

A Study on the Health Care of Diabetes Patients in India

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Abstract

Diabetes is a rapidly growing health challenge and potential epidemic across the low-and-middle-income countries like India. It is projected that by 2025 the number of cases with diabetes in India would be 69.9 million with a vast majority still undiagnosed. This is primarily driven by dietary transitions and insufficient or lack of physical activity altering the physiological milieu leading to overweight or obesity and diabetes. Care for chronic diseases like diabetes poses challenges characterized by the need for sustained compliance to treatment, prevention or management of associated complications. This requires the continuous engagement of health systems in the continuum of care at all stages. Diabetes care requires coordination across all tiers of health care systems. Most importantly co-driven by the patient's knowledge, attitudes and perceptions toward awareness, treatment and adherence to the recommendations. The Noncommunicable Disease (NCD) Monitoring Framework targets (10) and indicators (21) set by the Ministry of Health and Family Welfare, Government of India adapted from the Global NCD framework (World Health Organization), calls for a need to halt the rise in diabetes and prevent premature deaths from NCDs by 25% by 2025. Such targets can be met only with effective strategies at multisectoral levels. However, an important limitation and quandary for policymakers are that majority of the population might be unaware of their diabetes status and are not adherent to advice. Robust empirical data on diabetes prevalence, awareness, treatment, control and adherence is needed to comprehend the impact of initiatives taken to halt the growing burden of diabetes, response of health systems and health-seeking behaviors amongst the population. Understanding where diabetics are lost in the care cascade is essential for targeted health interventions. Also, to monitor progress in health system performance for diabetes management over time.

Keywords: Rapidly Growing, Monitor, Diabetes Prevalence, Adherence

Introduction

India is a fast developing economy with a considerable number of diabetes patients. Its health care cost is rising with a deterioration in health standards among the economic productive young population. It is the country with the second highest numbers after China with 65.1 million diabetes cases that estimated in 2013. This is expected to increase up to 109.0 million in 2035. The highest prevalence of diabetes was noted in low-income countries (LIC) and lowest in high-income countries (HIC). The diabetes primarily affects individuals over 50 years of age in HIC, whereas in middle-income countries (MIC), the prevalence is higher in young individuals, which is the most productive age group. The prevalence in older age again rises as these young individuals age with increased life expectancies.

Diabetes has become a global pandemic and threat for world health due to demographic variations and cultural differences of societies supplemented by aging phenomena. It is a costly disease that has been identified as the prime causative factor for blindness, lipoprotein abnormalities, or mitochondrial dysfunction causing cardiovascular diseases, renal failure, and amputation in several countries. The World Health Organization (WHO) has reported 24 million cases of diabetic neuropathy, 5 million cases of retinopathy, and 6 million cases of amputation due to diabetes. The mortality in individuals with diabetes is chiefly due to cardiac complications. Therefore, diabetes can cause undesirable consequences and, hence, needs urgent consideration in the young population in order to timely strategize effective prevention therapies.

Genetic and environmental factors, such as heredity, change in lifestyle, age, smoking habits, increased alcohol consumption, screen time, parental conflicts, improper sleep, education, and stress, predispose young adults to diabetes, which is exacerbated with diabetic comorbid conditions. Obesity is the main risk factor that accounts for 80%–85% of the risks of developing type-2 diabetes.

The lack of physical activity among the younger population is a matter of concern as 84% of girls and 78% of males in Australia did not meet the criteria for minimum physical activity corresponding to their age. As a consequence, females were found to be more overweight than males. The risk of diabetes in young adults can be managed by routine physical activity and adopting a healthy and balanced diet, which focuses on the increased intake of dietary fiber. The WHO strongly recommends reducing the intake of free sugars throughout one's lifetime by avoiding foods or beverages containing added monosaccharides and disaccharides. A study was conducted in an urban slum in a large metropolitan city in northern India, which noted a high prevalence of metabolic disorders, such as obesity, dyslipidemia, and diabetes mellitus in middle age, particularly in females in such an economically deprived population. Hence, such prevalence

studies are required even at a national level to examine the important risk factors in this economic productive young population in order to have effective prevention strategies.

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin. In the past 3 decades the prevalence of type 2 diabetes has risen dramatically in countries of all income levels. Type 1 diabetes, once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin by itself. For people living with diabetes, access to affordable treatment, including insulin, is critical to their survival. There is a globally agreed target to halt the rise in diabetes and obesity by 2025.

About 422 million people worldwide have diabetes, the majority living in low-and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades.

Objectives

- To study how to prevent or delay the appearance of diabetes.
- To study the symptoms and causes of diabetes in India.

