



Review Article

DIABETES MELLITUS A PANDEMIC SCOURGE: A REVIEW

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Diabetes mellitus is a disease in which a person's blood sugar level is high either because the pancreas does not produce enough insulin, or the insulin that is produced is not effectively used up by the cells of the body. As a result of these, blood glucose level rises up which spills into the blood. Insulin is a hormone which is needed by the body to convert sugar and other starch into useful energy. Type 1 diabetes is when the body fails to produce adequate amount of insulin. Type 2 diabetes is when the body cannot properly make use of the insulin that is produced. Gestational diabetes occurs in pregnant women. Other forms of diabetes may be congenital or due to use of steroids and glucocorticoids or caused by cystic fibrosis. Diabetes is the world's fastest growing chronic disease with about 285 million patients. The causes of diabetes are heredity, feeding habits and life style. Symptoms of diabetes are frequent urination, increased thirsts and hunger. The complications of diabetes are cardiovascular diseases, stroke, reduced vision and blindness, kidney damage, diabetic coma, diabetic foot ulcer, and consequently amputation. It can be diagnosed by fasting plasma glucose test, oral glucose tolerance test and use of glucometer. In ancient times, diabetes was a dead sentence. Diabetes is one of the hardest diseases to live with. Presently, there is no known cure for diabetes except in very specific situations. Management of diabetes concentrates on keeping blood sugar level close to normal, healthy life style, regular exercise and good diet.

Keywords: Diabetes mellitus, Pandemic, Scourge, Management

INTRODUCTION

Diabetes mellitus is a silent killer. It works continuously behind the patients back. Sometimes, the patient doesn't know about the killer that is working inside him/her. Occasionally he went to a doctor for a different problem and during screening he was found to be diabetic.

Patient becomes worried—all his favorite menus are going away from him. He's going to lose the charms of life. Medical doctors, advise him to avoid sweet fast foods and fatty foods. He needs to take regular exercise. He is entering into a boring charmless life. But is that true? The truth is that you have to lose nothing but to be in a

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disciplined life. Whatever you do, you must keep your blood glucose under control. That is your ultimate responsibility for yourself, for all the organs to work optimally. Secondly you must have adequate knowledge regarding diabetes and its complications.

WHAT IS DIABETES

Diabetes is a disease in which the body does not produce or properly use insulin as a result the blood glucose level rises up which spills over in urine. Insulin is a hormone that is needed by the body to convert sugar and other starches into useful energy. Body fails to produce adequate amount of insulin causing type-1 Diabetes mellitus and body cannot properly use insulin in type-2 Diabetes mellitus. Type-1 include only 5-10% of diabetic patients and most of the rest types-2. There are some other special types of Diabetes mellitus like gestational diabetes which affects the pregnant woman.

HISTORY OF DIABETES

Diabetes is one of the first diseases described with an Egyptian manuscript from 1500 BC mentioning (too great emptying of the urine). Diabetes is one of the hardest diseases to live with the first described cases are believed to be of type 1 diabetes. Indian physicians around the same time identified the disease and classified it as *madhumeha* or *honey urine* noting that the urine would attract ants. The term "diabetes" or "to pass through" was first used in 230 BC by the Greek Apollonius of Memphis. Type 1 and type 2 diabetes were identified as separate conditions for the first time by the Indian physicians Sushruta and Charaka in 400-500 BC with type 1 associated with youth and type 2 with being really fat and wide. The term "mellitus" or "from honey"

was added by Thomas Willis in the late 1600s to separate the condition from diabetes insipidus which is also associated with frequent urination.

