Review On Diabetes Mellitus

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ABSTRACT :

One of the most prevalent non-communicable diseases in the world is "diabetes mellitus." India has a number of obstacles when it comes to managing diabetes, including an increase in both urban and rural prevalence, low public knowledge of the condition, a shortage of healthcare facilities, high treatment costs, inadequate glycaemic control, and an increase in the incidence of diabetic complications. The most popular way to administer insulin therapy for diabetes is by subcutaneous injections, which can be given up to four times per day. Long-term insulin therapy has led to issues with patient compliance, which has an impact on patient outcomes. These issues are further exacerbated by the intrusive nature of insulin delivery. Type 2 diabetes mellitus, which accounts for more than 90% of all diabetes occurrences, is the primary cause of thediabetic epidemic, while type 1 diabetes is becoming more common as well. Diabetes type 2 is a severe and widespread chronic illness brought on by a complicated interplay between genetics and environment, in addition to additional risk factors like obesity and a sedentary lifestyle.

Keywords: Diabetes mellitus, diagnosis, cause and treatment.

Introduction :

Diabetes mellitus is a long-term metabolic disease involving the proteins, lipids, and carbs. Diabetes mellitus is characterized by a poor or insufficient insulin secretary response, which results in impaired utilization of carbohydrates (glucose), as well as the hyperglycemias that follow. [1] Diabetes mellitus (DM), also known as "sugar" diabetes, is the most prevalent endocrine illness. It typically arises from an insufficient or absent amount of insulin or, less frequently, from impaired insulin function, or "insulin resistance" [2]. According to projections from the International Diabetes Federation (IDF), there are around 40.9 million diabetic people in India, and by 2025, that number is expected to increase to 69.9 million [3].

The pancreas secretes both the hormones glucagon and insulin. The alpha (α) cells and beta (ß) cells are found in the islets of Langerhan's, where they release glucagon and insulin respectively. Through the process of glycogenesis, insulin lowers blood glucose levels and transfers glucose into the muscles, liver, and adipose tissue. The consumption of glucose by neural tissue and erythrocytes does not require insulin, but alpha (α) cells are crucial in blood glucose regulation because they produce glucagon, which raises blood glucose levels by speeding up glycogenolysis [4, 5].

In addition, there is a higher chance of obesity, metabolic, cardiovascular, and cancer in the fetus's postnatal life [6]. Eighty to ninety percent of cases of diabetes mellitus are type II diabetes. Variation in geography can affect the severity of the issues as well as total morbidity and mortality [7, 8]. Furthermore, compared to those who are inactive, diabetics who engage in moderate physical exercise have a noticeably lower chance of passing away [24]. It is now well documented that the occurrence of such an event requires a particular genetic composition [9]. One of the main health obstacles to economic development plaguing the states of the WHO African Region is the rising prevalence of diabetes and other non-communicable disorders [10]. Refer to figures (1 and 2)

Diabetes results in abnormalities in two areas: either the synthesis or secretion of insulin, as in the case of Type 1 diabetes mellitus (T1DM) and pancreatic duct stenosis, or the development of insulin resistance or subnormal insulin production, as in the case of Type 2 diabetes (T2DM) and some secondary diabetes.

Classification of Diabetes Mellitus:

The World Health Organization released the first widely recognized categorization of diabetes mellitus in 1980 [11], and it was updated in 1985 [12]. The primary, or idiopathic, form of diabetes mellitus that is the subject of our discussion is the most prevalent and significant kind. It

needs to be distinguished from secondary diabetes mellitus, which encompasses hyperglycemia linked to 37 identifieable causes of pancreatic islet destruction, including inflammatory pancreatic diseases, surgery, tumors, certain medications, iron overload (hemochromatosis), and specific acquired or genetic endocrinopathies [1].

