Yoga is one of the most ancient cultural heritages of India. The word yoga in Sanskrit means “to unite”, and so yoga can be said to connote a unitive discipline. In this sense, it is an exercise in moral and mental cultivation that generates good health (arogya), contributes to longevity (chirayu), and the total intrinsic discipline culminates into positive and perennial happiness and peace. Therefore, yoga is the said to be indispensable to the ultimate accomplishment in life. It is a science that affects not only the conscious self but the subconscious as well. It is a practical physiological training (kriya yoga), which if practiced, can exalt man to the ‘supra mundane level’.

Yoga is one of the orthodox systems of Indian philosophy. It was collated, coordinated and systematized by Patanjali in his classical work, the Yoga Sutras, which consists of 185 terse aphorisms. In Indian thought, everything is permeated by the supreme universal spirit (paramatma or God) of which the individual

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human spirit (jivatma) is a part. The system of yoga is called Jivatma and Pramatma, because it teaches the means by which the jivatma can be united to, or be in communion with the paramathma, and so secure liberation (moksa).

Yoga has also been described as wisdom in work or skilful living amongst activities, harmony and moderation. “Yoga is not for him who gorges too much, nor for him who starves himself. It is not for him who steps too much, nor for him who stays awake. By moderation in eating and resting, by regulation in working and by concordance in sleeping and waking, yoga destroys all pain and sorrows”.

Every man wants happiness. He shuns pain. No one teaches any one to seek happiness. It is the innate, inherent subhava (nature) of everyone to seek happiness. Ananda is embodiment of one’s own nature.

Yogasanas are Indian’s unique contribution to physical education. Yoga and physical education may be compared to two bullocks hitched to shaft as they are for the judicious blending of the education of the body and the mind. There is no denial of the fact
that yoga and physical education attach importance by gaining the benefits of physical health, mental health, physical fitness and peace of mind through their regular practices. Physical education concerns the anatomical aspects of the physique with its physiological reactions for a given activity, the ultimate aim of which is to enjoy good health and optimum fitness. Yoga provides multidimensional development and it has now become an adjunct to physical education.

Yoga is a complete science of life that originated in India many thousands of years ago. It is the oldest system of personal development in the world, encompassing body, mind and spirit. Ancient yoga had a profound understanding of man’s essential nature and of what he needs to live in harmony with himself and his environment. The ancients perceived the physical body as a vehicle, with the mind as the driver, the soul as man’s true identity, and action, emotion and intelligence as the three forces, which pull the body-vehicle. In order for there to be an integrated development, these three forces must be in balance. Taking into account the interrelationship between body and mind, the yogis formulated a
unique method for maintaining the balance – a method that combines all the movement you need for physical health with breathing and meditation techniques that ensure peace of mind.\(^2\)

Yoga is an exact science. It is a perfect, practical system of self-culture. It is the discipline of the mind, senses and the physical body. It helps the student to attain perfect concentration of the mind, ethical perfection, moral excellence and spiritual calmness. It is the master-key to unlock the realms of Peace and Bliss, Mystery and Miracle. Yoga does not consist in sitting cross-legged for six hours or stopping the beatings of the heart or getting oneself buried underneath the ground for a week or a month; these are mere physical feats. Real Yoga is the attainment of the highest divine knowledge through conscious communion with God. The word Yoga comes from the Sanskrit root “Yuj” which means “to join.” Yoga is the science that teaches us the method of uniting the individual soul with the Supreme Soul, of merging the individual will in the Cosmic Will. Yoga transmutes the unregenerate nature of the student and raises him to the highest state of Divine Glory and Splendour. It

bestows on you increased energy, vitality, vigour, longevity and a high standard of health. It will infuse in you a sense of security, a new strength, confidence and self-reliance. Yoga brings a message of hope to the forlorn, joy to the depressed, strength to the weak, and knowledge to the ignorant. It kills all sorts of pain, misery and tribulation. By practice of Yoga you can turn out efficient work within a short space of time, resist temptations, remove disturbing elements from the mind and attain full success in every walk of life. Through the practice of Yoga you can control the subtle forces within the body and command nature. You can unfold all your latent faculties and develop physical, mental, supernatural and divine powers. The whole mystery of Nature will become an open book to you. You can live in the Eternal Light and Glory of God.\(^3\)

The Sanskrit word comes from the root ‘Yug” which means to unite and it represents both a process and a state of unity. The state of yoga is the culmination of syntropy: it is a state devoid of the limitations of time and space, a state which transcends matter and energy and which cannot be qualified by any attribute. This reality

of pure Consciousness has been recognized by all thinkers, spiritualists or materialists, as the fundamental axiom of life from which intelligence, volition, love and thought emanate.  