The first complete clinical description of diabetes was given by the Ancient Greek physician Aretaeus of Cappadocia (1st century CE), who also noted the excessive amount of urine which passed through the kidneys. Diabetes mellitus appears to have been a death sentence in the ancient era. Hippocrates made no mention of it, which may indicate that he felt the disease was incurable. Aretaeus did attempt to treat it but could not give a good prognosis; he commented that "life (with diabetes) is short, disgusting and painful". The disease must have been rare during the time of the Roman Empire with Galen commenting that he had only seen two cases during his career

In the medieval Persia, Avicenna (980-1037) provided a detailed account on diabetes mellitus in *The Canon of Medicine*, "describing the abnormal appetite and the collapse of sexual functions," and he documented the sweet taste of diabetic urine. Like Aretaeus before him, Avicenna recognized primary and secondary diabetes. He also described diabetic gangrene, and treated diabetes using a mixture of lupine, trigonella (fenugreek), and zedoary seed, which produces a considerable reduction in the excretion of sugar, a treatment which is still prescribed in modern times. Avicenna also described diabetes insipidus very precisely for the first time, though it was much later Thomas Willis differentiated it from diabetes mellitus in a chapter of his book *Pharmaceutics rationalis* (1674).

The sweet urine symptom of diabetes is evident in the Chinese name for diabetes, *tang niao bing*, meaning "sugar-urine disease". This

name has also been borrowed into Korean and Japanese. In 1776 Matthew Dobson confirmed that the sweet taste comes from an excess of a kind of sugar in the urine and blood. Although diabetes has been recognized since antiquity, and treatment of various efficacy have been known in various regions since the Middle Ages, and in legend for much longer pathogenesis of diabetes has only been understood experimentally since about 1900. An effective treatment was only developed after the Canadians Frederick Banting and Charles Best first used insulin in 1921 and 1922. The discovery of a role for the pancreas in diabetes is generally ascribed to Joseph Von Mering and Oskar Minkowski, who in 1889 found that dogs whose pancreas were removed developed all the signs and symptoms of diabetes and died shortly afterwards. In 1910, Sir Edward Albert Sharpey-Schafer suggested that people with diabetes were deficient in a single chemical that was normally produced by the pancreas. He proposed calling this substance insulin, from the Latin word *insula*, meaning Island, in reference to insulin producing islets of Langerhans in the pancreas.

POPULATION AFFECTED

Diabetes is the world's fastest growing chronic disease; in Australia the number of people with diabetes and pre-diabetes is estimated to be approximately 3.5 million. Diabetes can happen to anybody, with children and young adults developing type 1 diabetes, whilst type 2 diabetes is more common in the 40 to 59 age bracket. In the United States, there were approximately 675,000 diabetes-related emergency department visits in 2010 that involved neurological complications, 409,000 visits with kidney complications, and 186,000 visits with eye complications.

Globally, as of 2010, an estimated 285 million people had diabetes, with type 2 making up about 90% of the cases. Its incidence is increasing rapidly, and by 2030, this number is estimated to almost double. Diabetes mellitus occurs throughout the world, but is more common (especially type 2) in the more developed countries. The greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will probably be found by 2030. The increase in incidence in developing countries follows the trend of urbanization and lifestyle changes, perhaps most importantly a "Western-style" diet.

DIABETES IN OTHER ANIMALS

In animals, diabetes is most commonly encountered in dogs and cats. Middle-aged animals are most commonly affected. Female dogs are twice as likely to be affected as males, while according to some sources, male cats are also more prone than females. In both species, all breeds may be affected, but some small dog breeds are particularly likely to develop diabetes, such as Miniature Poodles. The symptoms may relate to fluid loss and polyuria, but the course may also be insidious. Diabetic animals are more prone to infections. The long-term complications recognized in humans are much rarer in animals. The principles of treatment (weight loss, oral antidiabetics, subcutaneous insulin) and management of emergencies (e.g., ketoacidosis) are similar to those in humans.

ECONOMIC IMPORTANCE OF DIABETES

In the developed world, diabetes is the most significant cause of adult blindness, in the non-

elderly and the leading cause of non-traumatic amputation in adults, and diabetic nephropathy is the main illness requiring renal dialysis in the United States. Diabetes increases the risk of stroke, cardio vascular disease and other conditions. As diabetes and associated condition continues to increase the burden of care on the health-care system, there has been a push towards patient education and self management strategies. This course promotes up to date information on the best quantity care and assistance professionals can provide to people with diabetes. The 1989 St. Vincent Declaration was the result of international efforts to improve the care accorded to those with diabetes. Doing so is important not only in terms of quality of life and life expectancy, but also economically – expenses due to diabetes have been shown to be a major drain on health-and productivity-related resources for healthcare systems and governments.