A person's diabetes type is frequently determined by the conditions that existed at the time of diagnosis, and many diabetics find it difficult to fall into a single class [14]. Hyperglycemia is likely a common trait across a broad set of illnesses that make up primary diabetes mellitus. [1]
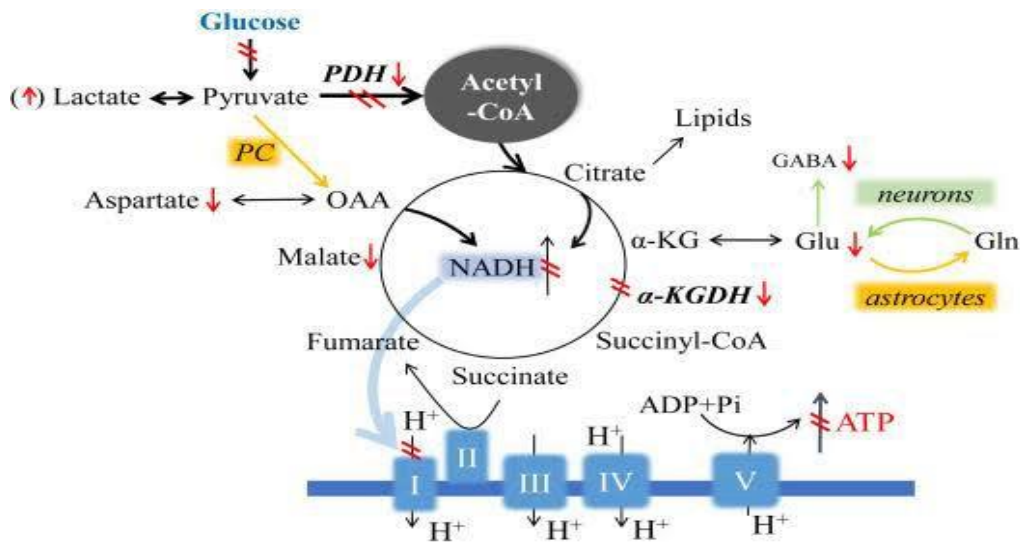
Fig 1: Glucose Metabolism

Insulin Dependent Diabetes Mellitus (Type1 IDDM):

Previously known as juvenile-onset or ketosis-prone diabetes, this type of diabetes mellitus is also known as autoimmune diabetes. The person may also seek treatment for other autoimmune diseases, including Addison's disease, Hashimoto's thyroiditis, and Graves disease [17]. Insulin-dependent diabetes mellitus (IDDM), another name for type I diabetes mellitus, is primarily seen in children and young adults. Its onset is typically abrupt and can be fatal [4]. Anti-glutamic acid decarboxylase, islet cell, or insulin antibodies are typically present in type 1, indicating the autoimmune mechanisms that cause beta-cell death [34]. Type 1 diabetes (caused by b-cell breakdown, which typically results in a complete lack of insulin) (American Diabetes Association, 2014). The rate at which beta cells are destroyed varies greatly; in certain people, it can happen quickly, while in others, it can happen slowly [18]. The pancreatic ß-islets cells are destroyed, resulting in a significant shortage or absence of insulin production. Insulin injections are necessary for treatment [4]. Upon initial detection of fasting diabetic hyperglycemia, 85–90% of patients with Type 1 diabetes mellitus have markers of immune destruction, such as islet cell auto-antibodies, auto-antibodies to insulin, and auto-antibodies to glutamic acid decarboxylase (GAD) [19]. Although the precise origin of diabetes mellitus is still uncertain, auto-antibodies that kill beta-islet cells have been linked to an autoimmune process in the majority of cases [4].

Non-Insulin Dependent Diabetes Mellitus(Type2 Niddm):

Adult-onset diabetes is another name for type 2 diabetes mellitus. The American Diabetes Association (2014) [20] describes the increasing insulin secretary malfunction against the backdrop of insulin resistance. Insulin resistance is a common feature in people with this kind of

diabetes [21]. The primary causes of morbidity and death from diabetes are the long-term problems that affect the kidneys, eyes, nerves, blood vessels, and kidneys in both types [1]. The causes are multifaceted, and risk factors for developing the condition include obesity, a sedentary lifestyle, aging (which affects middle-aged and older individuals), and genetics (Ross and Wilson 2010). Patients who have these conditions are more likely to experience macrovascular and microvascular complications [22, 23].

Gestational Diabetes Mellitus:

Gestational diabetes mellitus (GDM) is the term for glucose intolerance that is discovered or shown for the first time during pregnancy [2]. Gestational diabetes mellitus (GDM) is the term used to describe women who acquire Type 1 diabetes mellitus during pregnancy as well as women who have untreated asymptomatic Type 2 diabetes mellitus [16]. Pregnancy-related diabetes that is not obviously over diabetic is known as gestational diabetes mellitus, or GDM [17]. Long-term effects of intrauterine exposure to hyperglycemia are responsible for the increased risk of obesity and type 2 diabetes in offspring born to mothers with gestational diabetes mellitus (GDM), which can develop during pregnancy and go away after delivery.