According to Swami Satyaand Saraswathi “Yoga is not an ancient myth buried in oblivion. It is the most valuable inheritance of the present. It is the essential need of today and the culture of tomorrow”.

Yoga is an ancient system of breathing practices, physical exercises and postures, and meditation intended to integrate the practitioner's body, mind, and spirit. It originated in India several thousand years ago, and its principles were first written down by a scholar named Patanjali in the second century B.C.

Yoga had its genesis in the wandering ascetics who sought the solitude of the forests to practice this ancient science and then imparted their knowledge to the ardent students (mumuksu) who lived in their ashrams. The ancient yogins were possessive about this art form and did not make any effort to popularize yoga. The yogic

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postures and the subsequent stages of yoga were handed down only to the deserving students. Hence, this science remained limited to the confines of the forests or remote caves. Very little was known about this Vedic practice until the Yoga Institute of Santa Cruz, Mumbai was founded in 1918, which became India's oldest technical institute on Yoga.\textsuperscript{7}

In the yoga sutras of Patanjali there is a concise definition of Yogasana: “Sthiram Sukham Aasanam”, meaning ‘that position which is comfortable and steady’. In this context, asanas are practiced to develop the ability to sit comfortably in one position for an extended period of time, an ability necessary for meditation. Raja yoga equates yogasana to the stable sitting position.

Yoga is usually defined as union: union between the limited self and the Divine Self. The aim of Yoga is not really to unite us with anything for we are already united. It is to help us realize our identity with the Divine Self, to make us know and tune into our intrinsic nature. There are many definitions of Yoga, which apply to all levels of existence and awareness. At the physical level, we need

\textsuperscript{7} Retrieved from http://hinduism.about.com/bl-yoga-define.htm on 24-04-2012.
to harmonize the functions of different organs, muscles and nerves so that they do not hamper or oppose each other. Disharmony in various body parts and systems brings about inefficiency and lethargy or clumsiness. Moreover, it manifests in diseases in the body. 

Yoga is the science of right living, and as such, is intended to be incorporated in daily life. It works on all aspects of the person: the physical, vital, mental, emotional, psychic and spiritual. Yoga aims at bringing the different bodily functions into perfect coordination so that they work for the good of the whole body.

Yoga is a practical aid, not a religion. Yoga is an ancient art based on a harmonizing system of development for the body, mind, and spirit. The continued practice of yoga will lead you to a sense of peace and well-being, and also a feeling of being at one with their environment. This is a simple definition. 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. Think of this

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practice as being the means and tools to realign and rebalance your vehicle (body) on a regular basis. You take control and you can then become your body mechanic instead of having to pay someone else to do it (medical professionals). Because your body is finely tuned you will find that your chances for injuries and illnesses will drop as you are in a much more attuned state. You don't want for something major to happen to you before you decide to do something about it. That's reactive behavior and that's going to set you back big time, all you have to do is take action now.  

Yogsanas have a deeper significant value in the development of the physical, mental and spiritual personality, whereas pure exercises only have a physical effect on the muscles and bones. Physical exercises are performed quickly and with a lot of heavy breathing.

The yoga postures (known as asanas), help to stretch and relax the muscles and skeletal system. The physical release through these soothing movements can help create a sense of calmness and well-being. Physical exercise of any kind will help people with high

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levels of anxiety, and yoga postures have the added bonus of specifically generating deep muscle relaxation while toning at the same time.\(^\text{10}\)

Studies show that yoga may promote heart health in both the young and old. Yoga postures aimed at stretching and strengthening the joints in the upper body can improve grip strength and diminish pain among people with carpal tunnel syndrome. Yoga may also be effective for managing pain and enhancing a range of motion in people with osteoarthritis.