Several countries established more and less successful national diabetes programs to improve treatment of the disease. Diabetic patients with neuropathic symptoms such as numbness or tingling in feet or hands are twice as likely to be unemployed as those without the symptoms. In 2010, diabetes-related emergency department visits rates in the United States were higher among patients from the lowest income communities (526 per 10,000 populations) than from the highest income communities (236 per 10,000 populations). Approximately 9.4% of diabetes related emergency department were for the uninsured.

CLASSIFICATION AND CAUSES OF DIABETES

Diabetes mellitus is classified into four categories:

- Type 1 diabetes
- Type 2 diabetes
- Gestational diabetes and
- Other specific types of diabetes

The other specific types are collection of a few dozen individual causes, diabetes insipidus has similar symptom to diabetes mellitus. The term type 1 Diabetes has replaced several former including childhood – on set diabetes, juveniles, and insulin-dependent diabetes mellitus. Likewise, the term type 2 diabetes has replaced several former terms including adult – on set diabetes, obesity related diabetes, and noninsulin dependent diabetes mellitus.

CLASSIFICATION OF DIABETES

The classification of diabetes mellitus and the tests used for diagnosis were brought into order by the national diabetes data group of USA and second World Health Organization expert committee on Diabetes mellitus in 1979. Apart from minor modification by WHO in 1985, Little has been change d since that time. There is however considerable new knowledge regarding the aetiology of different diabetes as well as more information on the predictive value of different blood glucose values for the complication of diabetes. A WHO consultation has therefore taken place in parallel with a report by an American Diabetes Association Expert Committee to reexamine diagnostic criteria and classification. The present document includes the conclusion of the former and is intended for wide distribution and discussion before final proposals are submitted to WHO for approval. The main changes proposed are as follows. The diagnostic fasting plasma (blood) glucose value has been

lowered to >7.0 mmol (-1) (6.1 mmol (-1)). Impaired Glucose Tolerance (IGT) is change to allow for the new fasting Level. A new category of Impaired Fasting Glycaemia (IFG) is proposed to encompass values which are above normal but below the diagnostic cut – off for diabetes (plasma > 6.1 to < 7.0 mmol 1 (-1) whole blood $> \text{or} = 5.6$ to < 6.1 mmol Gestational Diabetes Mellitus (GDM) now includes gestational impaired glucose tolerance as well as the previous GDM. The classification defines both process and stage of the disease. The processes include type 1, autoimmune and non autoimmune with beta cell destruction, type 2 with varying degrees of insulin resistance and insulin hypo secretion. Gestational Diabetes and other types where the cause is known (e.g., Moody, endocrinopathies). It is anticipated that this group will expand as causes of Type 2 become known. Stages range from normal Myoglycaemia to insulin required for survival. It is hoped that the new classification will allow better classification of individuals and lead to fewer therapeutic misjudgments’.

TYPE 1 DIABETES

Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to insulin deficiency. This type can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, in which beta cell loss T-cell-mediated autoimmune attack. There is no known preventive measure against type 1 diabetes, which causes approximately 10% of diabetes mellitus cases in North America and Europe. Most affected people are otherwise healthy and of a healthy weight when onset occurs. Sensitivity and responsiveness to insulin are usually normal, especially in the early

stages. Type 1 diabetes can affect children or adults, but was traditionally termed “juvenile diabetes” because a majority of these diabetes cases were in children.

Brittle diabetes, also known as unstable diabetes or labile diabetes, is a term that was traditionally used to describe the dramatic and recurrent swings in glucose levels, often occurring for no apparent reason in insulin-dependent diabetes. This term, however, has no biologic basis and should not be used. There are many reasons for type 1 diabetes to be accompanied by irregular and unpredictable hyperglycemia, frequently with ketosis, and sometimes serious infection, gastroparesis (which leads to erratic absorption of dietary carbohydrates), and endocrinopathies (e.g., Addison’s disease). These phenomena are believed to occur no more frequently than in 1% to 2% of persons with type 1 diabetes.

