

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

**Physical exercise and its meaning**

Exercise is a physical activity that is planned or structured. It involves repetitive bodily movement done to improve or maintain one or more of the components of physical fitness like speed, strength, endurance, flexibility, body composition etc.

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

Exercise from the practical point of view may be formulated as “any bodily exertion for the sake of keeping the organs and their functions in a healthy state” (Karambelkar, 1971).
Exercise comprises all movements designed to act on the muscles, the blood vessels, the nervous system, the skin and the abdominal organs (R. Tait, 1944).

Types of Physical Exercise

Exercises are generally grouped into three types depending on the overall effect they have on the human body:

- Flexibility exercises such as stretching improve the range of motion of muscles and joints.
- Aerobic exercises such as cycling, walking, running, hiking or playing Badminton focus on increasing cardiovascular endurance.
- Anaerobic exercises such as weight training, functional training or sprinting increase short-term muscle strength.

Exercise can be classified in various ways. However, there are certain basic movement patterns in each exercise. These may be expressed in terms of tension development in the muscles. The term ‘contraction’ has often been used to mean tension in the muscles resulting in their shortening. The shortening of the muscle is called concentric contraction and the lengthening of the muscle as eccentric contraction. Both concentric and eccentric contractions are also known as isotonic contraction. When a muscle develops tension but the length of the muscle remains unchanged, it is called static or isometric contraction.
The various systems of gymnastic exercises developed in Europe in the nineteenth century had exercise as one of their objectives in the development of muscular strength. The experimental investigation by De Lorme, (1949) demonstrated that the tension developed in the muscle is the determining factor in strength increase. Hellebrandt and Houtz, (1956) experimentally demonstrated that muscular endurance was increased when repetitive exercises were performed against heavy resistance. Today, we have a variety of exercise like Calisthenics, Gymnastics, Marching, Jogging, Dancing, Stretching exercises, Mobility exercises, Aerobics, Weight training exercises and Yogic exercises. For the past many years, a technique known as Ballistic Stretching, Static Stretching and Proprioceptive Neuromuscular Facilitation (PNF) have been advocated for the improvement of joint flexibility.

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

Exercise is a physiological pattern, and like emotion involves a variety of bodily changes. Experts in the field of physical education believe that regular vigorous physical activity helps to improve the strength and functioning of the heart, lungs muscles and it also appears to have much potential for adding not only more life to the years but also possibly more years to life.
Benefits of Physical Exercise

- Physical Exercises are essential for better living. Regular exercise helps to prevent obesity, which is related to both coronary heart disease and hypertension and an effective way of lowering stress. It helps to maintain emotional stability and enhances spiritual and moral development.
- Physical exercise produces a sense of enhanced energy; it increases mental and physical stamina.
- Physical exercise relieves tension and helps us to cope with daily stress.
- Physical exercises can relieve weariness and boredom and reduce depression and anxiety.
- Physical exercises produce a sense of control that may not be experienced in other aspects of our lives.
- Reduce the risk of developing and/or dying from heart disease.
- Reduce high blood pressure or the risk of developing high blood pressure.
- Potentially decrease resting systolic and diastolic blood pressure.
- Reduce high cholesterol or the risk of developing high cholesterol.
- Bring about positive changes in blood cholesterol.
- Reduce the risk of developing colon cancer and breast cancer.
- Reduce the risk of developing diabetes.
- Reduce or maintain body weight or body fat.
- Build and maintain healthy muscles, bones, and joints.
- Increase muscular strength and muscular endurance.
- Increase strength of tendons and ligaments.
- Potentially improve flexibility (range of motion of joints).
- Improve glucose tolerance and insulin sensitivity.
- Improve strength, balance, and functional ability in older adults.
- Improve psychological well-being.

