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A Short Review on Diabetes Mellitus

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ABSTRACT

One of the most frequent non-communicable diseases in the world is diabetes mellitus. Diabetes management in India faces a number of obstacles, including increased prevalence in both urban and rural regions, a lack of public awareness of the disease, inadequate health-care facilities, high treatment costs, inefficient glycaemic control, and a rising prevalence of diabetic complications. Insulin therapy for diabetes is usually administered through subcutaneous injections four times a day. Patient compliance has been hampered by long-term insulin therapy, which is exacerbated by the intrusive nature of its delivery. This has influenced patient outcomes. Although type 1 diabetes is becoming increasingly common, the main cause of the diabetic epidemic is type 2 diabetes mellitus, which accounts for more than 90% of all diabetes occurrences. Type 2 diabetes is a dangerous and frequent chronic disease caused by a complex interaction of genes and environment, as well as other risk factors like obesity and a sedentary lifestyle.

Keywords: Insulin, glycaemic index, sugar, eating habits, sedentary lifestyle, blood glucose level.

INTRODUCTION

Diabetes is a set of metabolic illnesses marked by hyperglycemia caused by problems with insulin secretion, insulin action, or both**(Jana *et al.*, 2019).**It is a condition that affects carbs, lipids, and proteins. Diabetes mellitus is characterised by a defective or insufficient insulin secretory response, which results in impaired carbohydrate (glucose) utilisation, as well as hyperglycaemias**(Kumar, 1992)**. Diabetes mellitus (DM) is the most prevalent endocrine illness, and it occurs when there is a deficit or lack of insulin, or, less typically, when insulin action (insulin resistance) is impaired **(Ross and Wilson, 2010)**. According to the International Diabetes Federation (IDF), India's total diabetic population is estimated to be around 40.9 million people, with that figure expected to climb to 69.9 million by 2025 **(Bacchetta *et al.*, 2006).**

The pancreas produces both insulin and glucagon hormones. The beta (ß) cells secrete insulin, and the alpha (α) cells secrete glucagon, both of which are found in the Langerhans islets. Insulin inhibits glycogenesis and transports glucose into the muscles, liver, and adipose tissue, lowering blood glucose levels. Alpha cells play an important role in controlling blood glucose

by producing glucagon and increasing blood glucose levels by accelerating glycogenolysis **(Wassmuth and Lernmark, 1989; Wassmuth and Eisenbarth, 2001).**Neural tissue and erythrocytes do not require insulin for glucose utilisation, whereas alpha (α) cells play an important role in controlling blood glucose by producing glucagon and increasing blood glucose levels by accelerating glycogenolysis.

In addition to increased risk of obesity, metabolic and cardiovascular disorders, andmalignancy in future life of fetus after delivery**(Rao and Yajnik, 1996).** Type II diabetes mellitus comprises 80% to90% of all cases of diabetes mellitus. Geographical variation can contribute in the magnitudeof the problems and to overall morbidity and mortality**(Tripathy and Samal, 1997; Betterle *et al.*, 1983)**. Moreover, people with diabeteswho undertake moderate amounts of physical activity are at inappreciably lower risk of deaththan inactive persons**(Gupta *et al.*, 1978)**. It is now well established that a specific genetic constitution isrequired for such an event to cause**(Bearse *et al.*, 2004)**.The growing burden of diabetes and other noncommunicablediseases is one of the major health challenges to economic developmentsbedeviling WHO African Region states **(Zimmet *et al.*, 1994)**.

In diabetes, there is an abnormality in either insulin synthesis or secretion, as shown in Type 1 diabetes mellitus (T1DM) and pancreatic duct stenosis, or the development of insulin resistance or subnormal production, as seen in Type 2 diabetes mellitus (T2DM) and certain secondary diabetes.