TYPE 2 DIABETES

Type 2 diabetes mellitus is characterized by insulin resistance, which may be combined with relatively reduced insulin secretion. The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor. However, the specific defects are not known. Diabetes mellitus cases due to a known defect are classified separately. Type 2 diabetes is the most common type. In the early stage of type 2, the predominant abnormality is reduced insulin sensitivity. At this stage, hyperglycemia can be reversed by a variety of measures and medications that improve insulin sensitivity or reduced glucose production by the liver.

GESTATIONAL DIABETES

Gestational diabetes mellitus resembles type 2

diabetes in several respects, involving a combination of relatively inadequate insulin secretion and responsiveness. It occurs in about 2-5% of all pregnancies and may improve or disappear after delivery. Gestational diabetes is fully treatable, but requires careful medical supervision throughout the pregnancy. About 20-50% of affected women develop type 2 diabetes later in life. Though it may be transient, untreated gestational diabetes can damage the health of the fetus or mother. Risks to the baby include macrosomia (high birth weight), congenital cardiac and central nervous system anomalies, and skeletal muscle malformations. Increased fetal insulin may inhibit fetal surfactant production and cause respiratory distress syndrome. Hyperbilirinemia may result from red blood cell destruction. In severe cases, prenatal death may occur, most commonly as a result of poor placental perfusion due to vascular impairment. Labor induction may be indicated with decreased placental function. A Caesarean section may be performed if there is marked fetal distress or an increased risk of injury associated with macrosomia, such as shoulder dystocia.

OTHER FORMS OF DIABETES MELLITUS

Other forms of diabetes form of diabetes mellitus include congenital diabetes, which is due to genetic defects of insulin secretion; cystic fibrosis related diabetes; steroid diabetes induced by high doses of glucocorticoids; and several forms of monogenic diabetes. Prediabetes indicates a condition that occurs when a person's blood glucose levels are higher than normal but not high enough for a diagnosis of type 2 diabetes mellitus. Many people destined to develop type 2 Diabetes mellitus spend many years in a state of

prediabetes which has been termed "America's largest healthcare epidemic. Latent autoimmune diabetes of adults is a condition in which type 1 diabetes mellitus develops in adults. Adults with prediabetes are frequently initially misdiagnosed as having type 2 diabetes is based on age rather than etiology. Many drugs impair insulin secretion and some toxins damage pancreatic beta cells.

CAUSES OF DIABETES

Diabetes has no particular cause. The cause may range from heredity, feeding habit to life style.

HEREDITY

Type 1 diabetes is partly inherited than triggered by certain infection, with same evidence pointing at Cowsackie B4 Virus. A genetic element in an individual susceptible to type 1 diabetes mellitus seems to require an environmental trigger. The onset of type 1 diabetes is unrelated to lifestyle.

FEEDING HABIT

Dietary factors also influence the risk of developing type 2 diabetes. Consumption of sugar and drinks in excess is associated with an increased risk. The type of fat in the diet is also important, with saturated fats and trans fatty acids increasing the risk and poly-unsaturated and monounsaturated fat decreasing the risk. Eating lots of white rice appears to also play a role in increasing risk.

LIFE-STYLE

Types 2 diabetes is due primarily to lifestyle factors and genetics. A number of lifestyle factors are known to be important in the development of type 2 diabetes including obesity (defined by a body mass index of greater than thirty), lack of physical activity, poor diet, stress, and

urbanization. Excess body fat is associated with 30% of cases in those of Chinese and Japanese descent 60-50% of cases in those of European and African descent; and 100% of pure Indians and Pacific Islanders. Those who are not obese often have high waist hip ration.

SYMPTOMS OF DIABETES

The classic symptoms of untreated diabetes are loss of weight , frequent urination, fatigue, increased thirst, and hunger. Symptoms may develop rapidly in (weeks or months) in type 1 diabetes, while they usually develop much more slowly or may be absent in types 2 diabetes.

COMPLICATIONS OF DIABETES

The complications of diabetes mellitus are far less common and less severe in people who have well controlled sugar levels. Other health problems accelerate the deleterious effects of diabetes. The complications of diabetes are diabetic ketoacidosis, hyperosmolar nonketotic, hypoglycemia, diabetic coma, respiratory infections, periodontal disease, microangiopathy, cardiovascular disease, diabetic foot ulcer, carotid artery stenosis, diabetic neuropathy and sexual problems.