**Benefits of Yoga over Physical Exercise**

The differences between yoga and physical exercises depend very much on the type of physical activity, the differences in a general sense are:

- In the practice of yogasanas, oxygen consumption is reduced whereas in physical exercise it is increased.
- In yogasanas the respiration rate falls, whereas in exercise it increases. Generally, physical exercises are done very quickly and with a lot of heavy breathing; therefore the respiratory system is forced to work much harder.
- In yogasanas the body temperature drops whereas in exercise it tends to rise.
- In yogasanas the metabolic rate drops whereas with exercise it increases.
- In yogasanas the muscles receive minimum nutrition/oxygen and the organs receive more, whereas in physical exercise, it is the muscles that receive the most nutrition/oxygen at the expense of the other organs. Large muscles are developed by different types of physical exercises;
these big muscles require greater nutrition and supply of blood; when not utilized, these muscles tend to become flabby as the muscle tissue turns to fat.

- In yogasanas, the blood pressure and heart rate decrease, whereas in exercise they increase with the result that the heart works harder.
- In broad terms, yoga practitioners need less food than people practicing physical exercise.
- Yogasanas help to harmonize the endocrinal secretions, balancing the emotions and giving a positive attitude to life.
- Yogasanas stimulate the parasympathetic nervous system, whilst exercises stimulate the sympathetic nervous system.
- Physical exercise tends to overwork the joints and can often engender rheumatism and stiffness later in life. The opposite is in the case with yogasanas.
- Yogasanas encourage flexibility and the capacity to adapt to the environment and to change; if done correctly, they also develop stamina.
- Unlike, most exercises, yogasanas are done slowly, with relaxation and awareness which also encourages coordination between the body systems and the mind.
- Physical exercise tends to build up toxins in the body, whereas yogasanas eliminate them.
Benefits of Physical Exercise over Yoga

• Physical Exercise improves the structural development of the joints.
• Physical Exercise improves the circulation of blood in the voluntary system, thereby resulting in better muscular development as a result of improved function of the muscles.
• Physical Exercise increases the muscle mass in the body whereas in yoga the muscle mass does not increase.
• Physical Exercise improves speed.
• Physical Exercise improves the agility.
• Physical Exercise increases the cardiovascular endurance.
• Physical endurance training has effects on adipose tissue distribution, and the effect on adipose tissue distribution is likely to be important in reducing cardiovascular risk.
• Physical Exercise improves strength and strength endurance.
• Physical Exercise increases capillarization and blood supply.
• During Physical Exercise when the body gets heated sweat comes out through the sweat pores to cool the surface of the body thereby bringing out the excess water and minerals like Sodium and Potassium in the body.
• For a regular practitioner of Physical Exercise the heart rate and blood supply quickly returns to normal following physical activity.
• Physical Exercise produces a sense of enhanced energy.
The benefits of yoga over physical exercise and benefits of physical exercise over yoga were discussed to get a clear understanding of both yoga and physical exercise.

**Purpose of the study**

There have been many proven researches in the past on yogic practices which have given positive results. The curiosity of the investigator was to know whether Physical Exercise was superior to Yogic Practice or Yogic Practice was superior to Physical Exercise and to know whether the combination of both Physical Exercise and Yogic Practice could bring about positive results in selected Anthropometric Measurements, Motor Ability Components and Physiological Variables.

**Significance of the study**

The contribution of yoga and physical exercise to personal health and performance in sports could be analyzed. By incorporating yoga and physical exercise physical educationists, trainers and coaches could formulate training schedules for sportsmen.

This study would help us to know about the progress of Anthropometric Measurements, development of Motor Ability Components and progress of Physiological Variables.
Hypothesis

1. There would be significant improvement on selected Anthropometric Measurements, Motor Ability Components and Physiological Variables that are influenced by Yogic Practices and Physical Exercises.

2. The experimental groups would be significant in the training outcomes more than the control group.

3. The experimental groups would be more significant group in the training outcomes when compared to the Control Group.

Delimitations

1. The study was confined to the school boys aged between 12-15 years.

2. Only male subjects were taken for this study.

3. This study was conducted only on 100 selected healthy school boys.

4. The training period was limited to twelve weeks only.

5. Only selected Anthropometric Measurements, Motor Ability Components and Physiological Variables were selected for the study.

