Present situation Type 2 Diabetes Mellitus in India

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Abstract: :

Diabetes Mellitus (DM) is growing public health concern globally, relating significantly to morbidity and mortality. It is arising from malfunctioning or defects in insulin secretion from pancreas, creating chronic, progressive metabolic disorder. The prevalence of diabetes has increased rapidly over the past few decades due to urbanization, sedentary lifestyles, unhealthy dietary patterns, and population ageing. It also highlights common complications associated with diabetes, including cardiovascular disease, neuropathy, nephropathy, and retinopathy. Diabetes Mellitus is the regarded as the most silent killer disease. This short review summarizes the main types of diabetes, key risk factors, pathophysiology, and the current burden of the disease, with particular emphasis on type 2 diabetes mellitus. Type 2 diabetes is characterized by both insulin resistance and inadequate insulin secretion. Owing to the complex and multifactorial nature of type 2 diabetes, effective management often requires combination pharmacotherapy aimed at restoring and maintaining normal glucose homeostasis. This review article focuses on Type 2 Diabetes and present situation in India. This article also suggests growing population of Diabetes by Year 2050. The objective of the article is to educate on Diabetes and its remedies in short.

Key Words: Diabetes Mellitus, Insulin, Pancreatic Diseases, Beta-cells, etc.

Introduction: :

Diabetes Mellitus (DM) is one of the many chronic illnesses that affect the body's metabolism due to the body's enduring high blood sugar levels that stem from the malfunction of either insulin -secretion, action, or both. Insulin is the major hormone that facilitates glucose uptake in human cell. Insulin is the most important hormone that controls blood sugar levels and is secreted from the pancreas. Lack of its secretion or failure of its action leads to high levels of blood sugar along with its metabolism that is required to sustain life [1]. There are severe complications of chronic high blood sugar levels such as Retinopathy, Neuropathy, Cardiovascular illnesses, and Diabetes Mellitus, which are among the most serious complications of high blood sugars, and contribute to high levels of morbidity and mortality [2].

As per International Diabetes Federation (IDF) approximately 589 million adults in the year 2024 of age group from 20 to 79 years are living with diabetes across the globe. This is suggesting that 1 in 9 adults in this age group are living with diabetes. This makes diabetes is one of the fastest growing global diseases and a massive public health challenge in the world [3].

India currently bears one of the largest global burdens of diabetes, driven by rapid urbanization, lifestyle transitions, and demographic changes.

Diabetes Mellitus consists of mainly three types

1) Type 1 Diabetes Mellitus (T1DM)

Type 1 diabetes is the type of diabetes that has an autoimmune attack on the body. This type of diabetes destroys the cells of the pancreas, known as beta cells, leaving the body with no insulin. The immune system attack involves both cell-mediated immunity and the production of antibodies against the antigens present in the beta cells of the pancreas, resulting in the loss of any insulin produced by the body [4].

In the last decade, there have been major changes in the understanding of pathology, epidemiology, disease diversity, and prediction of type 1 diabetes, especially related to pancreatic pathology.

Difficulties of life-long insulin therapy are better managed by patients due to the technological evolution of insulin pumps and glucose monitors. There are still some agents that hold the most promise in preventing some of the most disabling complications of the disorder. Nonetheless, despite the considerable organizational, financial, and intellectual investments, the disease still cannot be prevented and there is a lack of consistency in the standard of diabetes care around the world, including Type 1 diabetes. The ongoing epidemiology, pathology, diagnosis and therapy of Type 1 diabetes provide valuable information to help improve the lives of diabetes sufferers [5] [6].

