



Survey On The Evolution Of Severity Of Diabetic Patients Among Different Age Groups And Sexes In Central Kolkata

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Abstract

Diabetes is a condition that requires persistent medical attention and self-care. Diabetes mellitus is one of the most widely prevalent diseases all around the world. Through a survey, the epidemic nature of diabetes mellitus in sexes and age groups is reviewed. Numerous research teams in the biomedical field have given the molecular genetics of diabetes a great deal of attention lately. The review projects the prevalence or evolution of diabetes mellitus and its causes in various characteristics. Type 2 diabetes has the highest prevalence in people over 45 years of age. Diabetes is also significantly triggered by several other conditions, including heart disease, obesity, genetics, inactivity, and others. Despite the considerable data collection and survey analysis, a more in-depth study is still required in this area to ultimately enhance diagnoses, therapy, and reduce the likelihood of the emergence of chronic problems. The prevalence of diabetes mellitus is at an alarming epidemic level. Using approved blood glucose monitoring criteria for each form of diabetes, except for gestational diabetes, early detection of diabetes and prediabetes is crucial. Diabetes screening is crucial, especially in developing nations, to prevent delayed diagnosis. The interactions between genes and the environment play a huge role in the occurrence of diabetes. Understanding its mechanisms will make it easier to incorporate genomic data into the development of individualized patient treatment and improve clinical and dietary choices.

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1. Introduction

Diabetes mellitus is characterized by elevated blood glucose levels (hyperglycemia) in the bloodstream as a result of abnormal insulin synthesis and action. Insulin is produced by the pancreatic islets (beta cells). It

regulates blood glucose levels by acting as a hypo glycaemic agent. It is the body's main anabolic hormone because it controls how proteins, lipids, and carbohydrates metabolize. Insulin primarily regulates how the body processes carbohydrates from diet. During the breakdown of carbohydrates, glucose is produced. Due to insulin, glucose can be absorbed by muscles, the liver, and fat cells for use as fuel. However, low insulin levels or ineffective insulin utilization result in elevated blood glucose levels (Olokoba et al., 2012). Diabetes is brought on by persistently high glucose levels, which harm the body's ability to perform at its best. Diabetes-related chronic hyperglycemia is linked to ongoing harm, dysfunction, and organ failure, particularly in the kidneys, eyes, heart, nerves, blood vessels, teeth, and brain (Rask et al., 2013).

If someone has type 2 diabetes, their body cannot effectively utilize insulin and cannot keep blood sugar levels within normal ranges. This kind of diabetes affects 90% to 95% of diabetics. It develops over several years, and most people get diagnosed as adults. A healthy lifestyle that involves losing weight, eating wholesome meals, and being active can prevent or delay it. Type 2 diabetes used to be known as adult-onset or non-insulin-dependent diabetes. However, during the past 20 years, it has become more prevalent among kids and teenagers (Wilmot et al., 2014).

Typically, type 2 diabetes is less severe than type 1 diabetes. However, it still has the potential to lead to significant health issues, especially in the tiny blood vessels that pass through the kidneys, nerves, and eyes. Obesity, heredity, insulin resistance, and inactivity are the main contributors to diabetes, according to the majority of experts (Wu et al., 2014).

Everyone, regardless of gender or age, is at risk for diabetes. Tragically, the prevalence of diabetes among young people and adolescents is rising (Wilmot et al., 2014). If you have diabetes, you may have worried about how it came about or whether your children will have it as well. Diabetes can occasionally be hereditarily predisposed to or be brought on by environmental factors. Age, gender, weight, genetic make-up, family medical history, ethnicity, and environmental factors can all increase the likelihood of developing diabetes, even if the actual etiology of the majority of types of diabetes is still unknown. As a result, each diabetes subgroup has a unique cause of the disease, which changes based on the person and the type (Wu et al., 2014).