Anthropometric Measurements

- Height
- Body Weight
- Circumference of Chest
Motor Ability Components

- Speed
- Agility
- Explosive Power

Physiological Variables

- Pulse Rate
- Breath Holding Capacity
- Cardio Respiratory Endurance.

Limitations

1. External factors like food habits, lifestyle, daily routine and environmental factors which may have an effect on the result of this study were not taken into consideration while interpreting the results.

2. Apart from the training programme, the involvement of the subjects in their daily routine were not taken into consideration.

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

4. Apart from the given Physical Exercise and Yoga no other specific training was given so as to influence the results of the tests.
Definition and explanation of the terms

Yoga

The word yoga is derived from the Sanskrit root ‘YUJIR’ meaning ‘to yoke’ or ‘union’ or ‘to join’ a combination of body, mind and thought. On a more practical level Yoga is a means of balancing and harmonizing the body and mind and emotions. This is done through the practice of asana, pranayama, mudra, bandha, shatkarma and meditation and must be achieved before ‘union’ can take place with the higher reality.

Asanas (Postures)

The third limb of Yoga is asana or posture. Asana brings steadiness, health and lightness of limb. A steady and pleasant posture produces mental equilibrium and prevents fickleness of mind.

Asanas are not merely gymnastic exercises. They are postures. Asanas can be done alone, as the limbs of the body provide the necessary weights and counter weights. By practicing them, one develops agility, balance, endurance and great vitality. (B.K.S. Iyengar, 1966).

Pranayama

Pranayama is generally defined as Breath Control. The word pranayama is comprised of two roots: Prana plus Yama. Prana means vital energy or life force and yama means control. Five types of Prana are responsible for various pranic activities in the body; they are
(i) **Prana** – The area between the larynx and the top of the diaphragm. It is associated with the organs of respiration and speech and the gullet together with the muscles and nerves that activate them. It is the force by which the breath is drawn inside.

(ii) **Apana** – It is located between the navel region and provides energy for the large intestines, kidneys, anus and genitals. It is concerned with the expulsion of waste from the body.

(iii) **Samana** – It is located between the heart and the navel. It activates and controls the digestive system: the liver, intestines, pancreas and stomach, and their secretions.

(iv) **Udana** – It controls the area of the body above the neck activating all the sensory receptors such as the eyes, nose and ears.

(v) **Vyana** – Pervades the whole body, regulating and controlling all movements and coordinating the other pranas. It acts as a reserve force for the other pranas.

**Physical Exercise**

Physical Exercise is a subset of physical activity, which is an activity that is structured and planned.

Physical exercises improve the circulation of voluntary system, thereby resulting in better muscle development as a result of improved function of the muscles. *(Sonia Sehgal, 2004).*
Speed

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

Rapidity of movement or action is called speed. (Oxford Dictionary)

Agility

Agility is the ability to change the body's position, and requires a combination of balance, coordination, speed, reflexes, and strength.

In sports, agility is described in terms of response to an opposing player, moving target, as seen in field sports and racket sports. Sheppard and Young, (2006) define agility as "a rapid whole body movement with change of velocity or direction in response to a stimulus."

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

Explosive Power

Clarke, (1976) says Explosive power is the ability of a muscle or a group of muscles to release maximum force in the shortest possible time, in an explosive manner perfecting the body or an object.

Nelson, (1962) defines “explosive power as the rate of expenditure of energy".
Pulse Rate

Pulse Rate is the number of beats of the pulse per minute or the number of beats of the heart and entries per minute. The pulse rate is usually called the heart rate that is the number of times the heart beats each minute (bpm). Pulse rate changes from minute to minute. It will be faster when you exercise or are under stress. It will be normal when you are resting.

Breath Holding Capacity

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

Cardio Respiratory Endurance

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

Cardio Respiratory Endurance is the ability of the body's circulatory and respiratory systems to supply fuel during sustained physical activity. (USDHHS, 1996 as adapted from Corbin & Lindsey, 1994).
### Operational Terms

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