While the practice of yoga started nearly 6,000 years ago, the earliest written record documenting yoga as a health practice are recorded in the Vedas texts from India dating back at least three thousand years. There have been other ancient texts documenting the philosophy and teaching of yoga. However, yoga did not emerge as a fully developed practice until 500 B.C. In its traditional form yoga is considered a complete lifestyle that provides a path to spiritual enlightenment.

Yoga is perhaps the only form of activity which massages all the internal glands and organs of the body in a thorough manner, including those – such as the prostate - that hardly get externally stimulated during our entire lifetime. Yoga acts in a wholesome manner on the various body parts. This stimulation and massage of the organs in turn benefits us by keeping away disease and providing a forewarning at the first possible instance of a likely onset of disease or disorder. By gently stretching muscles and joints as well as massaging the various organs, yoga ensures the optimum blood supply to various parts of the body. This helps in the flushing out of toxins from every nook and cranny as well as providing nourishment up to the last point. This leads to benefits such as delayed ageing, energy and a remarkable zest for life. Muscles that have become flaccid, weak or slothy are stimulated repeatedly to shed excess flab and flaccidity.11

Stress, hormonal changes, and self-development are among the reasons why women should stay healthy. A woman's capability to handle stress, whether emotional or physical, highly depends on

her health. The hormonal changes associated with menopause, pregnancy and menstruation can cause women to suffer from premenstrual syndrome, menstrual cramps, headaches, and other symptoms. She also needs to stay healthy to be able to cope with pregnancy and menopause, together with the symptoms. Women have also been under the pressure to look good over the centuries. Nowadays, a large number of women would do almost anything to be thinner. Yoga, an ancient science, can help women cope with health issues and help them develop the state of their body and mind. It can help alleviate the pain that goes with menstruation, manage stress, and ensure an easier delivery, among other benefits. Yoga poses are also designed to tone and exercise the muscles of the body to eliminate excess fat, and to make it more flexible and stronger.\textsuperscript{12}

In patients with type 2 diabetes, who were subjected to yoga therapy for a period of 40 days, it was seen that there was a significant decrease in the fasting and postprandial blood glucose levels. A significant decrease in waist-hip ratio and changes in insulin levels were also observed, suggesting a positive effect of

yogasanas on glucose utilization and fat redistribution in type 2 diabetes. The investigators suggest that yogasanas may be used as an adjunct with diet and drugs in the management of type 2 diabetes.\textsuperscript{5} The findings from the study by Gordon et al. also second these findings. Their study demonstrated the efficacy of hatha yoga exercise on fasting blood glucose, lipid profile, oxidative stress markers and antioxidant status in patients with type 2 diabetes and suggest that hatha yoga exercise and conventional physical therapy exercise may have therapeutic preventative and protective effects on diabetes mellitus by decreasing oxidative stress and improving antioxidant status.\textsuperscript{13}

Diabetes mellitus: Better known just as “diabetes” -- a chronic disease associated with abnormally high levels of the sugar glucose in the blood. Diabetes is due to one of two mechanisms:

(1) Inadequate production of insulin (which is made by the pancreas and lowers blood glucose) or (2) Inadequate sensitivity of cells to the action of insulin. The two main types of diabetes correspond to these two mechanisms and are called insulin

dependent (type 1) and non-insulin dependent (type 2) diabetes. In type 1 diabetes there is no insulin or not enough of it. In type 2 diabetes, there is generally enough insulin but the cells upon it should act or not normally sensitive to its action.\textsuperscript{14}

Diabetes mellitus is a group of metabolic diseases characterized by high blood sugar (glucose) levels, that result from defects in insulin secretion, or action, or both. Diabetes mellitus, commonly referred to as diabetes (as it will be in this article) was first identified as a disease associated with "sweet urine," and excessive muscle loss in the ancient world. Elevated levels of blood glucose (hyperglycemia) lead to spillage of glucose into the urine, hence the term sweet urine. Normally, blood glucose levels are tightly controlled by insulin, a hormone produced by the pancreas. Insulin lowers the blood glucose level. When the blood glucose elevates (for example, after eating food), insulin is released from the pancreas to normalize the glucose level. In patients with diabetes, the absence or insufficient production of insulin causes hyperglycemia.

