CHAPTER I

INTRODUCTION

1.1 HEALTH

"You must keep a strict eye on your health; let everything else be subordinated to that". – Swami Vivekananda.

"The part can never be well unless the whole is well"

– Plato.

"Health is wealth, the basic requisite for very kind of happiness"

– Gandhiji.

"Anything that makes you weak physically, intellectually and spiritually is rejected as poison" – Swami Vivekananda

The World Health Organization (WHO) defined health in its broader sense in 1946 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

It is obvious that yoga, which so amply fulfills the criteria for a system of health care, has come to stay.

Health is the dynamic condition resulting from a body's constant adjustment and adaptation in response to stress and changes in the environment for maintaining an inner equilibrium called homeostasis.

Health is the level of functional or metabolic efficiency of a living being. In humans, it is the general condition of a person's mind, body and spirit, usually meaning to be free from illness, injury or pain

The maintenance and promotion of health is achieved through different combination of physical, mental, and social well-being, together sometimes referred to as the “health triangle”. Health is not just a state, but also "a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities."

In addition to health care interventions and a person's surroundings, a number of other factors are known to influence the health status of individuals, including their background, lifestyle, and economic and social conditions. These are referred to as "determinants of health".

Generally, the context in which an individual lives is of great importance on health status and quality of life. It is increasingly recognized that health is maintained and improved not only through the advancement and application of health science, but also through the efforts and intelligent lifestyle choices of the individual and society. According to the World Health Organization, the main determinants of health include the social and economic environment, the physical environment and the person's individual characteristics and behaviors.

More specifically, key factors that have been found to influence whether people are healthy or unhealthy include:

- Personal health practices and coping skills
- Healthy child development
- Biology and genetics

- Health care services
- Gender
- Income and social status
- Social support networks
- Education and literacy
- Employment/working conditions
- Social environments

Physical environments Focusing more on lifestyle issues and their relationships with functional health, data from the Alameda County Study suggested that people can improve their health via exercise, enough sleep, maintaining a healthy body weight, limiting alcohol use, and avoiding smoking. The ability to adopt and to self-manage has been suggested as core components of human health.

Genetics or inherited traits from parents also play a role in determining the health status of individuals and populations. This can encompass both the predisposition to certain diseases and health conditions, as well as the habits and behaviors individuals develop through the lifestyle of their families. For example, genetics may play a role in the manner in which people cope with stress, mental, emotional or physical.

1.2 HEALTH STATUS

The Health Status is usually measured in terms of life expectancy at birth, infant mortality rate, fertility rate, crude birth rate and crude death rate. These indicators of health are determined by numerous factors such as per capital income, nutrition, housing, sanitation, safe drinking water, social infrastructure, health and medical care services provided by government, geographical climate, employment

status, incidence of poverty and the like (Reddy and Selvaraju 1994; Dadibhavi and Bagalkoti 1994).

1.3 HEALTH STATUS IN INDIA

It is a well-known fact that India is, next only to China, the second largest country in terms of population in the world. But the health status of a great majority of the people is far from satisfactory as compared to China and other developed countries. However, over the last five decades or so, India has built up health infrastructure and manpower at primary, secondary and territory care in government, voluntary and private sectors and made considerable progress in improving the health of its population (Ray 2003; Bhat and Babu 2004).

However, India is one of the major countries where communicable Diseases are still not under control. The incidence of new fatal diseases such as AIDS/HIV, hepatitis-A is on the increase and tuberculosis and malaria still take a high toll. Chronic non-communicable diseases such as heart diseases, diabetes and cancer are also in the rise (Bhat and Babu 2004). Health risk due to high prevalence of alcohol and Tobacco consumption is also increasing. India's dream of "World Class" health care delivery system is difficult to achieve.

1.4 YOGA AND ITS ESSENTIALS AS THREAPY

Therapeutic Yoga is basically a system of self-treatment. According to yogic view, diseases, disorders and ailments are results of some faulty ways of living, bad habits, lack of proper knowledge of things related to individual's life style. The diseases are this resultant state of a short or prolonged malfunctioning of the body system. This malfunctioning is caused due to certain errors of the individuals. Since the root cause of a disease lies in the mistakes of the individual, its cure also lies in

correcting the mistakes by the same individual. Thus it is the individual himself who is responsible in both the cases that is, for causing as well as for curing the disease.

This being the basic assumption in this system about the nature of the trouble and its remedy, there is total reliance on the effort of the patient himself. The yoga expert shows only the path and works no more than a counselor to the patient.

1.5 TRADITIONALYOGA

The word “yoga” is derived from the Sanskrit root “yuj”, which means to bind, join, union, attach and yoke”. 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 one with their environment.

The word Yoga comes from Indian philosophy, it literally means union and in this context refers to the union of the individual's soul with the universal. There is simply no other discipline quite like yoga because it utilizes the body, mind and spirit, all in one practice. Yoga is indeed a spiritual path that is based on ancient sacred philosophy, but one does not need to make an ethical decision when practicing yoga, rather finding your own path is wholly accepted.

The holistic benefits of yoga are suitable for the young or old, sick or well, with any religious background. The secrets of yoga are inwardness, concentration, and purification of mind and body with cleansing thoughts and food.

1.6 HISTORY OF TRADITIONAL YOGA

1.6.1 VEDIC PERIOD

The oldest written records of Indian culture and yogic activities are found in the Vedas, which are a compilation of hymns and rituals over 3000 years old. The Vedic Yoga, also known as Archaic Yoga, revolves around the thought of reuniting the visible material world with the invisible spiritual world by sacrificing certain things. In order to practice these rather long rituals successfully it was necessary to be able to focus the mind to a very high level. This inner focus as a means to enhance the sensory and human ability is the root of all Yoga

1.6.2 PRE-CLASSICAL PERIOD

This period in Yoga history spans about 2000 years, until year 200. The most central Yoga literature from this period is the Upanishads - a collection of texts revolving around meta-physical speculation. They are just like the Vedas considered as enigmatic revelations. As opposed to the public rituals of the Vedic period, the Upanishads were secret scriptures. Some of these 200 Gnostic texts are directly related to Yoga and are about the complete connectedness of all things.

Yoga was now slowly finding its form. As Yoga and its secret teachings spread from teacher to student or from guru to yogi, the concept of an individual system of thought began to take shape.

1.6.3 CLASSICAL PERIOD

The eight-limbed Yoga described in the Sutras by Patanjali is usually referred to as Classical Yoga. The Yoga Sutras were most likely written around year 100-200 A.C. and consists of about 200 aphorisms (words of wisdom). Here Yoga is presented in a systematic and approachable way, and many yogis see it as an

important source of yogic understanding. Almost all serious Yoga practitioners will at some point study this literature and it has been published with commentary many times since it was first published.

1.6.4 POST-CLASSICAL PERIOD

The great number of independent yoga schools that where developed during the period after the Yoga sutras, is usually referred to as post-classical Yoga. As opposed to Patanjali's Yoga, the Yoga of this era was, very much like the post-classical and Vedic traditions, characterized by a non-dualistic nature. A few hundred years after Patanjali, the evolution of Yoga took an interesting turn - the potential of the human body now became an interesting field of study.

Yogis of the past had not paid very much attention to the (physical) body, as they focused all their energy on contemplation and meditation. Their goal was to leave their bodies and the world, in order to re-unite with the shapeless reality - the soul.

1.7 MODERN YOGA

Modern Yoga is said to have begun at the Parliament of Religions in Chicago, 1893. During this meeting the young Swami Vivekananda from India made a deep impression on the American he introduced to Yoga. Vivekananda became the most popular from members of the Parliament, and he subsequently toured the US giving lectures on Yoga. Many Yoga masters would later cross the ocean and follow in his footsteps, spreading Yoga to all corners of the continent. Yoga schools were founded and increasing numbers of people fell in love with the yogic forms of exercise. Many masters also went to Europe where the reception, for some reason, wasn't quite as warm.

Yoga, in the form of Hatha Yoga, debuted in the consciousness of the American masses when Russian born Indra Devi called "the first lady of Yoga", opened a Yoga studio in Hollywood in 1947. She taught movie starts like Gloria Swanson, Jennifer Jones and Robert Ryan, as well as educating hundreds of Yoga teachers.

1.8 YOGA TODAY

Yoga has gained tremendously in popularity during the last few years and today over 30 million people practice Yoga on a regular basis. Yoga is the most rapidly growing health movement of today, despite having existed for thousands of years already.

People’s attitude towards health, spirituality, way of life and our place in society have changed quite dramatically, as people are looking for answers for their everyday problems.

In these chaotic times our environment is fighting for survival and we humans suffer more and more from physical and psychological stress, with new diseases developing while old ones, that we thought we could handle with antibiotics, returns with an vengeance in the midst of our society. We can't always control these developments, but we can learn to face them. And to this end, Yoga is as good an invention as it has ever been.

1.9 YOGIC CONCEPT OF BODY AND HEALTH

A Kosha usually rendered "sheath", one of five coverings of the Atman, or Self according to Vedantic philosophy. They are often visualized like the layers of a union.

According to the Kosha system in Yogic philosophy, the nature of being human encompasses physical and psychological aspects that function as one holistic system. The Kosha system refers to these different aspects as layers of subjective experience.

Layers range from the dense physical body to the more subtle levels of emotions, mind and spirit. Psychology refers to the emotional, mental and spiritual aspects of our being. Together, all aspects make up our subjective experience of being alive.

The five sheaths (pancha-kosas) are alluded to in the fourteen verse of the Atma bodha. From gross to fine they are:

- Annamaya kosha, food-apparent-sheath
- Pranamaya kosha, air-apparent-sheath
- Manomaya kosha, mind-stuff-apparent-sheath
- Vijnanamaya kosha, wisdom-apparent-sheath (*Vijnana*)
- Anandamaya kosha, bliss-apparent-sheath (*Ananda*)

According to Vedanta the wise man should discriminate between the self and the koshas, which are non-self.

- **Annamaya kosha** - The food sheath. The food sheath is the gross, physical body. It includes the five organs of perception (sight, hearing, smell, taste, touch) and the five organs of action (Apprehension, locomotion, articulation, excretion, pro creation). It is called food sheath because food or anna enabled it to come into being, it is maintained by food, and it ultimately ends up as food or the constituents of food.

- **Pranamaya kosha** - The vital air sheath. There are five vital airs that correspond to five physiological functions of the mind and body. They are called the five pranas. Together they constitute the vital-air sheath. They have been given this name because they are related directly to your breath.

    1. **Prana** (in breath) -- affects faculty of perception: the functioning of the five senses
    2. **Apana** (out breath) -- affects faculty of excretion: eliminates, "throws out" or evacuates the wastes of the body
    3. **Samana** -- affects faculty of digestion; digests food received by the stomach
    4. **Vyana** -- affects faculty of digestion; distributes digested food to different parts of the body through blood stream
    5. **Udana** -- affects the faculty of thought-absorption: takes in fresh knowledge

These five faculties (pranas) are sharp and clear in youth. With age, the pranas lose their strength and vitality. This is why sight, hearing, etc. begin to fade with time and also the faculties of excretion, digestion and circulation become weak in old age. Our capacity to absorb and accept new thoughts and ideas is also reduced in old age. The vital air sheath (prannamaya kosha) is subtler than the food sheath (annamaya kosha). It controls the food sheath. When your pranas function properly your physical body remains healthy and strong. When they work inefficiently the body is adversely affected.

- **Manomaya kosha** - The mind sheath. The mind is comprised of passions and emotions, feelings, thoughts and impulses. It is full of

likes and dislikes. The mental sheath controls the vital air and food sheaths. For instance, when the mind is disturbed, the physiological functions (pranas) and the physical body are affected.

- **Vijnanamaya kosha** - The intellect sheath. The intellect thinks, reflects, reasons, discriminates, judges, etc. It analyses and distinguishes between pairs of opposites. It controls the above three sheaths.
- **Anandamaya kosha** - The bliss sheath. The bliss sheath consists only of mental impressions or tendencies in seed form called vasanas. When you are in deep, dreamless sleep you are in bliss sheath.