2. Type 2 Diabetes Mellitus (T2DM)

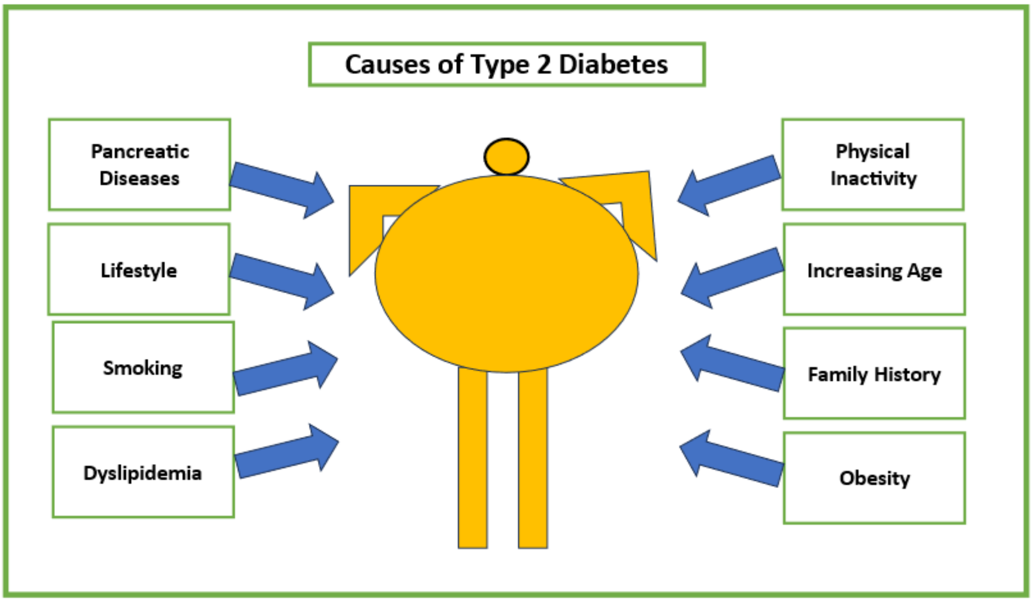
T2DM represents an unregulated dysfunction impacting insulin and its secretion alongside insulin resistance. It consists of the majority of the global diabetes population and has associations with obesity, physical inactivity, and family history of diabetes. T2DM treatments attempt to combine an overall change in lifestyle to one that is healthier and the addition of medications to reduce one's risk of hyperglycaemia and its associated comorbidities [7].

Type 2 diabetes is a problem for people's health all around the world. It is closely linked to the fact that many people are overweight. People who have Type 2 diabetes are at a risk of getting sick in many ways. They can get problems with the blood vessels in their bodies like problems with their eyes, kidneys and nerves. They can also get problems, with the blood vessels, like heart disease. This happens because their blood sugar levels are too high and because their bodies do not use insulin properly. Type 2 diabetes is closely linked to something called the insulin resistance syndrome, which's a group of health problems that often happen together. Things in our environment like being overweight eating badly and not exercising and tackling the problems that affect how our bodies to handle sugar in type 2 diabetes. Not being able to use insulin and not making enough insulin are the main issues with type 2 diabetes. Because type 2 diabetes is so complicated we need to use different medicines together to help our bodies handle sugar normally. Type 2 diabetes is a problem and these medicines can help people, with type 2 diabetes. The treatment must not only be effective and safe but also improve the quality of life. Several novel medications are in development, but the greatest need is for agents that enhance insulin sensitivity, halt the progressive pancreatic β-cell failure that is characteristic of T2DM and prevent or reverse the microvascular complications [8][9].

3. Gestational Diabetes Mellitus (GDM)

GDM is a form of diabetes that is only found in the mother's pregnancy. It is a risk when the mother has a lower production of insulin along with increased insulin resistance from the mother's body. GDM is a risk to the mother and baby, and is known to give an increased a-risk-of developing T2DM for the mother in the future [10][11].

Causes of Type 2 Diabetes Mellitus.



1. Pancreatic Diseases- High Serum Uric Acid count in a person consequently leads to dead Beta-cells, which develops type 2 diabetes [12].

2. Lifestyle – Life style of some working Professionals often leads to sleep disorder. The Obstructive sleep apnea eventually leads to Type 2 diabetes [13].

3. Smoking – In cases of some individuals who are smoking, increase level of nicotine reduces glucose intake in the body muscle, developing type 2 diabetes [14].

4. Abnormal level of Lipids (Dyslipidemia)- High level of Low- Density Lipoproteins (LDL) than High Density Lipoproteins (HDL) lead to beta-cell dysfunction and type 2 diabetes [15].

5. Increasing Age- Some Individuals develop Type 2 Diabetes as aging increases insulin resistance. Aging increases the lipid metabolism disorder; these may cause Type 2 diabetes [16].

6. Physical Inactivity- Physical inactivity means a person not doing physical exercise 30-60 minutes for three to four times a week. Physical inactivity causes insulin resistance and slow loss of beta-cells. These invites type 2 diabetes in some individuals [17].

7.Genetics or Family History – Hereditary factors or Genetical make up play a role in Type 2 diabetes [18].

8. Obesity- Obesity or excessive weight gain is recognized as the most important and significant risk factor in the development and progression of type 2 diabetes mellitus (DM) in all age groups. It has reached pandemic proportions, and thus the treatment of obesity has become important in the prevention and management of type 2 DM [19] [20].