Numerous variables, including the interplay of genetic, environmental, and age-related risk factors, can cause type 2 diabetes. According to the American Diabetes Association (2009), there are four common kinds of diabetes: type 1, type 2, prediabetes, and gestational. Other kinds of diabetes include those associated with cystic fibrosis, monogenic diabetes, and those brought on by uncommon disorders. These kinds of diabetes, which affect about 2% of people, are just as serious as type 1 and type 2 diabetes. However, due to their rarity, various kinds of diabetes are frequently misdiagnosed. Even though diabetes can take many different forms, it is a condition that can be controlled with the proper medications, health advice, exercise, and nutrition.

The term 'obesity' is used to describe the condition when the body stores an excessive quantity of fat (adipose tissue). Type 2 diabetes and obesity have several things in common. The severity of type 2 diabetes and body mass index (BMI) are connected. Because of this, those who are overweight run a severe risk of developing diabetes. Additionally, compared to patients of a healthy weight, is even higher in obese patients (Fruh et al., 2017).

Studies claim the level of fatty acids and inflammation is elevated in obesity, leading to reduced insulin sensitivity and type 2 diabetes. Non-insulin-dependent diabetes, as the name suggests, is the most common form. It accounts for about 90% of the cases. Patients diagnosed with this kind of diabetes produce a tiny amount of insulin which is not enough for the body to process glucose (Wondmkun et al., 2020). Obesity also poses a threat to heart disease, stroke, and high blood pressure; all of these promote causing diabetes.

Since type 2 diabetes and being overweight have emerged as a major link, dieticians and health experts suggest focusing on a healthy diet, weight loss, and exercise because it reduces the gravity of the disease.

Exercise is beneficial in controlling blood sugar levels without taking additional medications. But, if necessary, you must take medications to allow the body to use its insulin more efficiently. Type 2 diabetes is largely preventable. Lifestyle changes and weight loss can bring successful results (Franz et al., 2017).

Science does not have conclusive knowledge of the mechanism of the genetic factor. However, studies have verified a minimum of 150 DNA variations associated with type 2 diabetes. Since every individual is different,

each person may have variations that increase or decrease the risk (Ali, 2013).

Several gene mutations correlate to higher diabetes risk. However, scientists and researchers believe not everyone carrying a mutation will develop diabetes. Examples include ABCC8, which helps regulate insulin, TCF7L2, which influences insulin secretion and glucose production, and numerous others. (Ali O et al., 2013). Although the risk of sharing genes is high, making changes in lifestyle patterns such as exercise and healthy eating can positive impact. With age the risk of having diabetes rises. It is more likely to be affected by diabetes during late adulthood or old age because it is expected to have other medical conditions. That makes it harder to control diabetes. Moreover, it can also lead to heart-related diseases. Pills or injections might be necessary to manage blood glucose levels and other medications for high blood pressure and hyper cholesterolemia (Chentli et al., 2015).

Diabetes mellitus (DM) is a significant public health concern on a global scale. Both developed and developing countries have seen an increase in the prevalence of diabetes. Numerous potentially fatal consequences result from diabetes progression, particularly from inadequate glycemic control. This survey analyzes the Severity of Diabetic Patients Among Different Age Groups and Sex. It aims to evaluate the higher occurrence of age and gender groups and to indicate the main factors associated with the occurrence of diabetes.

2. Methodology

2.1 Experimental Design:

At the general population level among adults, ages 20 to 90, and this survey focused on DM-specific elements. A multistage cluster sampling was used to conduct the survey. The estimated prevalence of probabilities of diabetes in adults aged 18 to 69 years is projected in this survey. The sampling was conducted on 60 randomly selected people who were randomly split among various age and gender categories. Through the use of standardized questionnaires, survey data was electronically gathered in virtual assistants. To prevent any potential bias during data collection, every precaution for privacy and confidentiality was taken. In addition, household interviews were also conducted for people aged above 70 as they were unable to use digital platforms. During the household interviews, data on socio-demographic characteristics (such as education level, occupation, etc.) and risk factors like tobacco use, alcohol consumption, dietary factors (intake of fruits and vegetables, dietary salt), and levels of physical activity were also gathered. Treatment options for diabetes, kidney disease, high blood cholesterol, edema, and cardiovascular diseases were also covered. The survey questionnaire utilized for this investigation was prepared according to Alanazi et al. (2017) with slight modification.