When you cross the bliss sheath and move to other sheaths, you experience the dream and waking states of consciousness. Vasanas are inactive in deep sleep, but they manifest in the form of thought in the dream state, and actions in the waking state. Consequently you experience mental agitation, be it great or small, positive or negative, as long as you remain in the dream and waking states. When you enter deep, dreamless sleep, all your mental agitations cease and you experience undisturbed peace and bliss. This is why this sheath is called the 'bliss' sheath. However, the bliss experienced in deep sleep is material -- not to be confused with God's absolute divine bliss! This ADHI (stress) spread from one place to and occupy the entire body known as VYADHI (diseases). If stress occurs in the Astral body (sukshuma sarira) it reflects in the physical body (sthoola sarira). So as a result the entire body became prey to deadly diseases and disorder.

Adhi / Vyadhi: Our thoughts are transmitted to the body through the neuro-endocrine system. Scientists have found that these mental processes such as

thoughts and emotions cannot be separated from bodily mechanisms and function as all thought and emotions are involved in biochemical and neurological activities.

Here adhi (mental/emotional disturbances in the manomaya kosha or astral sheath) cause corresponding disturbances at the physical level (annamaya kosha). These disturbances are called vyadhi. This is transmitted through the intermediary of the pranamaya kosha (or energy body) causing disturbances in the prana. The good news is that we can consciously work with the body and/or pranamaya kosha to effect healing in the manomaya kosha and vice versa, we can consciously work in the manomaya kosha to effect positive healing changes in the pranamaya and annamaya koshas.

It is believed that a lasting cure is only possible when the causal disturbance is completely remedied; i.e., the previously unhealthy tensions and conflicts between the bodies or sheaths have been harmonized and resolved.

Here the adhis which originate in the manomaya kosha are considered causal and primary which in turn cause physical ailments (vyadhi). These adhis can also occur in the Vijnanamaya kosha and/or karmic sheath when our belief systems are out of sync with the inner wisdom karmic body and/or strong unresolved karmic forces are at play. Thus when the adhis are destroyed in the subtle or causal bodies, then the vyadhis are no longer generated or manifest. In addition there exist two kinds of adhis. One is ordinary or samaya (caused by the mind or emotions) and the other one is called, sara, which is intrinsic to a more causal spiritual malaise that can be successfully treated only through processes that affect the life style, belief system, self-identification process, karma, or in general our energetic relationship that we cling to as "s(S) elf" in relationship to "Reality" i.e., through modalities which reach into the Vijnanamaya and anandamaya koshas.

In either case, physical disease is caused by disturbances/corruption and/or obstruction of the nadis (psychic nerves) and energy patterns which have become disrupted, distorted, and patterned into corruptive patterns causing degeneration, dissipation, dis-ease, pain, suffering, stasis, and death. Thus effective therapy is aimed at removing the source of the disturbances, opening up these blocked pathways, and rechanneling and re-patterning the energy flow.

1.10 YOGA AND WORLD RELIGIONS

TABLE - I

YOGA AND WORLD RELIGIONS

CHRONOLOGY	MAJOR EVENT	DETAILS
10-5000 BC	First Civilized Cities Indus valley	Paintings found of Yoga Meditation in archaeological excavations in the Indus valley. This sophisticated culture developed around the Indus river and the long gone Saraswati river in northern India. On the border towards Pakistan.
3000 BC	Stone Seals Yoga Poses	Earliest archaeological evidence of Yoga's existence could be found in stone seals which depict figures of Yoga Poses.
2008 BC	The Vedas period of Yoga	A collection of hymns, mantras, and Brahmanical rituals that praised a greater being. Yoga is referred to in the book as yoking or discipline without any mention of practice or a method to achieve this discipline. The Atharva Veda too mentions yoga with a reference to controlling the breath.
1500 BC	Birth of Hinduism and Judaism	
800 BC	Upanishad: Pre-Classical Yoga Period	The Upanishads explains the importance for human to learn and understand more about the ultimate unity of all things. Furthermore, the Upanishads speak about Brahman (Universal spirit) and Atman (individual) and emphasize the characteristics of both Brahman and Atman.

700 BC	Ancient Greece Civilization Established	
509 BC	Birth of Gautama Buddha	
500 BC	Bhagavad Gita	Lord's Song was created and this is currently the oldest known Yoga scripture. It is devoted entirely to Yoga and has confirmed that it has been an old practice for some time.
100 BC	The Yoga Sutras: The Classical Period of Yoga	Written by Patanjali around the second century, it was an attempt to define and standardize Classical Yoga. It is composed of 195 aphorisms or sutras (from the Sanskrit word which means thread) that expound upon the Raja Yoga and its underlying principle. Patanjali's Eightfold path of Yoga (also called Eight Limbs of Classical Yoga or Ashtanga).
30 AD	Birth of Christianity	The Death of Jesus Christ 590 AD birth of Catholicism -1518 AD Birth of Protestantism.
570-610 AD	Origin of Islam: Birth of Mohammed	
1650 AD	Tibetan Buddhism: Rise of Dalai Lama	
1893 AD	Yoga Introduced in the United States	Modern yoga was introduced by young Swami Vivekananda in the Parliament of Religious which was held in Chicago in 1893.
1931 AD	Krsihnamacharya	Mysore. India, this is where Krishnamacharya developed and taught what is now known as Ashtanga Vinyasa Yoga. It was during this period that he taught Pattabhi Jois. B.K.S.Iyengar and T.K.V.Desikacharar (Krishnamacharya's son) and sent them out to spread the teachings of yoga.

1.11 TIBETIAN YOGA

Tibetian Yoga comprises of five simple, yet dynamic yogic exercises called Five Tibetian Rites. The Five Tibetan Rites is a yoga routine based on a ritual of exercises done by the Tibetan Lamas, which helped them to live very long and healthy life and to stay ever young.

1.11.1 HISTORY OF TIBETIAN YOGA

Tibetian Yoga is the union of mind, body and spirit and is based on Buddhism. The Godly Tibetian Lamas believe in living each moment to the fullest, i.e. to be consciously and totally present in every moment. These Lamas lived for 100 years and more but looked and felt like they were 50 years old. Their secret of eternal youth & vitality was a set of five simple yogic exercises called the 'Five Rites' which were developed over centuries in the monasteries of Tibet.

In 1930 they were brought to the west by a retired British army officer, Corl. Bred Ford who lived with the Lamas and practiced the Five Rites for three years and returned looking many years younger. His friend, Peter Kelder, recorded the experiences of Bred Ford in a book called "The Ancient Secret of the Fountain of Youth". Millions of people started doing the Five Rites with amazing experiences of regaining youth, vitality and of being cured of depression, arthritis, backache, diabetes, digestive, respiratory, heart problems. The entire routine can be completed in less than 20 minutes.

The Five Rites attract the universal energy into our body; balancing the Seven Chakras which promote the free flow of prana (chi energy) revitalizing our body and mind. They activate endocrine glands regulating the hormonal output. These low profile yogic secrets of the Lamas will unearth all the energies and an

awesome power lying dormant within you, aligning it with the cosmic energy to give you the best of both mind and body.

1.12 DIABETES MELLITUS

Diabetes mellitus is the disease which has plagued man for centuries though its incidence at present, especially in the more developed areas of the world, is higher than it has ever been in the past. The reason for this is that, through technological achievement, both stress and affluence have become increasingly widespread, and people have developed the tendency to avoid strenuous physical exercise and overeat. Thus recent flourishing of diabetes can be considered to be a side effect of this century, technological age, pollution on personal level reflecting global pollution.

At the present time modern science holds that there is no positive system of cure for diabetes mellitus. The most it can offer is control of the symptoms through dietary controls and daily use of insulin and other drugs. The disease itself, however, is commonly not affected by this, and may even increase in severity.

The ancient science of yoga has a more successful method of management which is thousands of years old. It is based upon the internal readjustment of the physical organism through stimulation of the body's own regenerative process. After many years of successfully dealing with sufferers of diabetes through implementing the internal yogic system, we wish to make the knowledge of these efficacious techniques available to all interested sufferers and therapists of diabetes in the world.

1.13 DISEASE AND CAUSES

1.13.1 DISEASE

'Disease' is loss of power and disorder in the body resulting in loss of resistance caused by the blockage of the life carrier in their flow through the blood stream and the tissues in the form of mucous or inorganic salts or both. It also reflects the negative pole of waste deposits of solids, liquids gases and energy blocks in the body.

1.13.2 CAUSES OF DISEASES

Lack of exercise	Lack of fresh air
Poor diet	Polluted air
Tiredness	Improper clothing
Pollution	Insufficient sleep
Improper routine	Poisons
Shocks	Excesses of anything
Wrong posture	Tension
Hormonal in balance	Lack of sunshine
Malfunction of immune system	Bacteria, Fungi, Virus etc.,
Smoking and alcohol	Hereditary
Narcotics	Allergy
Suppressed wishes	Obstructing natural's call
Lack of elements (Tattvas)	Disobeying the natural laws
Injustice against body	Lethargy
Mental disorders	Emotional maladjustment
Constipation	Pancha Kleshas.

1.13.3 HEALTHY PERSON

Accordingly to 'Hathyoga Pradipika' a person enjoys good health when he has: "Slim (lissome) body, joyous face, sonorous voice, sparking eyes, positive good health, virility, exuberance of vitality and radiance and purity of nervous system are the characteristics of a Hatha yogi."

1.14 CONCEPT OF DIABETES MELLITUS

Diabetes Mellitus (DM) is the most common and possibly one of the oldest metabolic disorders in the world. Diabetes is a life style related condition due to an imbalance in handling glucose level.

The word "diabetes" is borrowed from the Greek word meaning "a siphon." The 2nd-century A.D.Greek Physician, Aretus the Cappadocian, named the condition "diabetes." He explained that patients with it had polyuria and "passed water like a siphon".

Diabetes mellitus, commonly referred to as diabetes, means sweet urine. It is a chronic medical condition associated with abnormally high levels of sugar (glucose) in the blood. Elevated levels of blood glucose (hyperglycemia) lead to spillage of glucose into the urine, hence the term sweet urine.

1.15 TYPES OF DIABETES

- Insulin Dependent Diabetes Mellitus (IDDM)
- Non-Insulin Dependent Diabetes Mellitus (NIDDM)
- Maturity On Set Diabetes Of The Young (MODY)
- Malnutrition Related Diabetes Mellitus (MRDM)

- Other types of associated with certain conditions and syndromes
- Pancreatic diseases, Disease of Hormonal etiology, rig or chemical induced conditions. Abnormalities of insulin or it receptor, certain genetic syndromes.

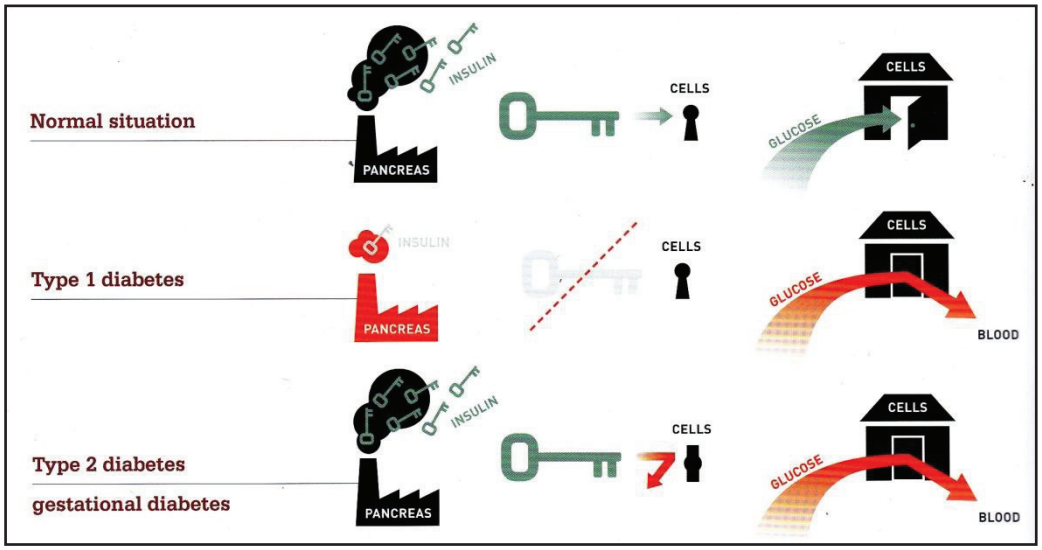

Figure 1. Types of Diabetes

1.15.1 TYPE I OR PRIMARY - INSULIN DEPENDENT DIABETES MELLITUS (IDDM)

The less prevalent more severe form of diabetes occurs in young people. This juvenile onset diabetes where the capacity of the pancreas produces insulin had been partially or even completely lost. The situation can be summarized as: genetic defect, follow a viral infection or environmental, insulitis, activation of autoimmunity, destruction of the cells of the pancreas, mental or emotional.