Diabetes is a chronic medical condition, meaning that although it can be controlled, it lasts a lifetime.\(^{15}\)

Diabetes mellitus occurs when the pancreas doesn’t make enough or any of the hormone insulin, or when the insulin produced doesn't work effectively. In diabetes, this causes the level of glucose in the blood to be too high. In type - I diabetes the cells in the pancreas that make insulin are destroyed, causing a severe lack of insulin. This is thought to be the result of the body attacking and destroying its own cells in the pancreas - known as an autoimmune reaction. It's not clear why this happens, but a number of explanations and possible triggers of this reaction have been proposed. These include: 1. infection with a specific virus or bacteria; 2. exposure to food-borne chemical toxins; and 3. exposure as a very young infant to cow's milk, where an as yet unidentified component of this triggers the autoimmune reaction in the body.\(^{16}\)

However, these are only hypotheses and are by no means proven causes. Type - II diabetes is believed to develop when:


1. the receptors on cells in the body that normally respond to the action of insulin fail to be stimulated by it - this is known as insulin resistance. In response to this more insulin may be produced, and this over-production exhausts the insulin-manufacturing cells in the pancreas; 2. there is simply insufficient insulin available; and 3. the insulin that is available may be abnormal and therefore doesn't work properly. The following risk factors increase the chances of someone developing Type - II diabetes: Increasing age, obesity and physical inactivity.\textsuperscript{17}

Yoga Asanas for Curing diabetes are Ardha Chandrasana (Half-Moon pose), Bhujangasana (Cobra Pose), Salabhasana (Locust Pose), Poorna Salabhasana (Full Locust Pose), Dhanurasana (Bow Pose) and Ustrasana (Camel Pose). These postures bring stimulation to the pancreas, as they exercise the erector spinae, latissimus dorsi, obliques, deep intertransversarii and posterior abdominal wall. Also, most of these postures cause the internal viscera to stretch, bringing stimulation to the pancreas and other glands and organs that otherwise receive no stimulation. Dandayamana-Bibbaktapada

\textsuperscript{17} Retrieved from http://chinese-school.netfirms.com/diabetes.html on 24-02-2012.
Pashimotthanasana (Standing Separate Leg Head-to-Knee Pose), Ardha Kurmasana (Half Tortoise Pose), Sasangasana (Rabbit Pose) and Janushirasana with Pashimotthanasana (Head-to-Knee with Stretching Pose) provide stimulation and rejuvenation to the cells of the pancreas and other endocrine glands by way of compression. Dandayamana-Bibbaktapada Pashimotthanasana (Standing Separate Leg Head-to-Knee Pose), Yoga Mudra, Ardha Kurmasana (Half Tortoise Pose), Sasangasana (Rabbit Pose) and Janushirasana with Pashimotthanasana (Head-to-Knee with Stretching Pose) provide stimulation and rejuvenation to the cells of the pancreas and other endocrine glands by way of compression. Since stress further complicates diabetes, the calmative effects of performing hatha yoga and the specific practice of Savasana (Dead Body Pose) at correct intervals also contributes to the reversal of this so-called chronic, incurable disease. And when certain other postures, such as Trikanasana (Triangle Pose), or Tuladandasana (Balancing Stick Pose) are applied in the therapeutic manner, aerobic conditioning occurs, eliminating the need for other exercise forms as therapy. Since hatha yoga improves flexibility and overall muscle tone,
however, most everyone finds their overall athleticism improved. Additionally, age is no barrier. Though many diabetics find it difficult, if not almost impossible, to maintain a regular exercise regimen as they grow older, they are still able to maintain an effective therapeutic hatha yoga regimen.\(^{18}\)

The term physical fitness has taken numerous meanings over the years. General definitions have included the concepts as the ability of function normally without undue fatigue and being able to enjoy leisure time activities without debilitating physical stress. In recent times the term has been divided into two distinct categories skill related and health related fitness. Skill related fitness include speed, agility, co-ordination, power, balance etc. Health related fitness refers to those aspects of physiological and psychological functioning, which are believed to offer the individual some protection against degenerative type diseases such as coronary heart disease obesity and various musclo-skeletal disorders.\(^{19}\)

Physical fitness is one aspect of total fitness. The term has been defined in different ways. Physical fitness is a prime requisite

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\(^{18}\) Retrieved from [http://yoga2ayurvedha4healing.googlepages.com](http://yoga2ayurvedha4healing.googlepages.com) on 24-02-2012.