3. Results

Table 1: Socio demographic characters of the study population

Variables		Frequency (n=60)	Percentage (%)
Sex	Male	23	38.3
	Female	37	61.6
Diabetic Prevalence	Diabetics	20	33.3
	Non-diabetics	40	66.6
Occupation	Sedentary	23	38.3
	Moderate	26	43.3
	Heavy	4	6.66

Table 2: Genetics and lifestyle characteristics of the participants

Items of Questionnaire		Frequency (n=60)	%
Diabetes and genes	Yes	18	30
	No	42	70
Fruit Consumption	Yes	16	26.6
	No	44	73.3
Patients aware about diabetes	Yes	50	83.3
	No	10	16.6
Patients keeping a track	Yes	22	36.6
	No	38	63.3
Following healthy Lifestyle or not	Yes	38	63.3

	No	22	36.6
Bad addiction	Yes	16	26.6
	No	44	73.3
Exercise	Yes	29	48.3
	No	31	51.6

Table 3: Participants preventive measures and treatments

Items of questionnaire		Frequency (n=60)	%
Treatment	Only diet	34	56.6
	Medication and diet	18	30
	Insulin and diet	2	3.33
	Insulin, medication and diet	6	10

Table 4: Participants suffering from chronic diseases of DM

Items of questionnaire		Frequency (n=60)	%
Chronic diseases associated with patients of diabetes	Edema	0	0
	DR	25	41
	CKD	7	11.66
	Cardiovascular diseases	12	20
	Pain/blisters/wounds in feet	7	11.6
	Feeling dizzy when stand after sitting or lying for a long period of time	18	30

Table 5: The prevalence of diabetes among different age groups

Age group	Specifications	Frequency (n=60)	Occurrence (%)
Age group (20-40)	Diabetics	1	1.667%
	Non-diabetics	17	28.333%
Age group (40-60)	Diabetics	11	18.333%
	Non-diabetics	3	5%
Age group (60-90)	Diabetics	7	11.667%
	Non-diabetics	2	3.333%

4. Discussion

Health education is regarded as a crucial element in enhancing understanding and altering behavior. People who have diabetes frequently lack a basic understanding of the disease's characteristics, risk factors, and complications. This random sample assisted in raising awareness by utilizing a digital platform and household interviews. Data was gathered and analyzed and projected through descriptive statistics. The occurrence of diabetes and impaired glucose tolerance estimated is at 33%, according to this survey. Table 1 shows in this survey there were 23 male and 37 female participants. The number of patients suffering from diabetes was 20 out of 60.

Sedentary behavior results in obesity and cardio vascular diseases. Moreover, sedentary behavior is known to harm vascular health, bone mineral density, and metabolism (Lavie et al., 2019). In this survey, 38.3% had a sedentary lifestyle, 43.3 had moderately active, and 6.66% were involved in heavy activity. Chronic diseases can worsen as a result of an excessively sedentary lifestyle. A metabolic disorder, which is characterized by an increase in TG levels, a decrease in HDLC levels, a decline in multiple organ insulin sensitivity and cardiopulmonary adaptability that is reversible, an increase in liver fat and dyslipidemia, and changes in body composition, is one effect of sedentary behavior. This is because prolonged periods of inactivity may cause skeletal muscle contractile activity to drop, which in turn causes the muscle enzyme lipoprotein lipase (LPL) to become less active (Lavie et al., 2019). Because of the nature of their jobs, those who cannot avoid being sedentary should engage in more intense exercise each week in order to reduce the negative effects of this lifestyle choice on their health. Moreover, in this survey, it has been observed that occupation plays a vital role. Being sedentary can alter body composition and have other negative effects that can exacerbate the pathophysiological processes of type 2 diabetes. (T2D) (Li et al., 2022).