1.15.2 TYPE II OR SECONDARY – NON INSULIN DEPENDENT DIABETES MELLITUS (NIDDM)

Non-Insulin Dependent Diabetes Mellitus (NIDDM) usually begins in the middle age or after 40 years. The Patho-physiological basis is a combination of

impaired beta cell function with marked increase in peripheral insulin resistance at receptor/post receptor levels and increased hepatic glucose output production.

1.15.3 MATURITY ON SET DIABETES OF THE YOUNG (MODY)

The most common form is maturity onset diabetes, which develops gradually in middle-aged, stressed, overweight, under exercised persons, whose diet contains an excess of sugars, starches and fats. This long term overloading of the digestive system, especially the pancreas, leads to progressive deterioration of the insulin secreting mechanism and de-sensitivity of the body tissues to the insulin.

1.15.4 MALNUTRITION RELATED DIABETES MELLITUS (MRDM)

Recently, a third type of Malnutrition Related Diabetes Mellitus (MRDM), called by WHO has been categorized as a separate entity. This type of diabetes is mainly seen in some tropical countries like India and it occurs in young people between 15-30 years of age. Generally people with MRDM are lean and under nourished. In this type of diabetes, the pancreas fails to produce adequate insulin. As a result, these diabetics require insulin. In contrast to type-I diabetics, these patients generally do not develop ketoacidosis when insulin injection are discontinued.

1.16 HISTORY OF DIABETES

Physicians have observed the effects of diabetes for thousands of years. For much of the time little was known about this fatal disease that caused wasting away of the body, extreme thirst, and frequent urination. It wasn't until 1922 that the first patient was successfully treated with insulin. One of the effects of diabetes is the presence of glucose in the urine (glycosuria). The Indian physician Sushruta in 400 B.C. described the sweet taste of urine from affected individuals and for many centuries to come, the sweet taste of urine was key to diagnosis. Around 250 B.C., the

named “diabetes” was first used. It was a Greek word that means “to siphon”, reflecting how diabetes seemed to rapidly drain fluid from the affected individual. The Greek Physician Aristaeus noted that as affected individuals wasted away, they passed increasing amounts of urine as if there was “liquefaction of flesh and bones into urine”.

The complete term “diabetes mellitus” was coined in 1674 by Thomas Willis, personal physician to King Charles II. Mellitus is Latin for honey, which is how Willis described the urine of diabetics (“as if imbued with honey and sugar”). Up until the mid-1800s, the treatments offered for diabetes varied tremendously.

1.17 HISTORY OF INSULIN

Insulin is hormone that is produced in the pancreas. Insulin allows the glucose to enter the cells of body where it is converted into energy. People with type 1 diabetics cannot survive without daily insulin doses. Some of the type II and gestational diabetics also needs doses of insulin together with other medication.

In Canada in 1921, scientist Frederick Banting and medical student Charles Best isolated a substance from the pancreas of dogs, which they named Isletin-which now is known as insulin. In a series of experiments, they found that a pancreatectomised dog could be kept live with injections of Isletin. The following year after much laboratory work to purify insulin extracted from calf, a 14 year old boy called Leonard became the first person with diabetics to receive an insulin injection. Prior to diabetic’s people with diabetics were put on starvation diet and had no hope of survival. News of success with the insulin spread quickly and demands for the drug skyrocketed worldwide. Since then huge advances have been made in research and development. However with nearly a century since its discovery people with type 1 diabetics in many parts of the world cannot access insulin, either because

they cannot afford to pay for it or because it is not readily available and die soon after developing diabetics.

TABLE - II

HISTORY OF INSULIN

1922	First clinical use of insulin
1920s	Short-acting bovine and pocrine extracts
1930s	Improved purification
1940s	Neutral Protamine Hagedorn (NPH) introduced
1950s	Lente and ultralente insulin
1970s	Highly purified (monocomponent) insulin
1980s	Premixed biphasic insulin Insulin pumps for CSII (continuous subcutaneous insulin infusion) Biosynthetic human insulin Pen injection devices
1990s	Rapid-acting insulin analogues
2000s	Long-acting insulin analogues

1.18 DIABETES FACTS

Despite the predominantly urban impact of the epidemic, type 2 diabetes is fast becoming a major health concern in rural communities in low-and-middle-income countries. No countries are escaping the diabetes epidemic, and in states and territories worldwide it is the poor and disadvantaged who are suffering most. Indigenous communities are among those especially vulnerable to diabetes.

In most of the countries diabetes has increased along-side rapid cultural and social changes: aging populations, increasing urbanization, dietary changes, reduced physical activity and unhealthy behaviors.

Some 387 million people worldwide or 8.3% of adults are estimated to have diabetes. About 80% live in low and middle income countries. If these trends continue, by 2035, some 592 million people or one adult in 10 will have diabetes. This equates to approximately three new cases every 10 seconds or almost 10 million per year. The largest increases will take place in the regions where developing economies are predominant.

The greatest number of people with diabetes is between 40 and 59 years of age. 179 million people with diabetes are undiagnosed. Diabetes caused 4.9 million deaths in 2014. Every seven seconds a person dies from diabetes.

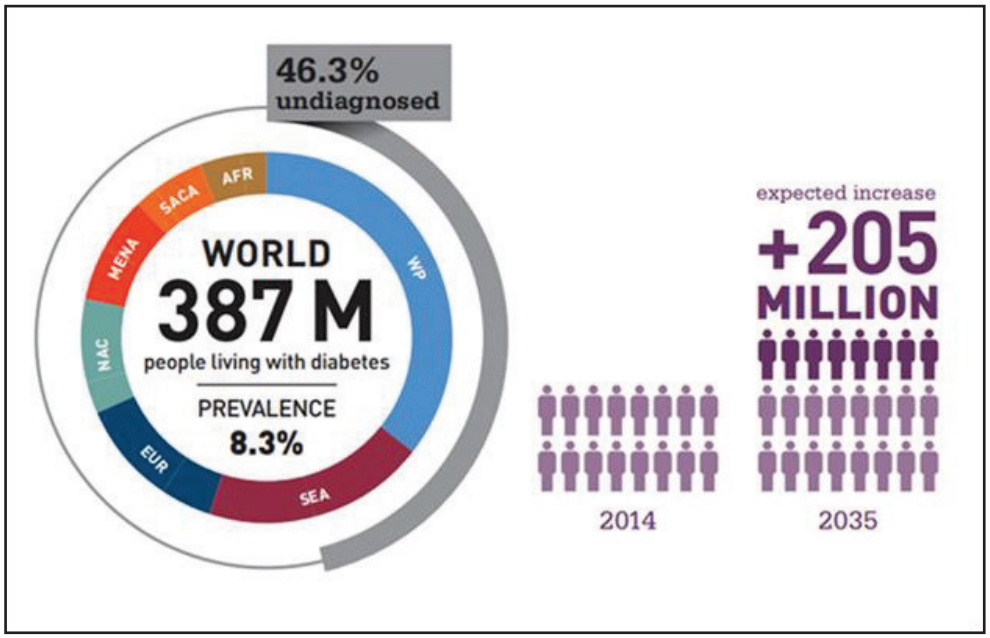

Figure 2. Diabetes Fact

Diabetes is a huge and growing problem and the costs to society are high and escalating. All types of diabetes are on the increase, type 2 diabetes in particular' the number of people with diabetes will increase by 55% by 2035.

1.19 MORTALITY

Diabetes and its complications are major causes of early death in most countries. Cardiovascular disease is one of the leading causes of death among people with diabetes. It can account for 50% or more of deaths due to diabetes in some populations. Approximately 5.1 million people aged between 20 and 79 years died from diabetes in 2013, accounting for 8.4% of global all-cause mortality among people in this age group. This estimated number of deaths is similar in magnitude to the combined deaths from several infectious diseases that are major public health priorities and is equivalent to one death every six seconds. Close to half (48%) of deaths due to diabetes are in people under the age of 60. The highest number of deaths due to diabetes occurred in countries with the largest numbers of people with the disease: China, India, USA and the Russian Federation.

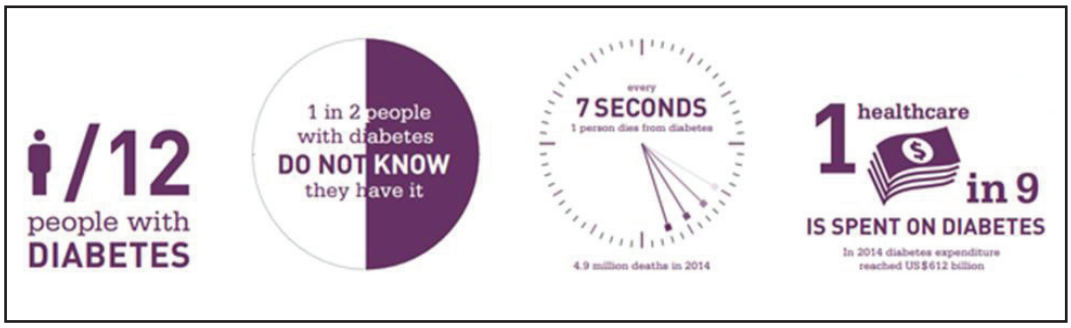

Figure 3. Mortality

1.20 TOP 10 COUNTRIES WITH DIABETES (20-79 YEARS), 2013

Age distribution fact is almost half of all adults with diabetes are between the ages of 40 and 59 years. More than 80% of the 184 million people with diabetes in this age group live in low-and middle-income countries. This age group will continue to comprise the greatest number of people with diabetes in the coming years. By 2035, it expected that the number will increase to 264 million. Again, more than 86% will be living in low-and middle-income countries.

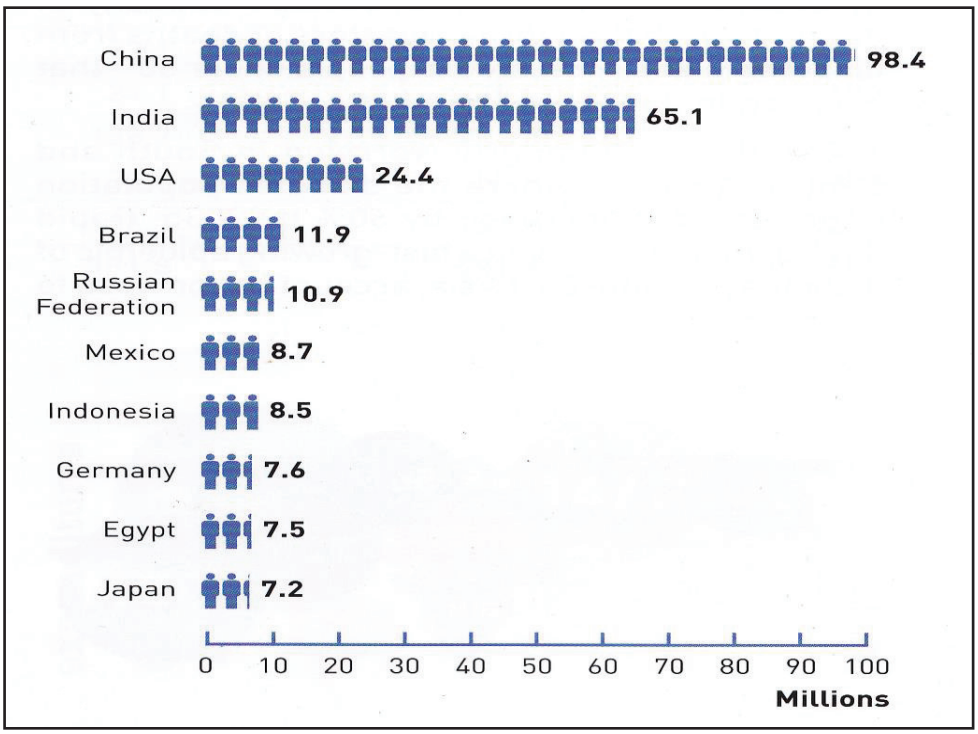

Figure 4. Top 10 Countries with Diabetes

1.21 PREDISPOSING FACTORS / CAUSES

Certain things make some individuals more likely to get Type II diabetes, even though the exact causes are not clear. These are called predisposing factors that is, factors existing beforehand that predispose someone to, or increase someone's chance of, developing the disease. These factors do not seem to be the cause of diabetes. Rather, your chances of getting it are greater when one or more of the following apply:

1.21.1 FAMILY HISTORY

The most common predisposing factor is a history of diabetes in the family. The factors of inheritance or genetic tendency that run in families are stronger in type II diabetes than in other kinds. If there is type II diabetes in the family, including aunt and uncles, a person's chances of developing it are greater than those of someone whose family does not have it. The chances depend on how many in the

family have it and whether it occurs on one or both sides of the family. However, many people have the genetic tendency but never get diabetes.

