



The State of Diabetes: Understanding India's Epidemic

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Abstract

Globally, the prevalence of diabetes is increasing as a result of ageing populations, urbanisation, obesity rates, and decreased physical activity. Diabetes affects young to middle-aged adults disproportionately in Asian countries, in contrast to the West where the disease primarily affects older people. This could have detrimental long-term implications on the economy and health of a country, particularly for emerging nations. According to projections from the International Diabetes Federation (IDF), there were around 50.8 million diabetics in India in 2010; by 2030, that number is expected to rise to 87.0 million. Reaching a near-normal glycaemic level is the main objective in the treatment of diabetes mellitus. In India, vascular problems and inadequate glycaemic management affect almost half of the patients. Consequently, the development of innovative treatment drugs for diabetes that do not compromise safety or cause complications to worsen is desperately needed. Despite extensive research on diabetes, a cure remains elusive for patients. As a result, this overview discusses current developments in diabetes research, treatment, and therapy.

Keywords: Diabetes; Insulin Pill; Diabetes Mellitus; Glycemic

Abbreviations: DCCT: Diabetes Control and Complications Trial; ADA: American Diabetes Association; UKPDS: United Kingdom Prospective Diabetes Study; OAD: Oral Antidiabetic Medication; IDF: International Diabetes Federation.

Introduction

Diabetes in India

Diabetes is a growing health concern in India, with an increasing number of individuals being diagnosed with the disease. According to a survey conducted by the Ministry of Health in India, the prevalence of diabetes has been

steadily rising over the years [1]. In 2000, there were an estimated 972 million people with hypertension globally, and a significant percentage of them resided in developing countries like India. The effects of diabetes if not properly managed can be devastating, leading to complications such as stroke, heart disease, kidney failure, and reduced quality of life. Furthermore, the impact of diabetes extends beyond physical health [2]. It also affects the mental and social well-being of individuals, leading to stress and anxiety. Stress management plays a crucial role in the overall management of diabetes.

Implementing a multidisciplinary approach that includes physical activity, healthy diet, and stress management is



essential for effective glycemic control in diabetics in India. This can help improve their quality of life and reduce the burden of the disease on individuals and the healthcare system [3]. It is important to prioritize stress management strategies, such as mindfulness-based stress reduction therapy, for diabetics in India [4]. This approach has shown promising results in improving the health and well-being of individuals with diabetes by helping them adapt to daily treatment needs and manage psychosocial issues associated with the disease. The increasing prevalence of diabetes in India calls for the implementation of effective stress management strategies, such as mindfulness-based stress reduction therapy, to improve the well-being and glycemic control in diabetics. The growing prevalence of diabetes in India necessitates the adoption of effective stress management strategies, such as mindfulness-based stress reduction therapy, to enhance the well-being and glycemic control of individuals living with diabetes in the country.

Worldwide Report of Increase in Diabetes

Diabetes is considered a worldwide pandemic, affecting millions of individuals throughout the world. This is a significant public health issue, with social and economic implications. Diabetes expression patterns have shifted, and emerging risk variables may be contributing to the condition. The rise in the prevalence of diabetes worldwide can be attributed to various factors such as urbanisation, ageing populations, obesity rates, and physical inactivity. The fast epidemiological shift linked to dietary modifications and a decline in physical activity is one of the main causes of the epidemic. Pollution is now considered an emerging risk factor for diabetes. Pollution has been linked to around 3.2 million new cases of diabetes, accounting for 14% of all new cases worldwide.

In Asian nations, the prevalence of diabetes is disproportionately high among young to middle-aged adults, in contrast to the West where the disease primarily affects elderly populations. This could have detrimental long-term implications on the economy and health of a country, particularly for emerging nations. It is anticipated that in 2010, healthcare costs related to diabetes will make up 11.6% of global healthcare spending. In 2010, it is anticipated that the cost of treating, preventing, and treating diabetes and its consequences would exceed at least 376 billion USD worldwide. This amount is expected to surpass USD490 billion by 2030 [5].

a) High Prevalence: India is home to over 77 million people living with diabetes, and this number is expected to rise in the coming years. Both urban and rural areas are affected, although urban populations tend to have a

higher prevalence due to lifestyle factors.