Studies have shown that the biochemical and metabolic characteristics of the muscle and fat in the body vary. The amount of total body fat has a direct correlation with the chance of acquiring metabolic diseases. Visceral adipose tissue (VAT) accumulation causes abdominal obesity, which is more closely associated with hypertension, dyslipidemia, and insulin resistance (IR) than obesity brought on by the formation of adipose tissue around the lower limbs and buttocks. The study found that abdominal obesity may be a distinct risk factor for conditions including diabetes and lipid metabolic disorders, which are elements of the metabolic syndrome. Additionally, 72% of T2D patients were found to have increased abdominal fat accumulation. Human muscle mass is influenced by a variety of factors, including inadequate nutrition, hormonal imbalances, metabolic and immunological disorders, deteriorating muscle fibers and motor units, and poor nutrition. One of the causes of sarcopenia is muscle atrophy, and decreasing muscle mass is the outcome of muscle fiber degeneration. Damage in people with T2D can also result from IR, endoplasmic reticulum stress, ectopic lipid deposition, oxidative stress, the buildup of advanced glycation end-products (AGEs), neuropathy, and nephropathy (Lietal.,2022).In light of India's large population base and ongoing population growth, our findings emphasize the future burden of diabetes.

Family history or genetic factors have a significant impact on the likelihood of getting T2D. 30% of diabetic participants had a family history of diabetes. In addition to directly affecting insulin action or secretion, genes may also have an impact on a person's response to certain environmental circumstances, increasing or decreasing their risk of developing diabetes. Even within the same broad setting, individuals differ greatly in their adoption of unhealthy lifestyles and their willingness to adjust such behaviors (Consortium et al., 2013). Who adopts an unhealthy diet (including the genetic influence on taste and food preferences), who exhibits a greater willingness to change unhealthy behavior, who burns more calories at rest, who exhibits greater activity levels when not actively exercising, what type of microbiome an individual carries, and who chooses a more sedentary lifestyle are all factors that genetic factors can affect in any given environment. Table 2 shows that most diabetes mellitus patients had a family history of the condition. Out of 20 individuals suffering from diabetes and 18 had a history of diabetes mellitus.

It is supported by the fact that many of these genes are expressed in beta cells or have functions in insulin secretion as the final step in the progression of diabetes. Few of these genes seem to affect insulin sensitivity (although this may change as more information becomes available), and genes involved in the insulin signaling pathway hardly ever show up in T2D GWAS studies (AliO et al., 2013).

Fruits are essential for controlling blood glucose levels and preventing diabetes. Fruits are said to be healthful because they are rich in antioxidants, vitamins, minerals, fibre, and phytochemicals. These foods' high sugar content puts the metabolism of uric acid, lipids, and glucose at risk. The prevention and management of hypertension and diabetes mellitus were examined and showed significant results in the regulation of blood glucose levels through fruit intake (Park et al., 2021). Eating more fresh fruit was associated with a significantly lower risk of developing diabetes, as well as a lower risk of death and the appearance of serious vascular complications in people who already had the illness, in an epidemiological study of Chinese adults. 26.6% of participants included fruits in their daily diet. In this study, those who consumed a lot of fruits had blood sugar levels that were more steady (Du et al., 2017). Additionally, it was found that more than half of diabetics are unaware of their raised fasting glucose levels and that early detection and treatment are crucial for preventing complications, prolonging lifetime, and enhancing quality of life (Sami et al., 2017).

Participants following a healthy lifestyle and choosing healthy alternatives significantly have more controlled blood glucose levels. 63.3% of participants followed a healthy lifestyle in this survey study. In addition, bad habits such as smoking and drinking elevate the chances of high blood glucose levels. Participants who did not possess any bad addition managed their blood glucose levels better than those who did. Table 2 shows the number of participants engage and did not engage in bad habits.

This survey found that individuals who exercise effectively manage their blood sugar levels as 48.3% of the participants participated in physical activity or exercises. Therefore, this survey has more individuals with better managed blood glucose levels. Physical activity helps to significantly lower blood sugar levels. There is no secret about the benefits of exercise for those with diabetes, or pretty much any other disease. Exercise improves your overall health by assisting with weight management, blood sugar control, blood pressure control, anxiety reduction, raising HDL cholesterol levels, bone and muscle strength, glucose levels and insulin sensitivity, reducing insulin resistance, which has further benefits for diabetics. Traditionally advised for the management

and prevention of diabetes is aerobic exercise (Colberg et al., 2010). Table 2 shows 29% of the participants in this study population included physical activity in their lifestyle.