in order to get the optimum in life and to live most and serve best in this modern world. A sound body and a sound mind are men’s most precious possessions.\footnote{Gena Hooks, \textit{Weight Training in Athletics and Physical Education}, (New Jersey: Prentice Hall Inc., 1974), p.97.}

Physical fitness is the combination of strength, flexibility, agility, power speed and endurance. It is the ability to enjoy our lives and achieve our goals without under fatigue or stress vigorous physical activity. It is only means of developing optimum level performance.\footnote{Partric Routh ‘O’ Keefe, \textit{Education Through Physical Activity}, (London: The C.V. Mosby Company, 1959), p. 265.}

Flexibility, which is considered as range of motion around a joint, is the base for any movement. To pick up a small object, to sit, to stand and to plant a nail into a wall one should have flexibility though other factors like strength are also essential. The bones and muscles which form the locomotive system of our body cause movement in a segment of one body and also in the whole body. It should be noted that the degree of joint flexibility is depends upon the physiological characteristics underlying the extensibility of the muscles and ligaments surrounding to joint. In addition it is
important to note flexibility in performing skills, as recent advancements in physical medicine and rehabilitation have indicated the importance of flexibility as it is related to general physical fitness. Particularly if a person waiting a satisfactory degree of flexibility, he is less susceptible to certain muscular injuries.\textsuperscript{22}

Muscular endurance is very important for people playing sports and who have to sustain an activity for long periods of time. Muscular endurance is determined by how well your slow twitch muscle fibers are developed. In case your wondering what slow twitch muscle fibers are. There are generally two types of muscle fibers in your body, slow twitch and fast twitch. Slow twitch muscle fibers cannot exert as much force as fast twitch, but can sustain an effort over a much greater period of time. Fast twitch muscle fibers can exert a great amount of force but for a very limited amount of time. Therefore, slow twitch equals endurance, while fast twitch equals strength.\textsuperscript{23}

\textsuperscript{23} Retrieved from \url{http://generalfitness.tripod.com} on 05-05-2012.
Muscular endurance differs from muscular strength in that it is a measure of a person’s ability to repeatedly apply maximal force, for example, in a series of press ups, over a period of time.

Human physiology is the science of the mechanical, physical, and biochemical functions of humans in good health, their organs, and the cells of which they are composed. The principal level of focus of physiology is at the level of organs and systems. Most aspects of human physiology, and animal experimentation has provided much of the foundation of physiological knowledge. Anatomy and physiology are closely related fields of study: anatomy, the study of form, and physiology, the study of function, are intrinsically tied and are studied in tandem as part of a medical curriculum.\textsuperscript{24}

Blood pressure (BP) is a force exerted by circulating blood on the walls of blood vessels, and is one of the principal vital signs. During each heartbeat, BP varies between a maximum (systolic) and a minimum (diastolic) pressure. The mean BP, due to pumping by the heart and resistance in blood vessels, decreases as the circulating

blood moves away from the heart through arteries. It has its greatest
decrease in the small arteries and arterioles, and continues to
decrease as the blood moves through the capillaries and back to the
heart through veins. Gravity, valves in veins, and pumping from the
contraction of skeletal muscles, are some other influences on BP at
various places in the body. The term blood pressure usually refers to
the pressure measured at a person's upper arm. It is measured on the
inside of an elbow at the brachial artery, which is the upper arm's
major blood vessel that carries blood away from the heart. A person's
BP is usually expressed in terms of the systolic pressure and diastolic
pressure, for example 120/80 millimetres of mercury (mmHG),
which is 16/11 kPa, for comparison.\textsuperscript{25}

High systolic pressure during exercise in untrained people is a
matter of concern. The combination of a high heart rate and systolic
blood pressure suggest high oxygen consumption by the heart. In
fact, the rate-pressure product is an excellent predictor of myocardial
load. As discussed, rate-pressure product is systolic blood pressure
multiplied by heart rate. If a person has heart disease, extreme levels

\textsuperscript{25} Retrieved from \url{http://en.wikipedia.org/wiki/Blood_pressure} on 10-03-2012.
of systolic blood pressure could easily result in myocardial hypoxemia. This is insufficient supply of oxygen to the heart.