Clinical Manifestations of T2DM

Clinical Diabetes Mellitus symptoms include increased thirst, increased frequency of urination, weight loss, cloudy vision, tiredness, and slow healing of injuries. These symptoms can be attributed to the underlying hyperglycaemia and how it can impact a number of body systems [21]. Diabetes mellitus types and presentations can be quite varied and unique to India due to genetic predispositions, childhood undernutrition, and life style changes happening at a rapid pace. Type 2 diabetes mellitus is common in Indians and occurs at a younger age and with a lower body mass index with a predominance for central obesity,' also known as the "Thin-Fat Indian phenotype" [22]. Symptoms like polyuria, polydipsia, fatigue, and loss of weight are common for classic diabetic patients to report to physicians and have sought earlier medical help for their complaints. Moreover, a considerable proportion of diabetic patients remain asymptomatic and therefore remain frequently underdiagnosed thereby frequently presenting with microvascular complications such as diabetic retinopathy, nephropathy, and neuropathy at or shortly following initial clinical diagnoses [23] [24]. "Premature coronary artery disease" is a common and notable example of a macrovascular complication, a condition that occurs at a relatively younger age than what can be visualized in a Western population [25].

Difficulties in T2DM

Microvascular complications including diabetes, are retinopathy, nephropathy, and neuropathy. Macrovascular problems are coronary artery disease and strokes. All are resulted from chronic hyperglycaemia and insulin resistance. Having the best possible control of glycaemia can help mitigate, even remove those complications [26]. Wound healing in Diabetes is poor, which further increases complications [27].

Approaches

1) Adequate control of diabetes mellitus requires multifactored organization, where different factors - lifestyle, and medication, combined with continual monitoring of glucose levels are included. Lifestyles include, diet, and continual exercise. These both are the focus of insulin sensitivity and control of glucose. The medication and types of control are determined by the type of the disease and reasons particular to the patient [28] [29].

Practical Guidance

As highlighted in the DiRECT (Diabetes Remission Clinical Trial) trial, it is important that diabetes remission programs are offered with structured medical supervision, starting with gradual withdrawal of glucose-lowering therapies and regular observation of blood glucose levels to avoid hypoglycaemia. Eating fewer meals helps the body burn fat and become more sensitive to insulin. This keeps blood sugar stable without medicines or low sugar attacks, with results similar to well-known studies like DiRECT (Diabetes Remission Clinical Trial), and improves overall quality of life at low cost. This approach would work well for people with early-onset type 2 diabetes, involving very low-energy dieting followed by gradual food introduction and weight maintenance, which would most likely take place in primary care settings. Follow-up visits will also play an important role in monitoring weight and glycaemic control and preventing relapse [30].

2) Another approach to control Type 2 diabetes is a specific surgery. The metabolic surgery like Roux-en-Y gastric bypass RYGB is promising upcoming approach to treat diabetes mellitus in type 2 especially in individuals with obesity [31].

RYGB has demonstrated significant and sustained improvements in glycaemic control that extend beyond the effects of weight loss alone. Multiple clinical trials and observational studies have reported high rates of diabetes remission or marked reduction in antidiabetic medication requirements following RYGB when compared with conventional medical therapy [32].

India has its own set of challenges in controlling as well as managing the cases of diabetes mellitus. This is because of several reasons prevalent in the socio-economic and health conditions of the country. One of the key reasons for poor control of diabetes mellitus cases in India is that a considerable number of patients are left undocumented due to a lack of awareness and poor screening, especially in the rural parts of the country [33]. Inaccessible health care of a disparate nature is another major challenge in controlling diabetes mellitus cases, as a considerable gap exists in relation to the accessibility of health care in urban and rural areas as well as within the public and private health institutions of the country in a broader manner [34]. The major financial burden created due to an unprecedented increase in expenditure in relation to diabetes mellitus treatment for a considerable length of time further creates major difficulties in controlling the cases of diabetes mellitus in India.

In India, there are experts like Dr. Jagannath Dixit, who has devoted significantly in education of upgrading lifestyle of Type 2 diabetes patients. He has chartered a plan for Type 2 diabetes patients. This plan is called as Dixit Lifestyle.

The Dixit lifestyle, pioneered by Dr. Jagannath V. Dixit, restricts intake to two daily meals paired with exercise, aiming to reverse type 2 diabetes by curbing insulin surges, shedding weight, and boosting sensitivity [35].

Meals begin with 6-8 dry fruits like almonds and walnuts, followed by salad, proteins from sprouts or eggs, and sugar-free home-cooked dishes. Beverages remain limited to water, unsweetened tea, or coffee to sustain satiety. Daily 45-minute brisk walks (4.5 km) meet aerobic guidelines.

In a 2022 case series of five obese type 2 diabetics, medication cessation occurred in 8-30 days, with HbA1c falling from 6.6-12.9% to 5.7-6.7% over three months. Participants lost 8-18% body weight and saw 12-14% waist reductions, alongside sharp drops in fasting insulin. A 2025 study echoed these HbA1c improvements and insulin gains [36].

Epidemiological Burden of Diabetes Mellitus on Indian Population.