Review of Literature

- **Harris and Zimmet (1997)** The subclass of diabetes, type I diabetes, is generally characterized by the abrupt onset of severe symptoms, dependence on exogenous insulin to sustain life and proneness to ketosis even in the basal state, all of which is caused by absolute insulin deficiency. IDDM is the most prevalent type of diabetes among children and young adults in developing countries, and was formally termed juvenile diabetes. It is a catabolic disorder in which circulating insulin is virtually absent, plasma glucagon is elevated, and the pancreatic B cells fail to respond to all insulinogenic stimuli.
- **Nolte and Karam (2001)** Type I diabetes is thought to result from an infectious or toxic environmental contingency in people whose immune systems are genetically predisposed to develop a vigorous autoimmune response against pancreatic B cell antigens. Extrinsic factors that might affect B cell functioning include damage caused by viruses such as the mumps virus and coxsackie virus B4, by chemical agents, or by destructive cytotoxins and antibodies released from sensitized immunocytes. An underlying genetic defect relating to pancreatic B cell replication or function may

predispose a person to the development of B cell failure after viral infections. In addition, specific HLA genes may increase susceptibility to a diabetogenic virus or may be linked to certain immune response genes that predispose patients to a destructive autoimmune response against their own islet cells (autoaggression). Observations that pancreatic B cell damage appears to be lessened when immunosuppressive drugs such as cyclosporine or azathioprine are given at the initial manifestation of type I diabetes support the importance of auto-aggression by the immune system as a major factor in the pathogenesis of this type of diabetes.

- **Gerich (2001)** The pathogenesis in type II diabetes is that the pancreas produces insulin but the body does not utilize the insulin correctly. This is primarily due to peripheral tissue insulin resistance where insulin-receptors or other intermediates in the insulin signaling pathways within body cells are insensitive to insulin and consequently glucose does not readily enter the tissue leading to hyperglycaemia or elevated blood glucose concentrations. Obesity, which generally results in impaired insulin action, is a common risk factor for this type of diabetes, and most patients with type II diabetes are obese and will ultimately require multiple anti-diabetic agents to maintain adequate glycaemic control.

General Principles of Diabetes Treatment

Diet and exercise are fundamental in the treatment of diabetes. Dietary recommendations must be customized for each individual to achieve the general objectives of treatment. It should be remembered that obesity is common in type 2 diabetics so one of the main objectives should be weight reduction. The calorie content of the diet should be adjusted in each individual in accordance with the body mass index and regular physical activity. As far as the nutrient proportions of the diet, it is recommended that proteins should constitute 10%-20% of calorie intake and fats less than 30%, with less than 10% saturated fats. With regard to carbohydrates, emphasis should be placed on total intake rather than on their origin, although rapidly absorbed carbohydrates should be avoided. Physical exercise, aside from constituting a mainstay of the treatment of diabetic patients, helps to prevent the development of diabetes in adult life.¹⁰⁻¹⁴ In patients with type 2 diabetes, moderate regular exercise (30 min/day) is very beneficial, since it reduces glycemia by increasing sensitivity to insulin, improves the lipid profile, lowers blood pressure, contributes to weight loss, and improves cardiovascular state (decreased heart rate at rest, increased systolic volume, and decreased cardiac work). In addition, it gives the patient a sense of well being and better quality of life. The main disadvantage of exercise in diabetic patients is hypoglycemia, which can occur several hours later and should condition adjustments in the therapeutic regimen. In addition, in patients with type 1 diabetes and poor metabolic control, especially after

anaerobic exercise, hyperglycemic decompensation or even ketosis can take place. Aside from disturbing glucose metabolism, physical exercise can entail other risks. Therefore, the patient's exercise program must be planned individually taking into consideration physical capacity and potential risks. The diabetological education that the patient receives from qualified healthcare personnel is essential in achieving therapeutic objectives. For example, self-testing of capillary blood glucose informs the patient about the time of day when glycemic control is worse and helps to identify undetected hypoglycemia. Therefore, self-tests are fundamental for making opportune modifications in therapy. In addition, the patient who knows how to modify treatment based on capillary blood glucose measurements and has received advice on how to handle various situations, such as hypoglycemia or hyperglycemic-ketotic decompensation, will require fewer hospital admissions and have a better quality of life.

Symptoms of Diabetes

- Increased thirst (polydipsia) and dry mouth
- Frequent urination
- Fatigue
- Blurred vision
- Unexplained weight loss
- Numbness or tingling in your hands or feet
- Slow-healing sores or cuts
- Frequent skin and/or vaginal yeast infections

Additional details about symptoms per type of diabetes include:

Type 1 diabetes: Symptoms of T1D can develop quickly — over a few weeks or months. You may develop additional symptoms that are signs of a severe complication called diabetes-related ketoacidosis (DKA). DKA is life-threatening and requires immediate medical treatment. DKA symptoms include vomiting, stomach pains, fruity-smelling breath and labored breathing.

Type 2 diabetes and prediabetes: You may not have any symptoms at all, or you may not notice them since they develop slowly. Routine bloodwork may show a high blood sugar level before you recognize symptoms. Another possible sign of prediabetes is darkened skin on certain parts of your body (acanthosis nigricans).

Gestational diabetes: You typically won't notice symptoms of gestational diabetes. Your healthcare provider will test you for gestational diabetes between 24 and 28 weeks of pregnancy.

Causes of Diabetes

Too much glucose circulating in your bloodstream causes diabetes, regardless of the type. However, the reason why your blood glucose levels are high differs depending on the type of diabetes.