Diastolic pressure changes little during exercise in normal people. Typically, there is either no change or a slight decrease of less than 10 mm Hg during exercise. There is also a small decrease during recovery of less than 4 mm Hg. A significant increase in diastolic pressure (> 15 mm Hg or above 110 mm Hg) is associated with a greater prevalence of coronary artery disease.

The rhythmic expansion and contraction of the arteries corresponding to each beat of the heart is referred to as the pulse in the medical field. In simple words, pulse is the rate at which the human heart beats, indicating the health of the heart. The pulse of an individual, or the rate at which his heart beats, can facilitate a quick evaluation of the individual’s health. The pulse can be felt at any spot in the body, wherein the artery is compressed against the bone. The normal pulse rate for humans, while resting, ranges between 60 to 80 beats per minute. In well-conditioned athletes, the pulse rate can also be as low as 60. When the pulse rate exceeds the normal range for a resting pulse, the condition is referred to as tachycardia,
and when it falls below the normal range, the condition is referred to as bradycardia. Immense variations are observed in the heart rate when the individual indulges in different activities. For instance, while sleeping, the pulse rate of the individual may drop down to as low as 40 beats per minute, whereas while exercising, it may rise to as high as 150 - 200 beats per minute.\textsuperscript{26}

The volume of air inspired and expired per unit time is tightly controlled, both with respect to the frequency of breaths and to tidal volume. Breathing is regulated so the lungs can maintain the $\text{Pa}_o_2$ and $\text{Pa}_c_o_2$ within normal range, even under widely varying conditions such as, exercise.\textsuperscript{27}

The main function of carbohydrates is to furnish energy to the millions of cells within the human body. Carbohydrates, which make up approximately 50\% of the average American diet, are classified as either monosaccharides, disaccharides, or polysaccharides. All the carbohydrates in the diet must be reduced to monosaccharides by way of digestion before they can be used by

\textsuperscript{26} Retrieved from \url{http://www.buzzle.com/articles/normal-pulse-rate.html} on 10-11-2011

the body as a source of energy. The most common or simplest monosaccharides (one that has single 6 – carbon sugar molecule) carbohydrate is glucose which can be oxidized and used directly by the body for energy, or it may be broken down by the digestive system and converted into glycogen (a polysaccharide), and stored in the muscle and liver for later use. It is interesting to note that once the storage capacity for glycogen has been reached in the muscles and liver, the excess glucose is converted into fat and stored in the fatty (adipose) tissue of the body.\(^{28}\)

Cholesterol is a fatty substance (a lipid) that is an important part of the outer lining (membrane) of cells in the body of animals. Cholesterol is also found in the blood circulation of humans. The cholesterol in a person's blood originates from two major sources, dietary intake and liver production. Dietary cholesterol comes mainly from meat, poultry, fish, and dairy products. Organ meats, such as liver, are especially high in cholesterol content, while foods of plant origin contain no cholesterol. After a meal, cholesterol is absorbed by the intestines into the blood circulation and is then

packaged inside a protein coat. This cholesterol-protein coat complex is called a chylomicron. The liver is capable of removing cholesterol from the blood circulation as well as manufacturing cholesterol and secreting cholesterol into the blood circulation. After a meal, the liver removes chylomicrons from the blood circulation. In between meals, the liver manufactures and secretes cholesterol back into the blood circulation.29

Cholesterol is also necessary for the normal permeability and function of cell membranes, the membranes that surround cells. Cholesterol is carried in the bloodstream as lipoproteins. Low-density lipoprotein (LDL) cholesterol is the “bad” cholesterol because elevated LDL levels are associated with an increased risk of coronary artery (heart) disease. Conversely, high-density lipoprotein (HDL) cholesterol is the “good” cholesterol since high HDL levels are associated with less coronary disease. After the age of 20, cholesterol testing is recommended every 5 years. A diet high in saturated fats tends to increase the blood cholesterol levels while diets high in unsaturated fats tend to do the opposite, to lower blood

cholesterol levels. Although some cholesterol is obtained from the diet, most cholesterol is made in the liver and other tissues. The treatment of elevated cholesterol therefore involves not only diet but also weight loss and regular exercise (and, occasionally, medications).³⁰

Uric acid is produced from the natural breakdown of our body's cells and from the foods we eat. It is normally filtered out by the kidneys and passes out of the body in urine. If too much uric acid is being produced or if the kidneys are not able to remove it from the blood normally, the level of uric acid in the blood increases. If we suffer from gout or other conditions that affect levels, it is important to get our uric acid levels tested frequently. If we are taking medication, herbal or prescription, monitoring levels will help to assess dosage and effectiveness. We also need to ensure that we are maintaining healthy uric acid levels. Too much uric acid can worsen gout, while too little uric acid and neurological issues can occur.