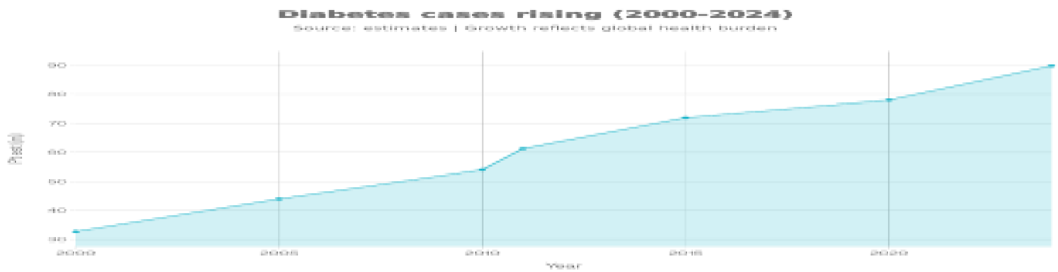
India is currently experiencing a rapidly escalating diabetes epidemic, posing a major public health challenge. Type 2 diabetes mellitus (T2DM) constitutes the vast majority of cases and is closely linked to rapid urbanization, lifestyle transitions, physical inactivity, and dietary changes. Recent epidemiological evidence indicates that India now has the second-highest number of adults with diabetes globally, following China, with projections suggesting a substantial further rise by the year 2050 [37].

Prevalence and Temporal Trends

Current estimates indicate that **over 100 million adults in India are living with diabetes**, reflecting an alarmingly high national prevalence [23]. The burden of the disease has increased sharply over the past decade, with the number of diagnosed cases rising from approximately **63 million in 2012 to more than 89 million in recent years**, demonstrating an accelerating trend [38]. This rapid increase highlights the impact of demographic aging, urban lifestyles, and metabolic risk factors on population health.

International Diabetes Federation and Diabetes Atlas and national estimates are Tabulated.

Year	Estimated Diabetes Patients (Millions)
2000	32.7
2005	44.0
2010	54.0
2011	61.3
2015	72.0
2020	78.0
2024	89.8



Projections based on national and international datasets predict a continued rise in diabetes prevalence by **2050**, underscoring the urgent need for effective preventive strategies and health system preparedness.

Undiagnosed Diabetes

A particularly concerning aspect of the diabetes epidemic in India is the high proportion of undiagnosed cases. Large population-based studies suggest that nearly 57% of adults with diabetes remain undiagnosed, especially in rural and socioeconomically disadvantaged populations. Undiagnosed diabetes significantly increases the risk of late presentation with complications, thereby imposing a greater burden on healthcare resources [39].

Diabetes in Younger Populations

Traditionally considered a disease of middle-aged and older adults, diabetes is now increasingly observed among younger individuals in India. Studies conducted in major urban centres such as Chennai and Delhi report a high prevalence of diabetes and prediabetes among young adults, attributed to sedentary lifestyles, obesity, and early-life metabolic risk factors. The early onset of diabetes has serious implications, as it prolongs disease duration and increases the lifetime risk of complications [40].

Public Health Implications

The growing diabetes burden in India, characterized by high prevalence, rapid increase, substantial underdiagnosis, and early age of onset, necessitates an urgent and comprehensive public health response. Diabetes is also termed as one of the most silent killer diseases [41].

Preventive strategies focusing on lifestyle modification, early screening, public awareness, and equitable access to care are critical to curb the progression of the epidemic. Additionally, significant regional variations in prevalence highlight the need for context-specific interventions and resource allocation [42].

Conclusions :

Diabetes is a major threat to human across the globe. Diabetes affects lifestyle of humans and contributes to high levels of morbidity and mortality. India is facing growing diabetes burden due to its rapid increase. Managing and controlling Type 2 diabetes can be observed through Dr. Dixit's Lifestyle. his review would like to emphasize that the country is going through a crucial phase with respect to the rising incidence, prevalence, onset, as well as undiagnosed cases of diabetes mellitus within the nation.

Although there have been improvements in diagnosing and managing this condition, there is a huge gap in early diagnosis, managing blood sugar levels, and controlling it over a longer period. In addition, geographical imbalances in accessing health care, as well as financial problems, have resulted in inhibiting factors because of poor prevention and control. Moreover, arising cases of complications arising due to diabetes have become a threat to health care.

The current reality highlights and emphasize the importance of having a comprehensive and multisectoral response to address prevention and screening, patient education, and building capabilities within primary healthcare. Policy-based intervention in lifestyle modification, addressing inequities, and building effective surveillance infrastructure is paramount in controlling the escalating epidemic of diabetes in the Indian context. Thus, it is important to conclude by stating that tackling diabetes mellitus in India and its effective management requires long-term dedication and commitment to move from evidence to effective public health response.

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