1.21.2 WEIGHT

Excess weight plays a large part in bringing out Type II diabetes. At least three out of four people are overweight often by twenty or thirty pounds and for years and years before the disease is diagnosed. Being overweight seems to increase the body's demand for insulin. In overweight people, even the individual cells that make up the body fat are fatter and it is thought that these larger fat cells do not respond as well to insulin.

1.21.3 AGE

Diabetes can affect people of all ages, but the chances of developing it increases with age. Most Type II diabetes are older than 40.

1.21.4 SEX

Up through early adult hood, both sexes have about the same chances of getting diabetes. However by age 30, women are more likely to get it than are men, and between the ages of 45 to 65, women are twice as likely as men to develop diabetes. Some women develop a different type of diabetes during pregnancy, which may turn into Type II diabetes some years later.

1.21.5 RACE

Racial and ethnic factors may be involved. For example certain tribes of American Indians and Hispanics have a much higher rate of diabetes than do other Americans. Some research suggests that the rate among blacks may be slightly higher

than among whites. But it is very difficult to separate racial and ethnic factors from genetic factors.

1.21.6 INACTIVITY

There is some evidence that inactivate people may be more likely to get this kind of diabetes than people who are very active. Physical activities seem to make the available insulin work better.

1.21.7 STRESS

Some studies have shown a relationship between stress and the development of diabetes. For example, if someone has inherited the tendency, a stressful event such as a death in the family, the loss of a job or a physical illness may continue or it may disappear for years and perhaps recur at another stressful time or in middle age.

1.21.8 SUMMARY

In summary, heredity seems to be the biggest factor that predisposes someone to developing Type II diabetes. All the other factors may precipitate it or bring it out, but probably only if the underlying genetic tendency is there to begin with. Of the others, excess weights is by far the most common precipitating it or brings it out, probably only if the underlying genetic tendency is there to begin with. On the other hand, some diabetics may not have any of these factors.

1.22 SIGNS AND SYMPTOMS OF DIABETES

Individuals can experience different signs and symptoms of diabetes and sometimes there may be no signs. Some of the signs commonly experienced include:

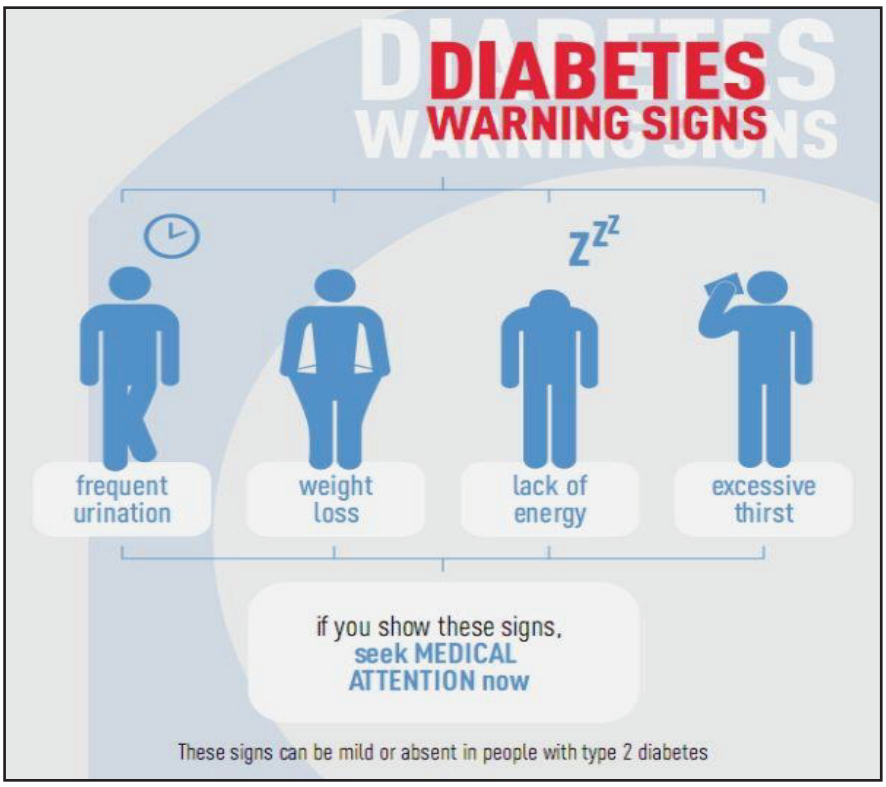

Figure 5. Diabetes Warning Signs

- Frequent urination
- Increased hunger
- Excessive thirst
- Weight loss
- Always tired and Sleep
- Blurry eyes or trouble seeing (focus)
- Tingling sensation or numbness in the hands or feet
- Delayed wound healing
- Dry and itchy skin
- Sexual problems.
- Nausea and vomiting

- Infections of the bladder, skin and vaginal area
- Lack of interest and concentration
- Frequent infections
- Slow-healing wounds
- Vomiting and stomach pain (often mistaken as the flu)

The development of type 1 diabetes is usually sudden and dramatic while the symptoms can often be mild or absent in people with type 2 diabetes, making this type of diabetes hard to detect.

1.22.1 FREQUENT URINATION

Polyuria and Nocturia: The patient usually complains of passing a larger than normal volume of urine, with increasing frequency every day. Glycosuria occurs when the blood glucose level is 180mg/dl. Glucose increases the osmolality of the glomerular filtrate and thus prevents the re-absorption of water as the filtrate passes down the renal tubules. In this way the volume of urine is markedly increased in diabetes and polyuria and nocturia occur.

1.22.2 DRY AND LITCHY SKIN

These classic symptoms, however, are not the normal presentation. Usually the disease is discovered on routine examination. Sometimes the patient suffers a frozen shoulder and this can be a manifestation of diabetes. Lethargy, weight loss and easy susceptibility to infections, particularly of the skin (like a simple boil or a fungal infection), excessive hunger, craving for sweet and sweating are some of the other symptoms.

Diabetes may co-exist with other disease states. Some others are malignancy, HIV infection, surgical stress, a heart attack, febrile illnesses and renal disease.

1.23 COMPLICATIONS OF DIABETES

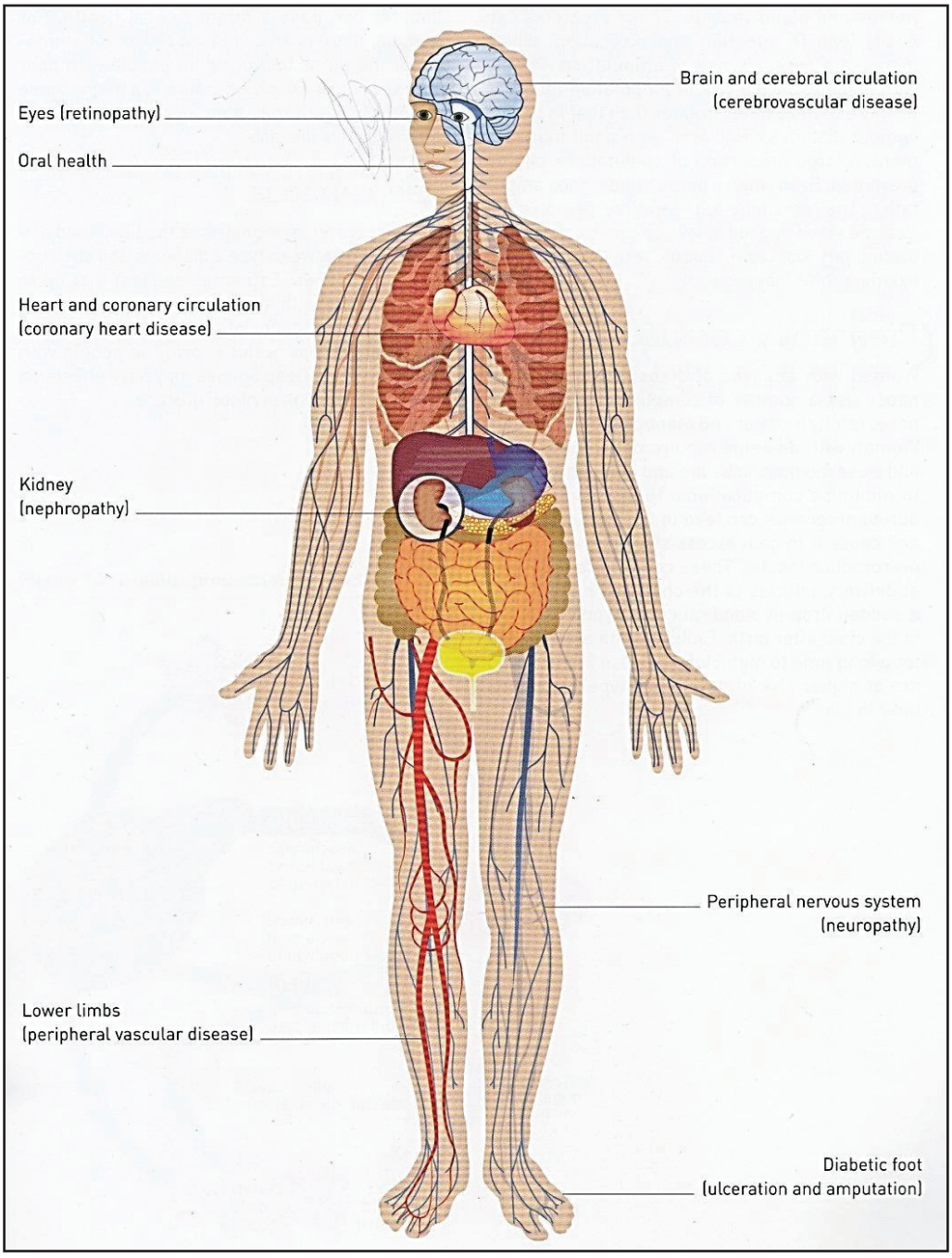

Figure 6. Major Diabetes Complications

People with diabetes have an increased risk of developing a number of serious health problems. Consistently high blood glucose levels can lead to serious diseases affecting the heart and blood vessels, eyes, kidneys, nerves and teeth. In addition, people with diabetes also have a higher risk of developing infections. In almost all high-income countries, diabetes is a leading cause of cardiovascular disease, blindness, kidney failure, and lower limb amputation.

Maintaining blood glucose levels, blood pressure, and cholesterol at or close to normal can help delay or prevent diabetes complications. Therefore people with diabetes need regular monitoring.

1.23.1 CARDIOVASCULAR DISEASE

Chronic complications occur over a long period of time and usually involve blood vessels. Uncontrolled diabetes over a period of time can damage blood vessels and may cause fatal complications such as coronary artery disease (leading to heart attack) and stroke. Cardiovascular disease is the most common cause of death in people with diabetes. High blood pressure, high cholesterol, high blood glucose and other risk factors contribute to increasing the risk of cardiovascular complications.

1.23.2 KIDNEY DISEASE (DIABETIC NEPHROPATHY)

Diabetes causes damage to small blood vessels in the kidneys leading to the kidneys becoming less efficient or to fail altogether. Kidney disease is much more common in people with diabetes than in those without diabetes. Maintaining near normal levels of blood glucose and blood pressure can greatly reduce the risk of kidney disease.

1.23.3 NERVE DISEASE (DIABETIC NEUROPATHY)

Diabetes can cause damage to the nerves throughout the body when blood glucose and blood pressure are too high. This can lead to problems with digestion, erectile dysfunction, and many other functions. Among the most commonly affected areas are the extremities, in particular the feet. Nerve damage in these areas is called peripheral neuropathy, and can lead to pain, tingling, and loss of feeling. Loss of feeling is particularly important because it can allow injuries to go unnoticed, leading to serious infections and possible amputations. People with diabetes carry a risk of amputation that may be more than 25 times greater than that of people without diabetes. However, with comprehensive management, a large proportion of amputations related to diabetes can be prevented. Even when amputation takes place, the remaining leg and the person's life can be saved by good follow-up care from a multidisciplinary foot team. People with diabetes should regularly examine their feet.