The association of high serum uric acid with insulin resistance has been known since the early part of the 20th century.

³⁰ www.lipidpanel.com
nevertheless, recognition of high serum uric acid as a risk factor for diabetes has been a matter of debate. In fact, hyperuricemia has always been presumed to be a consequence of insulin resistance rather than its precursor. However, it was shown in a prospective follow-up study that high serum uric acid is associated with higher risk of type 2 diabetic independent of obesity, dyslipidemia, and hypertension.

**STATEMENT OF THE PROBLEM**

The study under investigation involved the experimentation of yoga practices on physical fitness (flexibility and muscular endurance), physiological variables (blood pressure, resting pulse rate and breath holding time) and biochemical variables (total cholesterol, triglycerides, high density lipoproteins, blood glucose and uric acid) among women diabetic patients.

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HYPOTHESES

It is a well-known fact that systematic training for a continuous period is bound to cause changes in physiological, biochemical and psychological parameters. Based on this scientific fact the following hypotheses were formulated.

1. It was hypothesized that the selected yogasanas would bring about significant positive alterations on the selected criterion variables, such as, physical fitness, physiological and biochemical variables among diabetes patients.

2. It was also hypothesized, that there would be a significant difference on selected physical fitness, physiological and biochemical variables between the yogic practice group and the control group.

DELIMITATIONS

1. The study was confined to female diabetic patients (type – II) only.

2. The study was restricted to 30 subjects only. Further, they were divided into two equal groups of 15 subjects each.
Group – I underwent yogic practice and Group – II acted as the control group.

3. All the subjects were residents of Annamalainagar, Chidambaram, Tamilnadu.

4. The subjects selected were in the age group between 35 and 40 years.

5. The physical fitness variables selected for this study were flexibility and muscular endurance.

6. The physiological variables selected for this study were blood pressure (both systolic and diastolic), resting pulse rate and breath holding time.

7. The biochemical variables selected for this study were total cholesterol, triglycerides, high density lipoproteins, blood glucose and uric acid.

8. Yoga practices were given for a period of twelve weeks, six days per week, which was considered adequate to indicate physical fitness, physiological and biochemical variable changes.
LIMITATIONS

1. The meteorological variations, such as air, temperature, atmospheric pressure, relative humidity, etc., during the testing periods could not be controlled and their possible influence on the result of the study was recognized as a limitation.

2. The subjects selected for the study were diabetes patients from different economical backgrounds. Therefore, variations in their living conditions, life styles, diet, medicines, etc., were recognized as a limitation of the study.

3. The general mood and environmental factors at the time of taking blood pressure, blood samples, etc., that would have affected the samples, were recognized as a limitation of the study.

4. The participation of subjects of other physical activities as part of their habituation may affect the result of the study.
DEFINITION AND EXPLANATION OF THE TERMS

Yoga

Yoga is the system of philosophy and practice of esoteric meditation having as object the union of the individual human spirit with that of the universe.\textsuperscript{33}

Yoga is method by which one can remove ignorance, the cause of main folders and thus attain union with supreme self.\textsuperscript{34}

Yoga is the science of right living and, as such, is intended to be incorporated in daily life. It works on all aspects of the person: the physical, vital, mental, emotional, psychic and spiritual.\textsuperscript{35}

Asana

The word asana means “easy comfortable” and so the postures should be to have their full effects.\textsuperscript{36}

\textsuperscript{35} Swami Satyananda Saraswathi, \textit{Asana Pranayama Mudra Bandha}, p. 1.
Flexibility

According to Bosco and Gustafson, flexibility is defined as the measure of the range of the motion of body parts about their joints, attainable without undue strain to those joints and their muscular attachments.

According to Clarke, “Flexibility is the range of movement in a joint or a sequence of joints.”