DIABETIC KETOACIDOSIS

Diabetic ketoacidosis is an acute and dangerous complication that is always a medical emergency. Low insulin levels cause the liver to turn fatty acid to ketone for fuel (i.e., ketosis); ketone bodies are intermediate substrates in that metabolic sequence. This is normal when periodic, but can become a serious problem if sustained. Elevated levels of ketone bodies in the blood decrease the blood's pH, leading to DKA.

On presentation at hospital, the patient is typically dehydrated and breathing rapidly and deeply. Abdominal pain is common and may be severe. The level of consciousness is typically normal until late in the process, when lethargy may progress to coma. Ketoacidosis can become severe enough to cause hypotension, shock, and death. Urine analysis will reveal significant levels of ketone bodies which have exceeded their renal threshold blood levels to appear in the urine (often before other overt symptoms). Prompt, proper treatment usually results in full recovery though death can result from inadequate or delayed treatment.

HYPEROSMOLAR NONKETONIC

Hyperosmolar nonketotic state is an acute complication sharing many symptoms with Diabetic KA, but an entirely different origin and different treatment. A person with very high (usually considered to be above 300 mg/dl (16 mmol/L)) blood glucose levels, water is osmotically drawn out of cells into the blood and the kidneys eventually begin to dump glucose into the urine. This results in loss of water and an increase in blood osmolarity. If fluid is not replaced (by mouth or intravenously), the osmotic effect of high glucose levels, combined with the loss of water, will eventually lead to dehydration. The body's cells become progressively dehydrated as water is taken from them and excreted. Electrolyte imbalances are also common and are always dangerous. As with DKA, urgent medical treatment is necessary, commonly beginning with fluid volume replacement. Lethargy may ultimately progress to a coma, though this is more common in type 2 diabetes than type 1.

HYPOGLYCEMIA

Hypoglycemia, or abnormally low blood glucose, is an acute complication of several diabetes treatments. It is rare. The patient may become agitated, sweaty, weak, and have many symptoms of sympathetic activation of the autonomic nervous system resulting in feeling akin to dread and immobilized panic. Consciousness can be altered or even lost in extreme cases, leading to coma, seizures, or even brain damage and death. In patients with diabetes, this may be caused by several factors, such as too much or incorrectly timed insulin, too much or incorrectly timed exercise (exercise decreases insulin requirements) or not enough food (specifically glucose containing carbohydrates). The variety of interactions makes cause identification difficult in many instances. In most cases, hypoglycemia is treated with sugary drinks or food. However, in severe cases, an injection of glucagon may be required.

DIABETIC COMA

Diabetic coma is a medical emergency in which a person with diabetes mellitus is comatose (unconscious) because of one or more of the acute complications of diabetes:

- a. Severe diabetic hypoglycemia.
- b. Diabetic ketoacidosis advanced enough to result in unconsciousness from a combination of severe hyperglycemia, dehydration and shock, and exhaustion.
- c. Hyperosmolar nonketotic coma in which extreme hyperglycemia and dehydration alone are sufficient to cause unconsciousness.

In most medical contexts, the term diabetic coma refers to the diagnostic dilemma posed when a physician is confronted with an

unconscious patient about whom nothing is known except that he has diabetes. An example might be a physician working in an emergency department who receives an unconscious patient wearing a medical identification tag saying DIABETIC. Paramedics may be called to rescue an unconscious person by friends who identify him as diabetic. Brief descriptions of the three major conditions are followed by a discussion of the diagnostic process used to distinguish among them, as well as a few other conditions which must be considered. An estimated 2 to 15% of diabetics will suffer from at least one episode of diabetic coma in their lifetimes as a result of severe hypoglycemia.

RESPIRATORY INFECTIONS

The immune response is impaired in individuals with diabetes mellitus. Cellular studies have shown that hyperglycemia both reduces the function of immune cells and increases inflammation. The vascular effects of diabetes also tend to alter lung function, all of which leads to an increase in susceptibility to respiratory infections such as pneumonia and influenza among individuals with diabetes. Several studies also show that diabetes is associated with a worse disease course and slower recovery from respiratory infections.