- b) Type 2 Diabetes Dominance:** Type 2 diabetes accounts for the vast majority of diabetes cases in India, estimated to be around 90-95%. This type is strongly associated with lifestyle factors such as obesity, physical inactivity, and unhealthy diets, all of which have become increasingly common in Indian society [6].
- c) Early Onset and Rapid Progression:** Diabetes in India often manifests at a younger age compared to Western countries. Additionally, once diagnosed, the disease tends to progress more rapidly, leading to complications at a relatively younger age [7].
- d) Genetic Predisposition:** Indians have a genetic predisposition to developing diabetes, with studies suggesting that genetic factors play a significant role in the increased susceptibility observed in Indian populations. Genetic factors combined with environmental influences contribute to the high prevalence and severity of diabetes in the country.
- e) Rising Obesity Rates:** Obesity, particularly abdominal obesity, is a significant risk factor for diabetes in India. The shift towards sedentary lifestyles, increased consumption of calorie-dense foods, and reduced physical activity levels have contributed to rising obesity rates, further fuelling the diabetes epidemic [8].
- f) Challenges in Healthcare Infrastructure:** India's healthcare system faces numerous challenges in effectively managing diabetes. Access to healthcare facilities, especially in rural areas, may be limited, leading to undiagnosed or poorly managed cases. Additionally, there may be disparities in access to medications, diagnostics, and specialized care.
- g) Cultural and Dietary Factors:** Traditional Indian diets, rich in carbohydrates and fats, coupled with changing dietary habits, contribute to the diabetes epidemic. Urbanization has led to a shift towards processed and fast foods, which are high in sugar and unhealthy fats. Cultural practices such as sedentary lifestyles, heavy reliance on fried snacks, and consumption of sugary beverages further exacerbate the risk of diabetes [9].
- h) Complications and Economic Burden:** Diabetes imposes a significant economic burden on individuals, families, and the healthcare system in India. Complications such as cardiovascular disease, kidney failure, blindness, and lower limb amputations are not only debilitating but also costly to manage. The economic impact extends beyond healthcare costs to include lost productivity and reduced quality of life [10].

Current Diabetes Medications

Scientists from life science, pharma firms, and healthcare professionals worldwide are developing therapy regimens to prevent or postpone the onset of diabetes complications.

Treatment goals seek to reduce insulin resistance while maintaining insulin secretion.

In reality, no specific treatment strategies are developed. Despite this, the field of diabetic research produces FDA-approved pharmaceuticals for treating diabetes, including oral hypoglycemic agents [6].

Glycemic Control Based on New Research

The Diabetes Control and Complications Trial (DCCT) found that intensive insulin therapy improved metabolic control and lowered the risk of retinopathy, nephropathy, and neuropathy in type 1 diabetes.

The United Kingdom Prospective Diabetes Study (UKPDS) found that strict glycemic management in type 2 diabetes considerably reduces the risk of developing and deteriorating microvascular problems. The basic objective of managing diabetes is to achieve near-normal glycemia. The American Diabetes Association (ADA) recommends a glycemic management target of glycated haemoglobin A1c (HbA1c) < 7.0% [11].

Usage of Oral Antidiabetic Drug (OAD)

An oral antidiabetic medication (OAD) is the first-line therapy for type 2 diabetes. However, the progressive nature of type 2 diabetes frequently necessitates the use of two or more oral medicines in the long run, sometimes as a precursor to insulin therapy. OADs' optimum usage is frequently limited by safety and tolerability (particularly hypoglycemia) as well as weight gain. Insulin therapy is the cornerstone of diabetes care. It is the sole method of obtaining adequate glycemic control in insulin-deficient people with type 1 diabetes. Insulin is also administered intermittently or permanently in certain people with type 2 diabetes. Both OADs and insulin therapy raised the risk of hypoglycemia. The intensive group receiving a sulphonylurea (SU) (chlorpropamide, glibenclamide, or glipizide) or insulin gained significantly more weight than the conventional diet group. Patients receiving insulin gained more weight than those taking chlorpropamide or glibenclamide.

In India, studies show that over 50% of diabetics have poor glycemic control (HbA1c > 8%), uncontrolled hypertension, dyslipidemia, and a high risk of vascular consequences. Diabetes care in India is often inadequate. To improve diabetes care, health professionals must raise awareness and develop new therapeutic agents that can control the condition and prevent complications while remaining safe.