Muscular Endurance

Clarke stated that endurance is basic in measuring organic capacity believing that if one is able to run or swim more than the normal distance without undue fatigue he is in good physical condition.

The ability of a muscle to repeat identical movements or pressure or to maintain a certain degree of tension over a period of time.

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Blood Pressure

Force that moves blood into arteries and drains blood from the arteries as blood moves through the circulatory system.\textsuperscript{41}

Systolic Blood Pressure

The pressure exerted on the vessel walls during ventricular contraction, measured in millimeters of mercury by the sphygmomanometer.\textsuperscript{42}

Diastolic Blood Pressure

The pressure exerted by the blood on the vessel walls during the resting portion of the cardiac cycle, measured in millimeters of mercury by a sphygmomanometer.\textsuperscript{43}

Pulse Rate

Pulse rate is nothing but heartbeat and the number of time heartbeats per minute.\textsuperscript{44}

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  \item[41] Larry G. Shaver, \textit{Essentials of Exercise Physiology}, p. 295.
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Pulse rate is a wave of increased pressure, which is felt at the arteries when blood is pumped out of the heart.45

**Breath Holding Time**

Breath holding time is defined as the duration of time through which one can hold his/her breath without inhaling and exhaling after a deep inhalation.

**Cholesterol**

An odorless, tasteless, white fatty alcohol (sterol) found in all cell membranes and is vital to cell survival and growth. Cholesterol is also a key precursor or intermediate compound in the production by the body of numerous biologically important substances, collectively called steroids. These include various essential hormones plus bile acids, the major excretory product of cholesterol metabolism but also important in dietary fat. The human body contains about 140-145 grams of cholesterol, which is constantly being used and replenished though at different rates in different tissue.46

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Triglycerides

Triglyceride is an ester of three fatty acids and glycerol, which are the main components of animal and plant lipids. They are the most concentrated source of usable energy in the human body and are stored as subcutaneous fat deposits where they contribute to insulation.\(^{47}\)

Lipoprotein

Lipids and sterols circulate, as a part of macromolecular complexes known as lipoprotein. These are the means by which insoluble lipids are able to circulate in an aqueous medium. Lipoproteins consist of various combinations of cholesterol, triglycerides and phospholipids with specific peptides known as apolipoproteins. Lipoproteins are divided by their ultra centrifugal properties into chylomicrons, very low-density lipoproteins (VLDL), and low-density lipoproteins (LDL), high-density lipoproteins (HDL).\(^{48}\)

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**High-density Lipoprotein**

High-density lipoprotein cholesterol is a group of proteins found in the blood plasma and lymph that are combined with lipids. They transport cholesterol from the tissue to the liver to be broken down and excreted.\(^{49}\)

**Blood Glucose**

Glucose is a simple sugar we get by digesting carbohydrates. It is transported in the blood throughout the body and serves as the major sources of energy for each of the body cell. A high blood glucose level is the primary characteristic of diabetes.\(^{50}\)

**Uric Acid**

Uric acid is a waste product that results from normal body processes and is also found in some foods. Normally, the kidneys eliminate uric acid from the body in urine.\(^{51}\)

**SIGNIFICANCE OF THE PROBLEM**

Currently, sports coaches and physical educationists are giving preference to yoga and are introducing it in centers of teaching


learning. The significance of the study is based on the fact that yogasanas can be a valuable tool to improve physical fitness, physiological and biochemical capacities. The significances of the study are,

1. The result of the study would be of great interest to yogis, yoga therapists, middle-aged men and women and diabetic patients, as they would be able to assess the changes in physical fitness, physiological and biochemical variables.

2. The findings of the study will be of great value in designing and administrating ring, yoga therapy camps, yoga awareness camps, physical fitness programmes and remedial programmes for those who need such special attention.

3. The study will reveal the effect of practicing yogasanas on flexibility, muscular endurance, blood pressure, resting pulse rate, breath holding time, total cholesterol, triglycerides, high density lipoproteins, blood glucose and uric acid.

4. The result of the study will be useful for middle-aged men and women to do yoga as a tool to improve their fitness level and to cure various diseases.
5. The results of the study will be useful to overcome stress and strain.

6. This study would add to the quantum of knowledge in the area of fitness, physiology and biochemistry.