PERIODONTAL DISEASE

Diabetes is associated with periodontal disease (gum disease) and may make diabetes more difficult to treat. Gum disease is frequently related to bacterial infection by organisms such as *Porphyromonas gingivalis* and *Actinobacillus actinomycetemcomitans*. A number of trials have found improved blood sugar levels in type 2 diabetics who have undergone periodontal treatment.

MICROANGIOPATHY

The damage to small blood vessels leads to a microangiopathy, which can cause one or more of the following.

- *Diabetic cardiomyopathy*, damage to the heart, leading to diastolic dysfunction and eventually heart failure.
- *Diabetic nephropathy*, damage to the kidney which can lead to chronic renal failure, eventually requiring dialysis. Diabetes mellitus is the most common cause of adult kidney failure worldwide in the developed world.
- *Diabetic neuropathy*, abnormal and decreased sensation, usually in a 'glove and stocking' distribution starting with the feet but potentially in other nerves, later often fingers and hands. When combined with damaged blood vessels this can lead to *diabetic foot ulcer* (see below). Other forms of diabetic neuropathy may present as mono neuritis or autonomic neuropathy. Diabetic amyotrophic is muscle weakness due to neuropath.

CARDIOVASCULAR DISEASE

Macro vascular disease leads to cardiovascular disease, to which accelerated atherosclerosis is a contributor:

- Coronary artery disease, leading to angina or myocardial infarction ("heart attack")
- Diabetic myonecrosis ('muscle wasting')
- Peripheral vascular disease, which contributes to intermittent claudicating (exertion-related and foot pain) as well as diabetic foot.
- Stroke (mainly the ischemic type)

DIABETIC FOOT ULCER

Diabetic foot, often due to a combination of

sensory neuropathy (numbness or insensitivity) and vascular damage, increases rates of skin ulcers (diabetic foot ulcers) and infection and, in serious cases, necrosis and gangrene. It is why diabetics are prone to leg and foot infections and why it takes longer for them to heal from leg and foot wounds. It is the most common cause of non-traumatic adult amputation, usually of toes and or feet, in the developed world.

Figure 1: Diabetic Foot Ulcer



CAROTID ARTERY STENOSIS

Carotid artery stenosis does not occur more often in diabetes, and there appears to be a lower prevalence of abdominal aortic aneurysm.

However, diabetes does cause higher morbidity, and operative risks with these conditions.

DIABETIC ENCEPHALOPATHY

Diabetic encephalopathy is the increased cognitive decline and risk of dementia-including (but not limited to) the Alzheimer's type-observed in diabetes. Various mechanisms are proposed, including alterations to the vascular supply of the brain and the interaction of insulin with the brain itself.

SEXUAL PROBLEMS

A review of type 1 diabetes came to the result that, despite modern treatment, women with diabetes are at increased risk of female infertility, such as reflected by delayed puberty and menarche, menstrual irregularities (especially oligmenorrhoea), mild hyperandrogenism, polycystic ovarian syndrome, fewer live born children and possibly earlier menopause. Animal models indicate that abnormalities on the molecular level caused by diabetes include defective leptin, insulin and kisspeptin signaling.

DIAGNOSIS

Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed by demonstrating any one of the following:

- Fasting plasma glucose level > 7.0 mol/l (126 mg/dl)
- Plasma glucose > 11.1 mol/l (200 mg/dl) two hours after a 75 g oral glucose load as in a glucose tolerance test.
- Symptoms of hyperglycemia and casual plasma glucose > 11.1 mol/l (200 mg/dl)
- Glycated hemoglobin (Hb A1C) > 6.5%.