1.23.4 EYE DISEASE (DIABETIC RETINOPATHY)

Most people with diabetes will develop some form of eye disease Diabetic retinopathy, a common complication of diabetes, affects the blood vessels in the retina causing reduced vision or blindness. Consistently high levels of blood glucose, together with high blood pressure and high cholesterol, are the main causes of retinopathy. It can be managed through regular eye checks and keeping glucose and lipid levels at or close to normal.

1.23.5 PREGNANCY COMPLICATIONS

Women with any type of diabetes during pregnancy risk a number of complications if they do not carefully monitor and manage their condition. To prevent possible organ damage to the fetus, women with type 1diabetes or type 2 diabetes should achieve target glucose levels before conception. All women with diabetes

during pregnancy, type 1, type 2 or gestational should strive for target blood glucose levels throughout to minimize complications. High blood glucose during pregnancy can lead to the fetus putting on excess weight. This can lead to problems in delivery, trauma to the child and mother, and a sudden drop in blood glucose for the child after birth. Children who are exposed for a long time to high blood glucose in the womb are at higher risk of developing diabetes in the future. Moreover, women with non-communicable diseases (NCDs) are more likely to be divorced, separated or abandoned by their husbands, leaving them financially vulnerable.

1.23.6 HEARING IMPAIRMENT

Hearing problems are more common in people with diabetes.

1.23.7 SKIN CONDITIONS

Skin care is another important aspect of diabetes. Skin care is an important factor for people with diabetes. Diabetes may leave you more susceptible to skin problems, including bacterial and fungal infections. Skin conditions can be more likely amongst diabetics and reduced sensitivity of nerves and circulation can often make it harder to spot emerging skin problems. The skin on our feet need particular attention as the presence of diabetic neuropathy can sometimes lead to skin issues not being identified until an advanced stage, when they can cause serious problems. People with diabetes may experience greater loss of fluid from the body due to high blood glucose levels, which can cause dry skin on the legs, elbows, feet and other areas of the body. If dry skin becomes cracked, germs can get into these areas and cause infection, meaning that taking care of the skin is essential. If not checked regularly, even minor skin care problems can evolve into serious diabetes complications, such as diabetic foot ulcers and even amputation. Keeping the skin, particularly of your feet, in good condition should be a priority for people with

diabetes. As well as dry and cracked skin, a number of specific skin problems are closely linked to diabetes. Diabetic Dermopathy is also a common skin problem for people with diabetes. Sometimes known as shin spots, this condition leaves round, raised lesions that can turn into ulcers.

1.23.8 ALZHEIMER'S DISEASE

Type 2 diabetes may increase the risk of Alzheimer's disease. The poorer your blood sugar control, the greater the risk appears to be. The exact connection between these two conditions still remains unclear.

1.23.9 DKA (KETOACIDOSIS) & KETONES

Diabetic ketoacidosis (DKA) is a serious condition that can lead to diabetic coma (passing out for a long time) or even death. When your cells don't get the glucose they need for energy, your body begins to burn fat for energy, which produces ketones. Ketones are chemicals that the body creates when it breaks down fat to use for energy. The body does this when it doesn’t have enough insulin to use glucose, the body’s normal source of energy. When ketones build up in the blood, they make it more acidic. They are a warning sign that your diabetes is out of control or that you are getting sick. High levels of ketones can poison the body. When levels get too high, you can develop DKA. DKA may happen to anyone with diabetes, though it is rare in people with type 2. Treatment for DKA usually takes place in the hospital. But you can help prevent it by learning the warning signs and checking your urine and blood regularly.

1.23.10 STROKE

Stroke happens when the blood supply to part of your brain is suddenly interrupted. Then brain tissue is damaged. Most strokes happen because a blood clot

blocks a blood vessel in the brain or neck. A stroke can cause movement problems, pain, numbness and problems with thinking, remembering or speaking. Some people also have emotional problems, such as depression, after a stroke. If you have diabetes, your chances of having a stroke are 1.5 times higher than in people who don't have diabetes. But you can lower your risk by taking care of your health.

1.23.11 HYPEROSMOLAR HYPERGLYCEMIC NONKETOTIC SYNDROME (HHNS)

Hyperosmolar Hyperglycemic Nonketotic Syndrome or HHNS is a serious condition most frequently seen in older persons. HHNS can happen to people with either type 1 or type 2 diabetes is not being controlled properly, but it occurs more often in people with type 2. HHNS is usually brought on by something else, such as an illness or infection. In HHNS, blood sugar levels rise and your body tries to get rid of the excess sugar by passing it into your urine. You make lots of urine at first, and you have to go to the bathroom more often. Later you may not have to go to the bathroom as often and your urine becomes very dark. Also, you may be very thirsty. Even if you are not thirsty, you need to drink liquids. If you don't drink enough liquids at this point, you can get dehydrated. If HHNS continues, the severe dehydration will lead to seizures, coma and eventually death. HHNS may take days or even weeks to develop. Know the warning signs of HHNS.

1.23.12 INFERTILITY IN MEN - ERECTILE DYSFUNCTION (ED)

Erectile dysfunction is a common problem associated with diabetes that causes difficulty with getting or maintaining an erection. It is caused by neuropathy (nerve damage) and reduced blood circulation typically as a result of less well controlled diabetes or long standing diabetes.

High levels of blood glucose, blood pressure and cholesterol are all associated with an increased risk of erectile difficulties. Getting these under control, as well as cutting down on alcohol and quitting smoking can help to reduce the effects of ED. A number of different treatment options are also available.

1.23.13 SEXUAL DYSFUNCTION IN WOMEN

Diabetes and female sexual dysfunction (FSD) tends to get less coverage than male sexual dysfunction but studies have found that the prevalence in women could be as much an issue for women as men. Sexual dysfunction in women can affect sexual desire and arousal and can also lead to pain during sex. Diabetes can affect sex for women by Vaginitis (inflammation of the vagina) often caused by yeast infections, Cystitis (inflammation of the bladder) often a result of a urinary tract infection Pain during sex.

1.23.14 URINARY INCONTINENCE

The main symptom of incontinence is a loss of control of your bladder. Incontinence is defined as the loss of ability to control when you pass urine. Urinary incontinence is relatively common and affects about 5% and 13% of men and women respectively. Causes of incontinence may include, High blood glucose levels, Urinary tract infections, Autonomic neuropathy, certain medications, an enlarged prostate gland, Post-menopausal changes in the bladder muscles.

1.23.15 URINARY TRACT INFECTIONS - UTIS

Urinary tract infections may occur more often due to sugar in urine. A urinary tract infection is a bacterial infection that grows within the urinary tract - anywhere from the kidneys, the ureters, the bladder and through to the urethra. Urinary tract infections can be a particular problem for people with diabetes as sugar

in the urine makes for a fertile breeding ground for bacteria. This is supported by data from the American Diabetes Association (a report at the 73rd Scientific Sessions of the ADA), which showed 9.4% of people diagnosed with type 2 diabetes had a UTI compared to only 5.7% of people without diabetes.

1.24 DIABETES AND CANCER

Studies have shown that diabetes carries an increased risk for a number of different forms of cancer. Having cancer with diabetes can make achieving good diabetes control much more difficult but this can be relieved to some extent. One theory for why a link may exist is that high levels of circulating insulin (known as hyperinsulinemia) can promote the growth of tumors. In type 2 diabetes, insulin resistance commonly causes the body to produce more insulin than normal. Another reason why a link may be present is where a harmful lifestyle may lead to obesity and therefore higher risks of both type 2 diabetes and cancer. The risks of contracting the following cancers are shown to be doubled by the presence of type 2 diabetes. The cancers with increased risk in type 1 diabetes are Stomach cancer and cervical cancer.

1.25 EATING DISORDERS

Eating disorders are classed as abnormal attitudes to food. Having diabetes can make the physical effects of eating disorders more dangerous due to the impact on blood sugar levels. An eating disorder is when you have an abnormal attitude towards food that causes significant problems for your health or wellbeing. Eating disorders may vary from overeating to under eating and some eating disorders, such as bulimia, may involve alternating between the two. Diabulimia is a term which has been used to describe deliberate missing of insulin injections in an attempt to lose weight. When people with type 1 diabetes skip insulin injections, it starves the body from getting energy from food eaten. Diabulimia is particularly prevalent in teenage girls and

young women with type 1 diabetes. As high as 1 in 3 women with type 1 diabetes may have deliberately missed injections to lose weight. Diabulimia is an especially dangerous way to lose weight which greatly increases the risk of suffering diabetic ketoacidosis in the short term and increasing the risk of developing complications such as nerve damage and blindness later in life.

1.26 JOINT PAIN AND BONE CONDITIONS

Joint pain can develop as a result of diabetes. Diabetes affects both the nerves and circulation which can result in joint pain and disorders developing in a number of areas of the body. In terms of the complications of diabetes, joint disorders tend to get mentioned less than the likes of retinopathy and kidney disease but some of the conditions can be serious.

1.27 DENTAL HEALTH

Dental hygiene is an essential part of good health. For diabetics, problems with the teeth and gums can be more common and more serious than for the average person. For this reason, if you have diabetes, dental care is even more important, but it does not mean that you have to adopt a new or different treatment regimen. Being aware of how best to look after your teeth is an essential part of learning to live with both type 1 and type 2 diabetes.

1.28 GUM DISEASE

Gum disease is a very common infection and occurs when bacteria within the mouth begins to form into a sticky plaque which sits on the surface of the tooth. Over time, if this is not removed by regular brushing using the correct technique, a gum inflammation called gingivitis can develop. This will lead for red and swollen gums, bleeding will often occur whilst brushing. Gum disease will stem from

untreated gingivitis, and in turn the teeth will begin to decay. One unfortunate side effect of diabetes and high blood glucose levels is the fact that any infection in or on the body will spread more easily. Keeping blood glucose levels under control reduces the risk of infection spreading. Unfortunately, when your body begins to fight an infection, blood glucose levels will usually rise in response. Should the infection in your mouth become worse, your food intake could be affected, further affecting your diabetes.

1.29 THRUSH

Thrush of the mouth is also more common amongst people who have less controlled blood glucose levels. Signs of oral thrush include white patches within the mouth and cracking of the skin at the corner of the lips.

1.30 DENTAL HYGIENE, DIABETES AND HEART PROBLEMS

Diabetes can lead to excess cholesterol building up in the bloodstream, raising the risk of heart disease. A number of studies have linked higher rates of heart disease with gum disease but researchers are yet to find conclusive evidence that poor dental health directly impacts on heart health. However, improved dental health will reduce oral infections and this will therefore help with keeping blood glucose stable and help maintain your wellbeing.

1.31 DENTAL TREATMENT AND BLOOD SUGAR LEVELS

Make sure your dentist knows you have diabetes as they may need to take this into account when they give advice or recommend treatment. If you are on medication that can lead to hypos, such as insulin or sulfonylurea, speak with your dentist or your doctor to see if your diabetic treatment regime will need to be modified before the dental work. High blood sugar levels may affect the time the teeth

and gums take to heal. If dental work is taking an unusually long time to heal, you should contact your diabetes healthcare team or dentist immediately for advice.

1.32 DIABETES RISK FACTORS

Figure 7. Diabetes Risk Factors

Several risk factors have been associated with **type 2 diabetes** and include:

- Family history of diabetes
- Overweight
- Unhealthy diet
- Physical inactivity
- Increasing age
- High blood pressure
- Ethnicity

1.33 ADDITIONAL DIABETES RISK FOR WOMEN

Diabetes is associated with lower rates of fertility and Socio Economic Determination of Health. There are a number of reasons which can play a part including, obesity, being underweight, having diabetic complications, having PCOS and having an autoimmune disease. With this said, many women with diabetes are able to conceive, particularly if diabetes is well controlled and a healthy bodyweight is maintained. Socio economic determinants of health are

- Socio-economic determinants
- Reproductive, maternal and child-health
- Gestational diabetes
- Early origins of diabetes
- Stigma and discrimination
- Impaired glucose tolerance (IGT)

1.33.1 SOCIO-ECONOMIC DETERMINANTS OF HEALTH

Socio-economic determinants are the conditions in which people live; where they are born, grow up, live, work, and age. These conditions affect a person's health and vulnerability to disease, including diabetes, and may vary by wealth, social status and gender.