CLASSIFICATION OF DIABETES MELLITUS

The World Health Organization (WHO) published the first widely accepted categorization of diabetes mellitus in 1980**(Verge *et al.*, 1996)**, and it was updated in 1985. Primary or idiopathic diabetes mellitus is the most prevalent and important type of diabetes mellitus, and it is the subject of our discussion. It must be distinguished from secondary diabetes mellitus, which is characterised by hyperglycemia caused by specific causes, such as inflammatory pancreatic disorders, surgery, tumours, certain medicines, iron overload (hemochromatosis), and some acquired or genetic endocrinopathies **(Kumar, 1992)**. Diabetes mellitus is divided into clinical phases and aetiological forms, as well as various types of hyperglycemia **(DeFronzo *et al.*, 1997)**.

The circumstances existing at the time of diagnosis play a large role in assigning a type of diabetes to an individual, and many diabetics do not simply fit into a single category **(Lillioja *et al.*, 1993)**. Primary diabetes mellitus is most likely a collection of illnesses with hyperglycemia as a common trait **(Kumar, 1992)**.
The new classification of diabetes mellitus contains stages which reflect the various degrees of hyperglycemia in individual subjects with any of the disease processes which may lead to diabetes mellitus **(Mooy *et al.*, 1995; Harris, 1993)**.

The old and new terms of insulin-dependent (IDDM) or noninsulin- dependent (NIDDM) which were proposed by WHO in1980 and 1985 have disappeared and the terms of new classification system identifies four types of diabetes mellitus: type 1(IDDM), type 2(NIDDM), "other specific types" andgestational diabetes **(WHO Expert Committee 1999)**. These were reflected in the subsequent International Nomenclature of Diseases (IND) in1991and the tenth revision of the International Classification of Diseases (ICD-10) in 1992 **(DeFronzo *et al.*, 1997)**. Hence, classification of diabetes mellitus is described as below:

1. Insulin Dependent Diabetes Mellitus (Type1 IDDM)

This form of diabetes is also known as autoimmune diabetes, and it was previously referred to as juvenile-onset or ketosis prone diabetes. Other autoimmune conditions that the person may seek include Graves' disease, Hashimoto's thyroiditis, and Addison's disease **(Jun and Yoon, 2004)**. Type I diabetes, commonly known as insulin-dependent diabetes mellitus (IDDM), is a type of diabetes that affects primarily children and young adults. Its onset is usually abrupt and can be fatal **(Wassmuth and Lernmark, 1989)**. Anti–glutamic acid decarboxylase, islet cell, or insulin antibodies are commonly present in type 1 diabetes, indicating autoimmune mechanisms that contribute to beta-cell death. Type 1 diabetes (related to b-cell death, which frequently results in total insulin shortage) **(American Diabetes Association, 2014)**. The rate of beta cell breakdown is extremely

variable; it might happen quickly in some people and slowly in others **(Boney et al., 2005)**.

Because the ß-islets cells of the pancreas are destroyed, there is a severe deficit or absence of insulin secretion. Insulin injections are required for treatment**(Wassmuth and Lernmark, 1989)**. When fasting diabetic hyperglycemia is first discovered, markers of immunological damage, such as islet cell auto-antibodies and/or auto antibodies to insulin, and auto antibodies to glutamic acid decarboxylase (GAD), are found in 85-90 percent of people with Type 1 diabetes mellitus **(Alberti and Zimeet, 1998)**. Although there is evidence of an autoimmune process involving auto-antibodies that kill beta islet cells in most persons, the specific origin of diabetes mellitus is uncertain **(Wassmuth and Lernmark, 1989**).

2. Non-Insulin Dependent Diabetes Mellitus(Type2 Niddm)

Adult-onset diabetes is another name for type 2 diabetes mellitus. On the background of insulin resistance, a gradual insulin secretary malfunction **(American Diabetes Association, 2014)(Leonardo, 1987)**. Insulin resistance is very common in people with this kind of diabetes **(Blood *et al.*, 1975)**. Both kinds of diabetes have long-term problems in the blood vessels, kidneys, eyes, and nerves, which are the leading causes of morbidity and death **(Kumar, 1992)**. Obesity, sedentary lifestyle, rising age (affecting middle-aged and older persons), and genetic factor **(Ross and Wilson, 2010)** are all predisposing factors, and such patients are at an elevated risk of developing macro and micro vascular problems **(Tripathi, 2013; Dyck *et al.*, 1993)**.