A positive result, in the absence of unequivocal hyperglycemia, should be confirmed by a repeat of any of the above methods on a different day. It is preferable to measure a fasting glucose level because of the ease of measurement and the considerable time commitment of formal glucose tolerance testing, which takes two hours to complete and offers no prognostic advantage over the fasting test. According to the current definition, two fasting glucose measurements above 126 mg/dl (7.0 mol/l) is considered diagnostic for diabetes mellitus. People with fasting glucose levels from 110 to 125 mg/dl (6.1 to 6.9 mol/l) are considered to have impaired fasting glucose. Patients with plasma glucose at or above 140 mg/d L (7.8 mol/L), but not over 200 mg/d (11.1 mol/L), two hours after a 75 g oral glucose load are considered to have impaired glucose tolerance. Of these two pre diabetic states, the latter in particular is a major risk factor for progression to full-blown diabetes mellitus, as well as cardiovascular disease. Glycated hemoglobin is better than fasting glucose for determining risks of cardiovascular disease and death from any cause.

The following tests are used for the diagnosis of diabetes:

- A fasting plasma glucose test measures your blood glucose after you have gone at least 8 h without eating. This test is used to detect diabetes or pre diabetes.
- An oral glucose tolerance test measures your blood sugar after you have gone at least eight hours without eating and two hours after drink a glucose-containing beverage. This test can be used to diagnose diabetes or pre diabetes.
- In a random plasma glucose test, your test, your doctor checks your blood sugar without

regard to when you ate your last meal. This test, along with an assessment of symptoms, is used to diagnose diabetes, but not pre diabetes.

FASTING PLASMA GLUCOSE TEST (FPG)

The FPG is the preferred test for diagnosing diabetes and is most reliable when done in the morning. If your fasting glucose level is 100 to 125 mg/d, you have a form of pre-diabetes called Impaired Fasting Glucose (IFG), meaning that you are more likely to develop type 2 diabetes but do not have it yet. A level of 126 mg/d or above, confirmed by repeating the test on another day, means that you have diabetes.

ORAL GLUCOSE TOLERANCE TEST (OGTT)

Research has shown that the OGTT is more sensitive than the FPG test for diagnosing pre-diabetes, but it is less convenient to administer. The OGTT requires you to fast for at least eight hours before the test. Your plasma glucose is measured immediately before and two hours after you drink a liquid containing 75 g of glucose dissolved in water. If your blood sugar level is between 140 and 199 mg/d 2 h after drinking the liquid, you have a form of pre-diabetes called impaired glucose tolerance

USE OF GLUCOMETER

Glucometer is blood glucose monitoring device which uses glucose oxides or glucose dehydrogenises as reagent measure glucose in a colorimetric method. This gives you information if you have normal, low or a high glucose level. Glucose level different according to age and feeding status. Normal ranges for blood levels.

- Infant (40 – 90 mg/dl)
- Child < 2 years (60 – 100 mg/dl)
- Child > 2 years to Adult (70 – 105 mg/dl)
- Adult (70 – 105 mg/dl)
- Elderly patients (50 years/more) often have a slightly elevated blood glucose level, but should not normally exceed 126 mg/dl.

In fasting state, in an adult 60 to 100 mg/dl is accepted normal. Below 60 mg/dl is considered as hypoglycemia and above 140 mg/dl is considered as hyperglycemia. Glucose level above 200 mg/dl in 3 consecutive fasting blood glucose levels is considered as diabetic. Blood glucose rises after meal 2 hours after meal it ranges between 140 to 200 mg/dl. Any level above 260 mg/dl is considered as diabetic. These levels vary slightly from study though the variations are negligible.

The patient can titrate his medication or food intake according to glucose level like when he feels hypoglycemic he may take oral glucose like a glass of juice or glucose gel to be applied in oral cavity or may use a glucagon injection which many diabetic patients carry with them. A hypoglycemic patient may present following symptoms. Normal or low BP. Altered mental status, Anxious or combative, Seizure or fainting, Coma, Weakness, simulating CVA. Most of times the patients can feel themselves and take some food early get relieved. Some unlucky patients may become unconscious and may need hospitalization. On the other hand most of the time hyperglycemia remain unnoticed unless it very high causing diabetic coma. This unnoticed hyperglycemia slowly poisons the patient; this can be prevented by regular checking using a glucometer. Lh