Insulin resistance: Type 2 diabetes mainly results from insulin resistance. Insulin resistance happens when cells in your muscles, fat and liver don't respond as they should to insulin. Several factors and conditions contribute to varying degrees of insulin resistance, including obesity, lack of physical activity, diet, hormonal imbalances, genetics and certain medications.

Autoimmune disease: Type 1 diabetes and LADA happen when your immune system attacks the insulin-producing cells in your pancreas.

Hormonal imbalances: During pregnancy, the placenta releases hormones that cause insulin resistance. You may develop gestational diabetes if your pancreas can't produce enough insulin to overcome the insulin resistance. Other hormone-related conditions like acromegaly and Cushing syndrome can also cause Type 2 diabetes.

Pancreatic damage: Physical damage to your pancreas — from a condition, surgery or injury — can impact its ability to make insulin, resulting in Type 3c diabetes.

Genetic mutations: Certain genetic mutations can cause MODY and neonatal diabetes.

Long-term use of certain medications can also lead to Type 2 diabetes, including HIV/AIDS medications and corticosteroids.

Complications of Diabetes

Diabetes can lead to acute (sudden and severe) and long-term complications — mainly due to extreme or prolonged high blood sugar levels.

Acute diabetes complications

Acute diabetes complications that can be life-threatening include:

Hyperosmolar hyperglycemic state (HHS): This complication mainly affects people with Type 2 diabetes. It happens when your blood sugar levels are very high (over 600 milligrams per deciliter or mg/dL) for a long period, leading to severe dehydration and confusion. It requires immediate medical treatment.

Diabetes-related ketoacidosis (DKA): This complication mainly affects people with Type 1 diabetes or undiagnosed T1D. It happens when your body doesn't have enough insulin. If your body doesn't have insulin, it can't use glucose for energy, so it breaks down fat instead. This process eventually releases substances called ketones, which turn your blood acidic. This causes labored breathing, vomiting and loss of consciousness. DKA requires immediate medical treatment.

Severe low blood sugar (hypoglycemia): Hypoglycemia happens when your blood sugar level drops below the range that's healthy for you. Severe hypoglycemia is very low blood sugar. It mainly affects people with diabetes who use insulin. Signs include blurred or double vision, clumsiness, disorientation and seizures. It requires treatment with emergency glucagon and/or medical intervention.

Management and Treatment

Diabetes is a complex condition, so its management involves several strategies. In addition, diabetes affects everyone differently, so management plans are highly individualized.

The four main aspects of managing diabetes include:

Blood sugar monitoring: Monitoring your blood sugar (glucose) is key to determining how well your current treatment plan is working. It gives you information on how to manage your diabetes on a daily — and sometimes even hourly — basis. You can monitor your levels with frequent checks with a glucose meter and finger stick and/or with a continuous glucose monitor (CGM). You and your healthcare provider will determine the best blood sugar range for you.

Oral diabetes medications: Oral diabetes medications (taken by mouth) help manage blood sugar levels in people who have diabetes but still produce some insulin — mainly people with Type 2 diabetes and prediabetes. People with gestational diabetes may also need oral medication. There are several different types. Metformin is the most common.

Insulin: People with Type 1 diabetes need to inject synthetic insulin to live and manage diabetes. Some people with Type 2 diabetes also require insulin. There are several different types of synthetic insulin. They each start to work at different speeds and last in your body for different lengths of time. The four main ways you can take insulin include injectable insulin with a syringe (shot), insulin pens, insulin pumps and rapid-acting inhaled insulin.

Diet: Meal planning and choosing a healthy diet for you are key aspects of diabetes management, as food greatly impacts blood sugar. If you take insulin, counting carbs in the food and drinks you consume is a large part of management. The amount of carbs you eat determines how much insulin you need at meals. Healthy eating habits can also help you manage your weight and reduce your heart disease risk.

Exercise: Physical activity increases insulin sensitivity (and helps reduce insulin resistance), so regular exercise is an important part of management for all people with diabetes.

Due to the increased risk for heart disease, it's also important to maintain a healthy:

- Weight
- Blood pressure
- Cholesterol

Prevention of Diabetes

You can't prevent autoimmune and genetic forms of diabetes. But there are some steps you can take to lower your risk for developing prediabetes, Type 2 diabetes and gestational diabetes, including:

- Eat a healthy diet, such as the Mediterranean diet.
- Get physically active. Aim for 30 minutes a day at least five days a week.
- Work to achieve a weight that's healthy for you.
- Manage your stress.
- Limit alcohol intake.
- Get adequate sleep (typically 7 to 9 hours) and seek treatment for sleep disorders.
- Quit smoking.
- Take medications as directed by your healthcare provider to manage existing risk factors for heart disease.

It's important to note that there are some diabetes risk factors you can't change, such as your genetics/family history, age and race. Know that Type 2 diabetes is a complex condition that involves many contributing factors.

Conclusion

Diabetes is a serious medical condition that affects millions of people worldwide. It can cause various health complications and should be treated promptly to prevent long-term damage to the body. By understanding the types, causes, symptoms, and treatment options for diabetes, individuals can take steps to manage the condition effectively and lead a healthy life. If you experience any symptoms of diabetes, it is crucial to seek medical attention immediately.

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