3. Gestational Diabetes Mellitus

The glucose intolerance occurring for the first time or diagnosed during pregnancy is referred to as gestational diabetes mellitus (GDM) **(Ross and Wilson, 2010)**. Women who develop Type1 diabetes mellitus during pregnancy and women with undiagnosed asymptomatic Type 2 diabetes mellitus that is discovered during pregnancy are classified with Gestational Diabetes Mellitus (GDM) **(Harris, 1993)**. Gestational diabetes mellitus(GDM) (diabetes diagnosed during pregnancy that is not clearly over diabetes)**(Jun and Yoon, 2002)**. The gestational diabetes mellitus may develop during pregnancy and may disappear after delivery; In the longer term, children born to mothers with GDM are at greater risk of obesity and type 2 diabetes in laterlife, a phenomenon attributed to the effects of intrauterine exposure to hyperglycaemia.

DIAGNOSIS OF DIABETES MELLITUS

A single abnormal blood glucose measurement should never be used to diagnose diabetes in an asymptomatic individual. If diabetes is diagnosed, the practitioner must be certain that the diagnosis is correct because the repercussions for the patient are severe and long-term**(Mohan and Padeepa, 2009)**. Urine sugar, blood sugar, glucose tolerance test, renal glucose threshold, diminished glucose tolerance, increased glucose tolerance, renal glycosuria, extended glucose tolerance curve, cortisone stressed glucose tolerance test, intravenous glucose tolerance test, and oral glucose tolerance test are all used to diagnose diabetes mellitus.

DIETARY MANAGEMENT OF DIABETES MELLITUS

Principle of Diet

Low-calorie, low-sugar, high-protein, high-fiber, and moderately fat-rich foods should be provided, as well as a suitable number of vitamins (mostly vitamins C and E) in the diet. Minerals such as zinc should be prescribed in this case**(Tewari, 2019)**.

Adequate caloric value Dietary management should be taken properly by the both diabetic and non-diabetic patient such as:

- Protein, carbohydrate, and fat intake must all be balanced, and carbohydrate intake must be limited in all circumstances.
- Should be as near to normal as feasible.
- Food should be divided into similar-sized portions at regular intervals.
- Reduce total calorie consumption by lowering fat and carbohydrate intake.
- The patient should be advised to maintain his dietary habits on a daily basis.

CONCLUSION

Diabetes mellitus is one of the most common non-communicable diseases in the world. Diabetes management in India is beset by challenges, including rising prevalence in both urban and rural areas, a lack of

public awareness of the disease, insufficient health-care facilities, high treatment costs, ineffective glycemic control, and an increase in diabetic complications. Insulin therapy for diabetes is normally given four times a day by subcutaneous injections. Long-term insulin therapy has impacted patient compliance, which is exacerbated by the intrusive nature of its administration. This has had an impact on patient outcomes. Although type 1 diabetes is growing more widespread, type 2 diabetes mellitus, which accounts for more than 90% of all diabetes cases, is the main cause of the diabetic epidemic. Diabetes type 2 is a serious and common chronic disease caused by a complex interaction of genes and environment, as well as additional risk factors such as obesity.This has had an impact on patient outcomes. Although type 1 diabetes is growing more widespread, type 2 diabetes mellitus, which accounts for more than 90% of all diabetes cases, is the main cause of the diabetic epidemic. Type 2 diabetes is a serious and common chronic disease that results from a complex combination of genes and environment, as well as additional risk factors such as obesity and a sedentary lifestyle. This has had an impact on patient outcomes. Although type 1 diabetes is growing more widespread, type 2 diabetes mellitus, which accounts for more than 90% of all diabetes cases, is the main cause of the diabetic epidemic. Type 2 diabetes is a serious and common chronic disease that results from a complex combination of genes and environment, as well as additional risk factors such as obesity and a sedentary lifestyle.

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