Type 2 diabetes is a complicated, multifaceted condition. It leads to decreased β -cell activity and insulin resistance over time. The United Kingdom Prospective Diabetes Study (UKPDS) and The Diabetes Control and Complications Trial (DCCT) data indicate that managing diabetes well can greatly reduce the risk of vascular problems. According to the UKPDS, 53% of type 2 individuals require insulin within 6 years of diagnosis, and 75% require multiple therapies after 9 years. Long-term usage of insulin can increase fat accumulation, particularly in the abdomen, potentially worsening insulin resistance. Recurrent hypoglycemia can lead to significant complications.

Insulin Pills Instead of Injectable Insulin

The oral administration of pharmaceuticals has several advantages, including simplicity of administration, high patient compliance, and low industrial costs. However, due to various gastrointestinal obstacles to medication absorption, oral administration is an uncomfortable method of protein drug delivery. Insulin is a medicine used to control type 1 diabetes. The present method of administration involves a subcutaneous injection; however, patients may not adhere owing to discomfort and needle anxiety.

Developing an oral insulin product can improve the quality of life for diabetics worldwide [12].

Harvard researchers used a unique way to disperse insulin in a liquid containing choline and geranic acid, which is found in cardamom. After taking the insulin tablet, rats' blood glucose levels dropped to half of their original level before returning to normal four hours later. According to Banerjee, et al. [12] the choline/geranic acid beverage prevented insulin digestion and improved its transit into circulation, resulting in a significant drop in blood sugar levels. Insulin administered orally mimics a natural reaction, reaching the liver and regulating insulin secretion in the circulation. Type 1 diabetes is characterized by T cell-mediated autoimmune destruction to insulin-producing β -cells, resulting in insulin insufficiency [13,14]

Exogenous insulin is the first-line therapeutic option for type 1 diabetes. Although insulin has advantages in diabetes care, it lacks the ability to alter blood glucose levels to normal ranges, which can lead to problems. Transplanting human cadaveric islets to replace damaged β -cells in type 1 diabetics is a current treatment option [15]. provide an excellent summary of the issue. Islet transplants provide long-term euglycemia and effectively address insulin insufficiency, improving persons' quality of life. Obstacles to cadaveric pancreatic islet transplantation include donor

scarcity, low yield, and the need for immunosuppressive therapy to prevent rejection [16].

Prevention of Diabetes in India and Cost of Treating Diabetes in India

Prevention: Diabetes is a medical concern that is not adequately addressed by India's financial allocations. Preventive actions are necessary to decrease the load. The condition is caused by a combination of hereditary and environmental factors. While genetics cannot be changed, many environmental variables may be modified. Modifiable risk variables include obesity, nutrition, and physical activity levels. Diet and exercise interact to affect body fat patterns, which impact insulin sensitivity. Traditional diets with less saturated fat and complex carbohydrates, as well as increased physical exercise, may reduce the incidence of cardiovascular disease and diabetes, even if there is a hereditary predisposition. Pollution is increasing and is also of the major reason for increment in diabetes in India, we need to opt green technologies to avoid pollution [17-23].

Cost: Diabetes care and control incur significant expenditures for both individuals and the healthcare system. Caring for diabetes comes as a direct cost to people, families, and healthcare authorities.

Indirect and intangible expenses are higher. Indirect expenses include lost productivity due to frequent absences, incapacity, premature retirement, and even death due to complications. Intangible expenses include pain, anxiety, and stress, which negatively impact one's life quality.

A research found that patients in metropolitan regions spent an average of INR 10,000 (US\$227) per year for diabetes treatment, whereas those in rural areas spent INR 6260 (US\$142). From 1998 to 2005, the urban population's total expenditure increased by 113%. Without subsidies, low-income groups paid more on diabetes care (34% for urban poor and 27% for rural poor). 85 Diabetics face much greater medical expenditures compared to non-diabetics. The average annual expense per patient is INR 4500 (about US\$120). Diabetes care is predicted to cost over 180 000 million rupees annually [24].

Conclusion

Diabetes is a prominent noncommunicable illness. There is no permanent treatment for the multifactorial illness. Diabetes treatment options include diet, medications, islet cell transplantation, and stem cell therapy. Dietary management reduced pancreatic triglyceride levels and insulin release. Controlling diabetes and its complications benefits both individuals and the economy by reducing the need for costly research, care, and therapy. Diabetologists are

increasingly concerned about the rising number of people experiencing diabetic complications. Early intervention and treatment for diabetes individuals are urgently needed. This study examines contemporary trends in diabetes, including categorization, diagnosis, and therapy choices.

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