Other Specific Type (Monogenic Types):

Hepatocyte nuclear factor (HNF)-1a, a hepatic transcription factor, has mutations on chromosome 12 that cause the most prevalent type of monogenic types of diabetes.They also called them beta cell genetic abnormalities. The early onset of hyperglycemia (usually before the age of 25) is a common characteristic of several kinds of diabetes. These can also be known as maturity-onset diabetes of the young (MODY)[12], maturity-onset diabetes in youth, or diabetes with defects in insulin action. Individuals with exocrine pancreas diseases like pancreatitis or cystic fibrosis, as well as those with dysfunction linked to other endocrinopathies like acromegaly, are also considered to be affected. as well as those who have pancreatic dysfunction

brought on by chemicals, medications, or infections[16]. Certain medications are also used in conjunction with HIV/AIDS treatment or following organ transplantation. A few families have been found to have genetic defects that prevent proinsulin from being converted to insulin; these features are inherited in an autosomal dominant way. Less than 10% of DM cases are made up of these [11].

Some Common Sign and Symptoms:

Cells that have diabetes mellitus are essentially malnourished since they are unable to absorb glucose in the usual way [2]. Diabetes mellitus's long-term effects include the progressive development of certain complications such as retinopathy, which can result in blindness, nephropathy, which can cause renal failure, neuropathy, which can cause foot ulcers, Charcot

joints, and symptoms of autonomic dysfunction and sexual dysfunction [24]. Diabetes raises a person's risk of illness. Refer to table (1).

Additional symptoms can be attributed to the following:
1. Gluconeogenesis, which is triggered by amino acids and body protein and results in tissue degradation, muscular atrophy, and elevated blood glucose levels.
2. ii. The breakdown of body fat, which releases some of its energy and produces an excessive amount of ketone bodies [2]

Etiology of Diabetes Mellitus:

The Greek term "aetiologia" is where the word "etiology" originates. Thus, the science of determining the causes and origins of a disease is known as etiology, and it encompasses the following:
1. The juvenile-onset (insulin-dependent) type is thought to have an autoimmune origin at this time.
2. Viruses such as coxsackie B may potentially contribute to the genesis of diabetes.
3. It has been demonstrated that the mumps and rubella viruses cause morphologic alterations in the structure of the islet cells.
4. There is debate over the contribution of genetics to the etiology of diabetes. An individual's pancreas may be more vulnerable to one of the aforementioned viruses due to a potential hereditary characteristic [45].

Causes of Diabetes Milliteus:

Disturbances or abnormality in gluco-receptor of ß cell so that they respond to higher glucose concentration or relative ß cell deficiency. In either way, insulin secretion is impaired; may

progress to ß cell failure [25]. The theory of principal in micro vascular disease leading to neural hypoxia, and the direct effects of hyperglycaemia on neuronal metabolism [26]
1. Reduced sensitivity of peripheral tissues to insulin: reduction in number of insulin receptors, 'down regulation' of insulin receptors. Many hypersensitive and hyperinsulinaemic, but normal glycaemic; and have associated dyslipideaemic, hyperuriaemiac, abdominal obesity. Thus there is relative insulin resistance, particularly

   at the level of liver, muscle and fat. Hyperinsulinaemic has been implicated in causing angiopathy [24].

2. Excess of hyperglycaemia hormone (glucagon) etc. /obesity; causes relative insulin deficiency –the ß cells lag behind. Two theories have demonstrated abnormalities in nitric oxide metabolism, resulting in altered perineural blood flow and nerve damage [25]. 3. Other rare forms of diabetes mellitus are those due to specific genetic defects (type 3) like "maturity onset diabetes of young" (MODY) other endocrine disorders, pancreatectomy and gestational diabetes mellitus (GDM). [24].

Diagnosis of Diabetes Mellitus:

The diagnosis of diabetes in a asymptomatic subject should neverbe made on the basis of a single abnormal blood glucose value. If a diagnosis of diabetes is made, the clinician must feel

confident that the diagnosis is fully established since the consequences for the individual are considerable and lifelong [27]. The diagnosis of diabetes mllitus include, urine sugar, blood sugar, glucose tolerance test, renal threshold of glucose, diminished glucose tolerance, increased glucose tolerance, renal glycosuria, extended glucose tolerance curve, cortisone stressed glucose tolerance test, intravenous glucose tolerance test, oral glucose tolerance test.

Treatment of Diabetes Mellitus:

The treatment is to overcome the precipitating cause and to give high doses of regular insulin. The insulin requirement comes back to normal once the condition has been controlled [65] the aims of management of diabetes mellitus can be achieved by:
1. To restore the disturbed metabolism of the diabetic as nearly to normal as is consistent with comfort and safety.
2. To prevent or delay progression of the short and long term hazards of the disease.

3. To provide the patient with knowledge, motivation and means to undertake this own enlightened care.

Conclusion :

Diabetes mellitus is a serious complication in today life. The lifestyle and day today circumstances are play major role in occurring this type of serious complications. In this review we get some idea regarding diabetes mellitus.

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