Figure 2: Use of a Glucometer

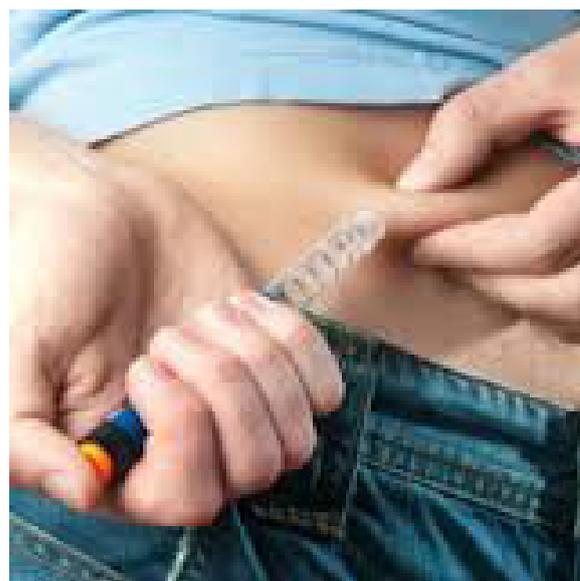
MANAGEMENT OF DIABETES

Diabetes mellitus is a chronic disease, for which there is no known cure except in very specific situations. Management concentrates on keeping blood sugar levels as close to normal (euglycemia) as possible, without causing hypoglycemia. This can usually be accomplished with diet, exercise, and use of appropriate medications (insulin in the case of type 1 diabetes; oral medications, as well as possibly insulin, in type 2 diabetes). Patient education, understanding, and participation is vital, since the complications of diabetes are far less common and less severe in people who have well-managed blood sugar levels. All forms of diabetes have been treatable since insulin became available in 1921, and type 2 diabetes may be controlled with medications. Insulin and some oral medications can cause hypoglycemia (low blood sugars), which can be dangerous if severe. Both types 1 and 2 are chronic conditions that cannot be cured. Pancreas transplants have been tried with limited success in type 1 DM; gastric bypass surgery has been successful in many with morbid obesity and type 2 DM gestational diabetes usually resolves after delivery.

MEDICATIONS

Metformin is generally recommended as a first line treatment for type 2 diabetes, as there is good evidence that it decreases mortality. Routine use of aspirin, however, has not been found to improve outcomes in uncomplicated diabetes.

Type 1 diabetes is typically treated with combinations of regular and NPH insulin, or synthetic insulin analogs. When insulin is used in type 2 diabetes, a long-acting formulation is usually added initially, while continuing oral medication. Doses of insulin are then increased to effect.

Figure 3: Patient Injecting Herself Insuline

Diet Tips For Diabetic Patients A Healthy Diet Is A Way Of Eating That Food That Reduces Risk For Complication Such As Disease And Stroke.

Healthy eating includes eating a wide variety of foods.

- Vegetables
- Fruits

- Non fat dairy products
- Beans
- Lain meats
- Poultry and fish

There is no one take perfect food, so including of variety of different foods and proteins is the healthy diet and also make sure that you have to choose the high quality food rich in vitamins, minerals and fibers.

EXERCISE

Get more physical activity there are many benefits to regular physical activity.

- Lose weight
- Lower your blood sugar
- Boost your sensitivity to insulin – when helps keep your blood sugar within a normal range.

Research shows that both anaerobic exercise and resistance training can help control diabetes but greater benefit comes from a fitness program that include both.

MODIFICATIONS OF LIFE-STYLE

Type 2 diabetes is due primarily to lifestyle factors and genetics. A number of lifestyle factors are known to be important to the development of type 2 diabetes, including obesity (defined by a body mass index greater than 30), lack of physical activity, poor diet, stress, and urbanization. Consequently modification of life-style is very important in preventing and controlling diabetes. Moreover, getting adequate sleep and rest should be adhered to.

CONCLUSION AND RECOMMENDATIONS

When it comes to type 2 diabetes, the most common type of diabetes prevention is a big deal. It's especially important to make diabetes prevention a priority if you are at increased risk of diabetes, for example, if you are overweight or have a family history of the disease. Diabetes prevention is as basic as eating more healthfully, becoming more physically active and losing a few extra pounds – and it's never too late to start. Making a few simple changes in your lifestyle now may help you avoid the serious health complications of diabetes down the road, such as nerve, kidney and heart damage. Consider the latest diabetes prevention tips from the American Diabetes Association.

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