As a result of socio-economic conditions, girls and women with diabetes experience barriers in accessing cost-effective diabetes prevention, early detection, diagnosis, treatment and care, particularly in developing countries. Socio-economic inequalities expose women to the main risk factors of diabetes, including poor diet and nutrition, physical inactivity, tobacco consumption and harmful use of alcohol.

1.33.2 REPRODUCTIVE, MATERNAL AND CHILD HEALTH

Over recent decades, diabetes has expanded into low and middle income countries and the age of onset has shifted down a generation. As a consequence, more women of reproductive age have diabetes, an estimated 28 million women of reproductive age with diabetes in 2012.

Women with diabetes have more difficulty conceiving and may have poor pregnancy outcomes. Without pre-conception planning, type 1 and type 2 diabetes can result in a significantly higher risk of maternal and child mortality and morbidity.

A comprehensive approach to women and children's health is needed, integrating diabetes across the reproductive, maternal and new-born child health (RMNCH) continuum of care, from adolescence and pre-conception through the post-natal period and early childhood.

1.33.3 GESTATIONAL DIABETES

Gestational diabetes mellitus (GDM) is defined as "any degree of glucose intolerance with onset or first recognition during pregnancy". GDM affects up to 15% of pregnant women worldwide, and in India alone an estimated 4 million women have GDM.

Women with GDM are more likely to give birth to macrosomic or large-for-gestational-age infants. GDM may results in obstructed labor, the death of the mother and the baby and birth injury for the infants. GDM also has long-term health impact, with more than 50% of women with GDM going on to develop type 2 diabetes within 5-10 years of delivery. Moreover, infants of women with GDM have a higher prevalence of obesity and higher risk of developing type 2 diabetes later in life.

1.33.4 EARLY ORIGINS

Mounting evidence indicates that many of the risk factors contributing to type 2 diabetes may be triggered by events in the womb and by the post-natal environment. Early life influences such as maternal under or over nutrition, diabetes in the mother, low birth-weight followed by childhood overfeeding - increase the risk of obesity, diabetes and cardiovascular diseases later in life. Chronic under nutrition leads to stunting and low pregnancy weight gain and is associated with inadequate nutrition in pregnancy.

Tackling the socio-economic determinants of the poor nutritional status of girls and women is critical, particularly in developing countries where the rate of undernourished women of reproductive age is high. A life-course approach is necessary to reduce the intergenerational transmission of diabetes; prevention must start with a healthy pregnancy, adequate nutrition and growth in fetus and early postnatal life.

1.33.5 STIGMA AND DISCRIMINATION

Many people living with diabetes suffer stigmatization and discrimination. However, stigma is particularly pronounced for girls and women, who carry a double burden of discrimination because of their health status and the inequalities perpetrated in male-dominated societies.

Families of girls and women with diabetes may withdraw support and force them to keep their health status secret. This discourages them from seeking diagnosis and treatment and creates diabetes related guilt and depression. Girls and women with diabetes can be discriminated against in terms of marriageability, which in many societies represents their main route to economic and social status, particularly in rural area.

1.33.6 IMPAIRED GLUCOSE TOLERANCE (IGT)

IGT is a category of higher than normal blood glucose, but below the threshold for diagnosing diabetes. Changes in diet and physical activity related to rapid development and urbanization have led to sharp increases in the numbers of people developing diabetes. Pregnant women who are overweight, have been diagnosed with IGT, or have a family history of diabetes are all at increased risk of developing gestational diabetes mellitus (GDM). In addition, having been previously diagnosed with gestational diabetes or being of certain ethnic groups puts women at increased risk of developing GDM.

1.34 INFERTILITY IN WOMEN

The following conditions are associated with reduced fertility rates:

- Polycystic ovary syndrome (PCOS)
- Oligo menorrhea (irregular periods)
- Secondary amenorrhea (absent periods)
- Premature menopause (premature ovarian failure)
- Endometrial cancer (uterine cancer)
- Micro vascular and cardiovascular complications
- Polycystic ovary syndrome (PCOS)
- Miscarriage

1.34.1 POLYCYSTIC OVARY SYNDROME

PCOS is a condition that affects women's ovaries causing an abnormal number of cysts to appear on the surface of the ovaries. PCOS is a common condition

affecting about 1 in 5 women at some point in their lives. Polycystic ovary syndrome can affect fertility for women by affecting a woman's ability to produce eggs. PCOS is linked with higher levels of circulating insulin, which is characteristic in type 2 diabetes. A UK study in 2012 showed that the risk of diabetes for women with PCOS was notably higher. Insulin resistance and weight gain are two contributing factors to PCOS. Insulin resistance typically causes the body to produce more insulin than normal (hyperinsulinemia). Higher levels of insulin can then cause ovaries to produce too much testosterone which can impair normal ovulation from occurring.

Whilst this feature does not in itself pose a health risk, it can reduce fertility. Women with PCOS have higher than normal levels of testosterone (hyperandrogenism). PCOS can affect fertility by leading to irregular periods (oligo menorrhea) or absent periods (secondary amenorrhea). The condition can be treated through making lifestyle changes, while medications such as clomiphene and metformin can help with improving the chances of conception. PCOS is particularly associated with obesity and type 2 diabetes. People with type 1 diabetes that are taking high amounts of insulin daily may also be at risk of or suffer from PCOS.

1.34.2 OLIGOMENORRHEA AND SECONDARY AMENORRHEA

Oligomenorrhea is the term for irregular periods that arrive at intervals of 35 days or more between each period.

Secondary amenorrhea is said to occur if you have previously had a normal menstrual cycle but have stopped getting a periods for 6 months or longer.

Both type 1 diabetes and type 2 diabetes are associated with increased risks of late and absent periods (oligomenorrhea and secondary amenorrhea). PCOS and obesity can contribute to these conditions and so can being underweight, with women going through diabulimia at particular risk.

1.34.3 PREMATURE MENOPAUSE

Premature menopause, also known as premature ovarian failure, is defined as reaching the menopause (the time when periods stop) before 40 years old. Research by Sytrotmeyer et al. (2003), shows that type 1 diabetes is associated with a greater risk of menstrual problems including premature menopause. Early menopause has also been associated with other autoimmune conditions such as Addison's disease and Hashimoto's thyroiditis, as well as hypothyroidism (an underactive thyroid gland). Research by Elbers et al. (2011), suggests that type 2 diabetes is also associated with greater rates of premature menopause.

1.34.4 ENDOMETRIAL CANCER (UTERINE CANCER)

Endometrial cancer, which is more common in women with type 2 diabetes and PCOS, can lead to infertility if the cancer is not diagnosed and treated at an earlier enough stage.

1.34.5 MICROVASCULAR AND CARDIOVASCULAR COMPLICATIONS OF DIABETES

A 2007 study by Jonasson et al. showed that women with type 1 diabetes with complications of diabetes, including microvascular (retinopathy, neuropathy and nephropathy) and cardiovascular complications experienced much lower rates of fertility.

1.34.6 MISCARRIAGE

Miscarriage is more likely as a result of diabetes, particularly if diabetes is not well controlled before or during the pregnancy. It is therefore strongly advised to achieve good control of blood glucose levels before you intend to conceive.

1.35 ANATOMY OF THE PANCREAS

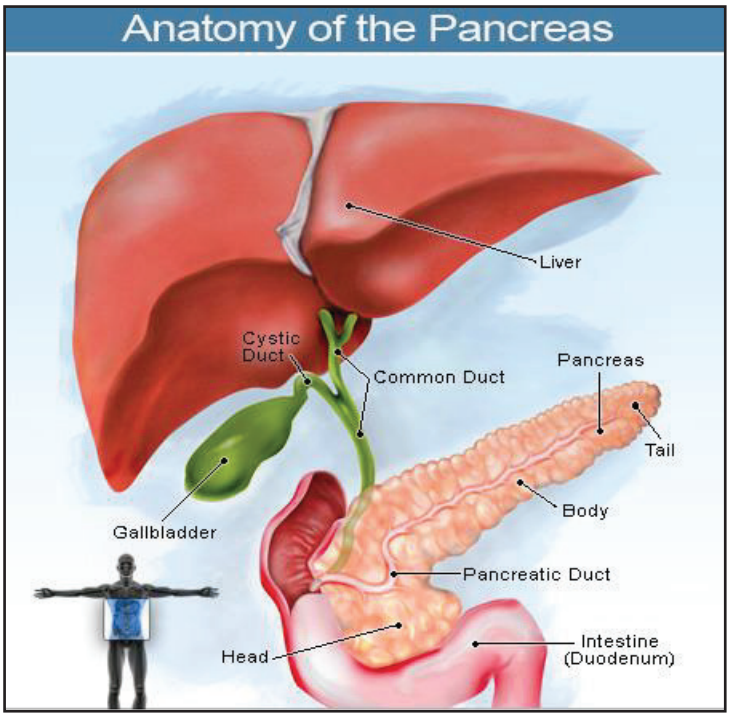

Figure 8. Anatomy of the Pancreas

The pancreas is about 15cm long. The pancreas is an elongated, tapered organ located across the back of the abdomen, behind the stomach. The right side of the organ (called the head) is the widest part of the organ and lies in the curve of the duodenum (the first section of the small intestine). The tapered left side extends slightly upward (called the body of the pancreas) and ends near the spleen (called the tail). The pancreas is made up of two types of tissue.

Exocrine: The exocrine part secretes pancreatic juice, which helps in the digestion of carbohydrates, fats and proteins. These enzymes are secreted into a network of ducts that join the main pancreatic duct, which runs the length of the pancreas.

Endocrine tissue: The endocrine part consists of groups of cells called the Islets of Langerhans. This secretes hormones into the bloodstream. These cells

produce hormones called insulin and glucagon. These hormones influence the utilization of sugar in the body.

1.35.1 FUNCTIONS OF THE PANCREAS

The pancreas has digestive and hormonal functions:

The enzymes secreted by the exocrine tissue in the pancreas help break down carbohydrates, fats, proteins, and acids in the duodenum. These enzymes travel down the pancreatic duct into the bile duct in an inactive form. When they enter the duodenum, they are activated. The exocrine tissue also secretes bicarbonate to neutralize stomach acid in the duodenum.

The hormones secreted by the endocrine tissue in the pancreas are insulin and glucagon (which regulate the level of glucose in the blood), and somatostatin (which prevents the release of the other two hormones).

Best way is to lower the diabetes by practicing yoga which avoids risks of developing complications later, slowing the progress of complications.

1.36 PREVENTION

At present, type 1 diabetes cannot be prevented. The environmental triggers that are thought to generate the process that results in the destruction of the body's insulin-producing cells are still under investigation. There is a lot of evidence that lifestyle changes (achieving a healthy body weight and moderate physical activity) can help prevent the development of type 2 diabetes.

Figure 9. Diabetes - Reduce your Risk

Obesity, particularly abdominal obesity, is linked to the development of type 2 diabetes. Weight loss improves insulin resistance and reduces hypertension. People who are overweight or obese should therefore be encouraged to achieve and maintain a healthy body weight.

Physical activity is one of the main pillars in the prevention of diabetes. Increased physical activity is important in maintaining weight loss and is linked to reduced blood pressure, reduced resting heart rate, increased insulin sensitivity, improved body composition and psychological well-being.

A balanced and nutritious diet is essential for health. A healthy diet reduces risk factors for cardiovascular diseases.

Other behaviors to consider include

Smoking: A well-established risk factor for many of the chronic diseases includes diabetes and its complications. As well as other harmful effects, smoking increases abdominal fat accumulation and insulin resistance. All smokers should be encouraged to quit smoking. However, weight gain is common when quitting smoking and therefore dietary advice on avoiding weight gain should also be given (e.g. managing cravings and withdrawal symptoms by using short bouts of physical activity as a stress-relief activity, rather than eating snacks).

Stress and depression: There is evidence of a link between depression and both diabetes and cardiovascular disease.

Sleeping patterns: Both short (<6h) and long (>9h) sleep durations may be associated with a higher risk of developing type 2 diabetes. Sleep deprivation may impair the balance of hormones regulating food intake and energy balance. Long sleep durations may be a sign of sleep-disordered breathing or depression and should be treated appropriately. There is also a close association between obesity and obstructive sleep apnea syndrome (OSA), the most common form of sleep disordered breathing.