The treatment or preventive measures taken by every participant were also recorded. In table 3, it is seen that participants mostly adopted a healthy diet to manage their blood glucose levels better (56.6%). 30% of the study population had take medication and diet as their preventive measure for diabetes. 6 participants were on medications, insulin and diet and 2 were on insulin and diet, i.e., 10% and 3.33% respectively.

Edema, kidney problems, and diabetic retinopathy are observed to be strongly associated with diabetes. Half of those with type 2 diabetes and one-third of those with type 1 diabetes are susceptible to CKD, respectively. Which is clinically indicated by the presence of either high urine albumin excretion or decreased renal function (Thomas et al., 2015). The most frequent side effect of diabetes mellitus (DM) is diabetic retinopathy (DR). It has long been understood to be a microvascular condition. Microvascular lesions must be found in order to diagnose DR. Treatment for DR is still difficult (Wang et al., 2018).

In table 4, participants suffering from diabetes mellitus having other diseases and complications are listed down. It was seen that there were no participants with oedema in this survey population. It is because diabetic macular edema is more prevalent in diabetic individuals above 40 years of age (Wang et al, 2022). However, 41% of the patients suffer from DR and 11.66% of patients suffer from CKD.

The main factor in the death of diabetic individuals is the strong link that exists between DM and CVD. It was discovered that 20% of the diabetics in this survey had cardiovascular diseases. Obesity, particularly T2DM-related obesity, is common in DM patients and is associated with an increased risk of CVD. Therefore, patients with DM have an increased risk of cardiac events. Biological pathways linked to DM have also been demonstrated in numerous investigations to independently raise diabetic individuals' risk of CVD. As a result, it's essential to address CV risk factors in DM patients to reduce the disease's long-term CV consequences. The relationship between DM and CVD is examined in this survey. Its current treatment suggestions, and suggested directions for future investigation (Schmidt et al., 2019).

Everyone with diabetes is at an increased risk of dying from CVD. In comparison to individuals without DM, adults with diabetes have a relative risk for CVD morbidity and death that varies from 1 to 3 for men and from 2 to 5 for women. Correct DM control and therapy are crucial as the disease's prevalence rises. Since CVD is the most frequent cause of mortality and morbidity in people with DM, lowering the cardiovascular (CV) risk of diabetic patients should be the main goal of diabetes management. The link between DM and CVD is extensive and complex, which makes it difficult to manage DM and reduce cardiac events (Leon et al., 2015).

Pain, blisters, wounds are common in patients suffering from high blood glucose levels form a prolonged period of time. It is vital to manage your blood glucose levels. In this survey, 11.6% had shown high blood glucose level related wounds or blisters. Moreover, feeling dizzy when standing after sitting or lying for a long period of time indicates elevated glucose levels in the blood. In this survey study, 18 out of 60 participants, i.e. 30%, have faced such issues.

The prevalence of diabetes was higher in 50–90 years, as shown in table 5. In individuals with high cholesterol and blood pressure, awareness levels, usage of anti-diabetic medications, and blood glucose control were all higher. This may be a result of increasing DM awareness in metropolitan areas, more affordable and accessible therapy, and routine blood glucose tests. Poor access to therapy for women can be linked to low levels of awareness and treatment among women (Florez et al., 2003). Additionally, having an education makes it easier to comprehend and adopt healthy behaviors.

Conclusion

In conclusion, diabetes and its possible consequences cause a huge amount of morbidity and mortality. To improve the quality of care and assist in diabetes prevention, it is critical to compute diabetes prevalence estimates, awareness levels, treatment and control levels, and future projections on a regular basis. The management of diabetes must include comprehensive health promotion and management strategies among diabetics as well as ongoing monitoring and surveillance of the condition. A larger survey will significantly give better information and knowledge and raise awareness.

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