1.37 YOGA – AN ASSET FOR PREVENTIVE CARE

Yogalayas imparts great emphasis on asana and pranayama to prevent illness and more important to preserve health. A regular routine of physical exercise from a young age has been shown to be of preventive value in medical disorders. Any kind of exercise is good, but yoga is ideal form as it is totally non-invasive, gentle and soothing. As most ailments are degenerative in nature, asanas keep the geriatric person active and therefore healthy. Apart from the asanas and pranayama, the other percepts for good living laid down by Patanjali reinforce a healthy body and mind.

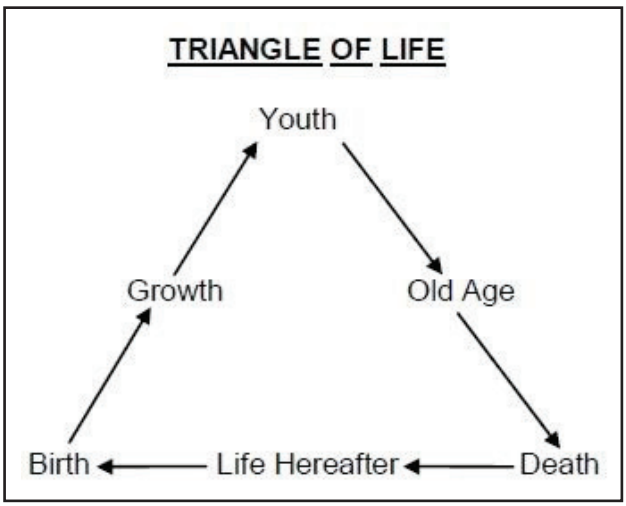

Figure 10. Triangle of Life

The yogi sees the life as a triangle; the physical body undergoes birth, growth, change, decay and death. The growth period reaches a plateau at about the age of eighteen – twenty years. In the first years of life, the "youthful period", the rate of cell rejuvenation (anabolic) exceeds the rate of cell decay (catabolic). In the average person, the body maintains equilibrium of these processes from the age of twenty until around thirty five. Then the decaying, or catabolic process, begins to take precedence, and the body starts its decline. This process later results in old age with its accompanying ills and despair. However, yogis say that we were not born merely to be subject of pain and suffering, disease and death. There is far greater purpose to life. But the spiritual investigation of life's purpose requires a keen intellect and a strong will; these are the products of a healthy body and mind. For this reason, the ancient sages developed an integral system to ward off or retard the decaying or catabolic process and to keep the physical and mental faculties strong. This is the system of yoga, a simple and natural programme involving five main principals:

Proper Exercise	-	Asana
Proper Breathing	-	Pranayama
Proper Relaxation	-	Shavasana

Proper diet	-	Vegetarian-Satvic
Positive Thinking and Meditation	-	Vedanta and Dhyana

Yoga is a life of self-discipline based on the tenets of simple living and high. The body is a temple or vehicle for the soul and has specific requirements which must be fulfilled for it to function smoothly and supply the optimum mileage. These requirements may be seen metaphorically in the relationship to those of another vehicle.

An automobile requires five things: a lubricating system; a battery; a cooling system; fuel; and a responsive driver behind the wheel, now let us look at our human needs:

Proper Exercise: acts as a lubricating routine to the joints, muscles, ligaments, tendons and other parts of the body by increasing circulation and flexibility.

Proper Breathing: aids the body in connecting to its battery, the solar plexus, where tremendous potential energy is stored. When tapped through specific yoga breathing techniques (pranayama) this energy is released for the physical and mental rejuvenation.

Proper Relaxation: cools down the system, as does the radiator of car. When the body and mind are continually overworked, their efficiency diminishes. Relaxation is nature's way of recharging the body.

Proper Diet: provided the correct fuel to the body. Optimum utilization of food, air, water and sunlight is essential.

Positive Thinking and Meditation: puts you in control. The intellect is purified. The lower nature is brought under conscious control through steadiness and concentration of mind.

1.38 ALTERNATIVE THERAPIES DIABETIC MANAGEMENT

The National Center for Complementary and Alternative Medicine, part of the National Institutes of Health, defines complementary and alternative medicine as a "group of diverse medical and health care systems, practices and products that are not presently considered to be part of conventional medicine." Complementary medicine is used with conventional therapy, whereas alternative medicine is used instead of conventional medicine.

Some people with diabetes use complementary or alternative therapies to treat diabetes. Although some of these therapies may be effective, others can be ineffective or even harmful. Patients who use complementary and alternative medicine need to let their health care providers know what they are doing.

Some complementary and alternative medicine therapies are discussed below. For more information, talk with your health care provider.

1.38.1 ACUPUNCTURE

Acupuncture is a procedure in which a practitioner inserts needles into designated points on the skin. Some scientists believe that acupuncture triggers the release of the body's natural painkillers. Acupuncture has been shown to offer relief from chronic pain. Acupuncture is sometimes used by people with neuropathy, the painful nerve damage of diabetes.

1.38.2 BIOFEEDBACK

Biofeedback is a technique that helps a person become more aware of and learn to deal with the body's response to pain. This alternative therapy emphasizes relaxation and stress-reduction techniques. Guided imagery is a relaxation technique that some professionals who use biofeedback do. With guided imagery, a person thinks of peaceful mental images, such as ocean waves. A person may also include the images of controlling or curing a chronic disease, such as diabetes. People using this technique believe their condition can be eased with these positive images.

1.38.3 CHROMIUM

The benefit of added chromium for diabetes has been studied and debated for several years. Several studies report that chromium supplementation may improve diabetes control. Chromium is needed to make glucose tolerance factor, which helps insulin improve its action. Because of insufficient information on the use of chromium to treat diabetes, no recommendations for supplementation yet exist.

1.38.4 GINSENG

Several types of plants are referred to as ginseng but most studies of ginseng and diabetes have used American ginseng. Those studies have shown some glucose-lowering effects in fasting and post-prandial (after meal) blood glucose levels as well as in A1c levels (average blood glucose over a 3-month period). However, larger and more long-term studies are needed before general recommendations for use of ginseng can be made. Researchers also have determined that the amount of glucose-lowering compound in ginseng plants varies widely.

1.38.5 MAGNESIUM

Although the relationship between magnesium and diabetes has been studied for decades, it is not yet fully understood. Studies suggest that a deficiency in magnesium may worsen blood glucose control in type 2 diabetes. Scientists believe that a deficiency of magnesium interrupts insulin secretion in the pancreas and increases insulin resistance in the body's tissues. Evidence suggests that a deficiency of magnesium may contribute to certain diabetes complications. A recent analysis showed that people with higher dietary intakes of magnesium (through consumption of whole grains, nuts, and green leafy vegetables) had a decreased risk of type 2 diabetes.

1.38.6 VANADIUM

Vanadium is a compound found in tiny amounts in plants and animals. Early studies showed that vanadium normalized blood glucose levels in animals with type 1 and type 2 diabetes. A recent study found that when people with diabetes were given vanadium, they developed a modest increase in insulin sensitivity and were able to decrease their insulin requirements. Currently researchers want to understand how vanadium works in the body, discover potential side effects, and establish safe dosages.

1.38.7 ALOE VERA

You can apply gel from this common household plant topically or take it as an oral supplement. Gel is commonly used to relieve burns. Two clinical trials found that aloe vera taken orally helped to lower the fasting blood sugar during a six-week trial period. However, the studies did not cover long-term use.

1.38.8 ALPHA - LIPOIC ACID

Alpha-lipoic acid is an antioxidant found naturally in foods like spinach, broccoli, and potatoes. The supplement is thought to reduce nerve damage related to diabetes (diabetic neuropathy) and improve the body's ability to use insulin. Some studies support the use of this supplement for neuropathy. While there is some evidence for the benefits of this treatment when taken intravenously, several studies show zero effectiveness in protecting against diabetic macular edema or improve the body's response to insulin, according to the National Center for Complementary and Alternative Medicine (NCCAM).

1.38.9 CINNAMON

Studies on this popular diabetes supplement have provided very inconsistent results. According to the Mayo Clinic, some studies show that cinnamon can enhance insulin sensitivity while others have found no effects. If cinnamon is helpful, its benefits are minimal.

1.38.10 GARLIC

Garlic, or allium sativum, is a popular supplement, but research on its effects in people with diabetes is minimal. Clinical trials in patients with type 2 diabetes who took garlic did not show changes in blood sugar or insulin levels. Some clinical trials found garlic lowered total cholesterol levels and blood pressure levels.

1.38.11 GYMNEMA SYLVESTRE (GYMEMNA)

This Ayurvedic treatment involves chewing the leaves of the gymnema plant. The Hindi name for the plant is "gurmar" or "sugar destroyer." The plant is rumored to have blood sugar-lowering effects. However, valid clinical studies have yet to demonstrate its effectiveness.

1.38.12 OMEGA-3 FATTY ACIDS

Considered “good” fats, omega-3 fatty acids are those found in salmon, walnuts, soybeans, and other foods. While supplements may help reduce heart disease risk in as well as reduce triglyceride levels, there is no evidence that they reduce diabetes risk or help patients better manage diabetes. Also, the supplements can interact with medications used to thin the blood.

1.38.13 PRICKLY PEAR CACTUS

Also known as nopal, this plant is used in cooking and for its reported medicinal effects. However, no direct link has been made with taking nopal and treatment for diabetes.

1.38.14 STRING BEANS

It is an excellent natural substitute for insulin and highly beneficial in diabetes.

1.38.15 BITTER GUARD

It is highly beneficial in the treatment of diabetics. The seeds of bitter guard can be added to food in a powder form.

1.38.16 JAMBU FRUIT

It is another effective home remedy known as Jambu. It is regarded in traditional medicine as a specific against diabetes because of its effect on pancreas.

1.39 ROLE OF YOGA

Diabetes that belongs to type 2 diabetes is treated with remarkable consequences through the help of yogasanas. Yoga in itself is an art of meditation and maintaining a perfect balance between the body and mind. Diabetes can be managed without medication, but cannot be managed without exercise and healthy diet.

Hence definite forms of yoga meditation, asanas or postures can have a curative impression upon the varied bodily parts both internal and external and also on the glands. Chief among these asanas are Halasana translated as plaugh posture, Bhujangasana also known as the snake or the cobra pose, Salabhasana are some of the few backward postures that can cause the pancreas to stimulate and exercise the abdominal muscles. Sun salutation which is a form of yoga asana is a great way to step-up the supply of blood to all parts of the body, which indirectly causes insulin improvement and assimilation.

1. Glucagon's secretion is enhanced by stress. Yoga effectively reduces stress, thus reducing glucagon and possibly improving insulin action.
2. Weight loss induced by yoga is a well-accepted mechanism.
3. Muscular relaxation, development and improved blood supply to muscles might enhance insulin receptor expression on muscles causing increased glucose uptake by muscles and thus reducing blood sugar.
4. Blood pressure plays a great role in development of diabetic and related complications, which is proven to be benefited by yoga. The same holds true for increased cholesterol levels.
5. Yoga reduces adrenaline, noradrenalin and cortisol in blood, which are termed as 'stress hormones'. This is a likely mechanism of

improvement in insulin action. Many yogic postures do produce stretch on the pancreas, which is likely to stimulate the pancreatic function.

6. Sensitivity of body cells to the action of insulin increases when regular exercise program participate. The increased sensitivity makes it possible for the cells of our body to use glucose more easily.

7. In India, we are having many patients controlled only on so called 'lifestyle modification' i.e. yoga essentially.

1.40 REASONS FOR THE SELECTION OF THE TOPIC

Today, over 387 million people have diabetes, and approximately half of these are women. As a result of increasing lifespan, the number of women at high risk of diabetes is rising. The health toll diabetes takes on women is significant, particularly in terms of diabetes-related complications such as eye, kidney and heart disease. This results in high rates of mortality and morbidity of women with diabetes. There is little gender difference in the global numbers of people with diabetes for 2013 or 2035. There are about 14 million more men than women with diabetes (198 million men vs 184 million women). However, this difference is expected to increase to 15 million (303 million men vs 288 million women) by 2035.

1.41 REASONS FOR THE SELECTION OF VARIABLES

Physiological variables like Body Mass Index, Blood pressure and Pulse Rate are the causes or complications of diabetes. Bio-Chemical variable Blood sugar Fasting, HbA1c and Total Cholesterol are the basic measurements to monitor the conditions of diabetes. Psychological variables like Anxiety, Work & Social Adjustment and Satisfaction with Life play a vital role in determining day today contributions to the development of their family, community and in turn society as a

whole. For the above Physiological, Biochemical and Psychological variables are considered for this study.

1.42 OBJECTIVES OF THE STUDY

- To find out whether there would be any significant difference on selected physiological variables among diabetic women due to the practices of Traditional Yoga and Tibetian Yoga.
- To find out whether there would be any significant difference on selected bio-chemical variables among diabetic women due to the practices of Traditional Yoga and Tibetian Yoga.
- To find out whether there would be any significant difference on selected psychological variables among diabetic women due to the practices of Traditional Yoga and Tibetian Yoga.

1.43 STATEMENT OF THE PROBLEM

The purpose of the study was to find out the effect of Traditional Yoga and Tibetian Yoga on selected Physiological, Bio-chemical and Psychological variable among Diabetic Women.

1.44 HYPOTHESIS

1. It was hypothesized that there would be significant differences due to the practices of Traditional Yoga and Tibetian Yoga on Selected Physiological, Bio-chemical and Psychological Variables among Diabetic Women than the control group.
2. It was hypothesized that there would be significant differences between Traditional Yoga and Tibetian Yoga groups on Selected

Physiological, Bio-chemical and Psychological Variables among Diabetic Women.

1.45 SIGNIFICANCE OF THE PROBLEM

- According to the World Health Organization (WHO), over 180 million people throughout the world have diabetes. This is projected to go up to 387 million by 2030.
- India has the dubious distinction of being the diabetic capital of the world. Home around 33 million people with diabetes 19% of the world diabetic population is from India.
- Of these, 90 to 95% have type-2 diabetes, and 5-10% has type-1 diabetes. Nearly 12.5% of India's urban populations have diabetes. The number is expected to escalate to an alarming 80 million by the year 2030.

The road with diabetes is not an easy one. When the blood sugar levels remain high, the sugar in the blood attacks the tissue cells by forming harmful by-products. They disturb the structure and function of the cells leading to cell damage or cell death. This could affect the vital organs in the body like Heart, Blood Vessels, Kidney, Eye, Nerves, Teeth, Legs and Feet.

1.46 DELIMITATIONS

The following delimitations would be taken into consideration in the interpretation of results.

- The study was confined to the women only.
- The study was confined to Type II diabetic women only.

- The age of the subject was ranged from 35 to 45 years only.
- The subjects were selected from Chennai city only.
- The subjects were treated with Traditional Yoga and Tibetian Yoga as independent variables only.
- The study was conducted on Physiological variables of BMI, BP and Pulse Rate as dependent variables only.
- The study was conducted on Bio-chemical variable of Blood Sugar Fasting, HbA1c and Total Cholesterol as dependent variables only.
- The study was conducted on Psychological variables of Anxiety, Work & Social Adjustment and Satisfaction with Life as dependent variables only.

1.47 LIMITATIONS

- The other ways of treatment taken by the patients were not taken into account.
- The patient's way of life style was not considered.
- During the treatment period patients' occupation or their daily activities were not considered by the scholar.
- External factors like diet, habits, life styles, body structure, socio-economic status and motivation were not taken into consideration.
- Environmental conditions were not considered.

1.48 MEANING AND DEFINITION OF THE TERMS

1.48.1 YOGA

Yoga as "Chittavrittinirodhah" - Patanjali's Yoga Sutra –I

(Cessation of mental modifications is yoga)

Yoga as "Samatvam yoga uchyate" - Bhagwadgita - II.48

(Balance / equanimity is called yoga)

Yoga as "Yogahkarmasukaushalam" - Bhagwadgita - II.50

(Yoga is skillfulness in action)

1.48.2 ASANA

Asana as "Sthiram sukham asanam" - Patanjali's Yoga Sutra - II.46.

(Steady and comfortable should be the posture).

1.48.3 PRANAYAMA

"Tasmin satisvasa prasvasa yorgati vichchhdah pranayamah"

- Patanjali's Yoga Sutra - I.46.

(The asana having been done, pranayama is the cessation of the movement of inhalation and exhalation).

1.48.4 TIBETIAN RITES

Tibetian Yoga comprises of five simple, yet dynamic yogic exercises called Five Tibetian Rites, meditation, pranayama and positive thinking. The Five Tibetian Rites is a yoga routine based on a ritual of exercises done by the Tibetan Lamas, which helped them to live very long and healthy life and to stay ever young.

1.48.5 DIABETES MELLITUS

Diabetes Mellitus is metabolic disorder due to relative or absolute lack of insulin is resulting in elevated blood glucose levels in association with long term vascular and neurological complication. It affects the carbohydrate, lipid and protein metabolism.

During the early stages of the disease the Insulin like Activity (ILA) of the blood is often increased, but most of this insulin appears to be bound to protein and is not available for transport across the cell membrane and action of the cell.

1.48.6 BODY MASS INDEX (BMI)

Body Mass Index (BMI), is a proxy for human body fat based on an individual's weight and height. Body mass index is defined as the individual's body weight divided by the square of their height.

TABLE - III

BODY MASS INDEX

BODY MASS INDEX (BMI)	
Severely underweight	less than 16.0
Underweight	from 16.0 to 18.5
Normal	from 18.5 to 25
Overweight	from 25 to 30
Obese Class I	from 30 to 35
Obese Class II	from 35 to 40
Obese Class III	over 40

1.48.7 BLOOD PRESSURE

Blood pressure (BP) is a force exerted by circulating blood on the walls of blood vessels, and is one of the principal vital signs. Blood Pressure is recorded in two readings, namely, Systolic Blood Pressure/Diastolic Blood Pressure (SBP/DBP). Transient elevations of systolic blood pressure occur in normal people under conditions such as exercise and emotional states such as anger. However, consistently elevated diastolic blood pressure, which reflects the base line pressure level in the arterial network, is considered most significant in diagnosis and assessment of the severity of hypertension. The mean BP, due to pumping by the heart and resistance in blood vessels, decreases as the circulating blood 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 contraction of skeletal muscles, are some other influences on BP at various places in the body.

The pressure is greatest during systole when the heart contracts and forces blood into arteries of the body. This is known as systolic pressure. The pressure is lower during relaxation phase of the heart and this is referred to as the diastolic blood pressure.

TABLE - IV

BLOOD PRESSURE

BLOOD PRESURRE	
Low Blood Pressure	< 90/60 (Systolic /Diastolic)
Ideal& Blood Pressure Range	120 / 80 (Ideal-Systolic /Diastolic) 90 -120 / 60 -80 (Range-Systolic /Diastolic)
Pre – High Blood Pressure	120 -140 / 80 -90 (Systolic /Diastolic)
High Blood Pressure	>140 / 90 (Systolic /Diastolic)

1.48.8 PULSE RATE

Pulse rate is the rate at which the heart beats; usually measured to obtain a quick evaluation of a person's health. The pulse rate is most often taken at the wrist. It measures the number of pulsations in the radial artery each minute. This is an indicator of a person's general physical condition; "he was still alive but his vital signs were weak". Femoral pulse - pulse of the femoral artery (felt in the groin). Radial pulse - pulse of the radial artery (felt in the wrist). Rate - a magnitude or frequency relative to a time unit.

TABLE - V

PULSE RATE

PULSE RATE	
Newborns (0-3 months)	100-150
Infants (3-6 months)	90-120
Infants (6-12 months)	100-160
Children ages 1-10	70-130
Children over age 10 and adults	70-80
Well-conditioned athletes	40-60

1.48.9 FASTING BLOOD SUGAR

Fasting as the name suggests, means refraining from eating or drinking any liquids other than water for eight hours. It is used as a test for diabetes. After fasting, a carbohydrate metabolism test is conducted which measures blood glucose. When fasting the hormone glucagon is stimulated and this increases plasma glucose levels in the body. If a patient doesn’t have diabetes, their body will produce insulin to rebalance the increased glucose levels. However people with diabetes either don’t produce enough insulin to rebalance their blood sugar (typically in type 1 diabetes) or their body is not able to use the insulin effectively enough (typical of type 2 diabetes).

Consequently when blood glucose levels are tested, people with diabetes will have blood sugar levels significantly higher than people who do not have diabetes. Fasting blood sugar is really very important particularly in diagnosing diabetes and oftentimes in therapeutic management and it's important because the system is clean of at least any sugar you've eaten prior to that test, because, when you're measuring blood sugar levels, depending on what you eat that adds to that number. So if you want a clean, cleansed number, a 'fasting' is a very good barometer.

1.48.10 HbAlc

The term HbA1c refers to glycated haemoglobin *(A1c)*, which identifies average plasma glucose concentration. It develops when hemoglobin, a protein within red blood cells that carries oxygen throughout your body, joins with glucose in the blood, becoming 'glycated'. By measuring glycated haemoglobin (HbA1c), clinicians are able to get an overall picture of what our average blood sugar levels have been over a period of weeks/months. For people with diabetes this is important as the higher the HbA1c, the greater the risk of developing diabetes-related complications.

HbA1c is also referred to as haemoglobin A1c or simply A1c. For people without diabetes, the range is 20-41 mmol/mol (4-5.9%).For people with diabetes; an HbA1c level of 48 mmol/mol (6.5%) is considered good control, although some people may prefer their numbers to be closer to that of non-diabetics. For people at greater risk of hypoglycemia (lower than normal blood sugar) is the target HbA1c of 59 mmol/mol (7.5%) to reduce the risk of hypos.

TABLE - VI

GLYCEMIC TARGET FOR NON PREGNANT DIABETIC ADULTS

GLYCEMIC TARGET FOR NON PREGNANT DIABETIC ADULTS	
Fasting blood sugar	80–130 mg/dl
Post Prandial Blood Sugar	90–180 mg/dl
Glycosylated Haemoglobin (HbA1c)	< 6.5 – Target, >8 - Action suggested, < 6 - Non- Diabetic Level

1.48.11 TOTAL CHOLESTEROL

Total cholesterol score is calculated using the following equation: HDL + LDL + 20 percent of your triglyceride level. A total cholesterol score of less than 150-250 mg/dl is considered optimal.

TABLE - VII

LIPID PROFILE

LIPID PROFILE (Method – CHO:CH8/PAP; HDL & LDL : ENZ Colorimetric)	
Serum/Total Cholesterol	150 – 250 mg/dl
Serum triglycerides	<200 mg/dl
HDL Cholesterol	35 – 70 mg/dl
LDL Cholesterol	< 125 mg/dl
VLDL	40 – 70 mg/dl

1.48.12 ANXIETY

Anxiety is psychological and physiological state characterized by somatic, emotional, cognitive, and behavioral components. The root meaning of the word anxiety is 'to vex or trouble'; in either presence or absence of psychological stress, anxiety can create feelings of fear, worry, uneasiness, and dread. Anxiety is considered to be a normal reaction to a stressor. It may help an individual to deal with a demanding situation by prompting them to cope with it. When anxiety becomes

excessive, it may fall under the classification of an anxiety disorder. Long term anxiety problems can leave us feeling helpless. It involves how we think, feel and act.

1.48.13 WORK AND SOCIAL ADJUSTMENT

Adjustment in psychology means the process of balancing conflicting need. Adjustment refers to the behavioral process of balancing conflicting needs or needs against obstacles in the environment. Humans and animals regularly do this, for example, when they are stimulated by their physiological state to seek food, they eat (if possible) to reduce their hunger and thus adjust to the hunger stimulus. Adjustment disorder occurs when there is an inability to make a normal adjustment to some need or stress in the family or environment. In general, the adjustment process involves a need or motive in the form of a strong persistent stimulus, non-fulfillment of this need, varied activity or exploratory behavior accompanied by problem solving. Various theorists impressed by the association of self-satisfaction, self-esteem or positive self-regard with good personal adjustment and by its absence in people who are “mal adjusted”. Some responses that remove or at least reduce are initiating stimulus and complete the adjustment.

1.48.14 SATISFACTION WITH LIFE

It is the way a person evaluates her life and how she feels about where it is going in the future. It is a measure of well-being and may be assessed in terms of mood, satisfaction with relations with others and with achieved goals, self-concepts, and self-perceived ability to cope with daily life. It is having a favorable attitude of one's life as a whole rather than an assessment of current feelings. Life satisfaction has been measured in relation to economic standing, amount of education, experiences and residence, as well as many other topics.