

Assessment of Risk Factors, Disease Control, and Health-Seeking Behavior of Diabetes Mellitus among Urban Slum Populations

Muhammad Iqbal Javaid¹ Ahsan Iqbal² Tallat Anwar Faridi³

¹Senior Optometrist, Gulab Devi Educational Complex, Lahore

²Department of Food Science and Technology, Minhaj International University Lahore

³Associate Professor, University Institute of Public Health, University of Lahore

Corresponding author's e-mail: iqbaljaved_opt@yahoo.com

Abstract

This cross-sectional descriptive study aims to specify the trend, major risk factors, and control of Diabetes mellitus (DM) patients in urban slum areas. A significant progression in adult populations globally has made it a major public health issue and a disaster of recent times. Lack of awareness, social constraints, and absence of community participation to address this public health issue contributed to a socio-economic burden on society. The study concluded the trends, major risk factors, and behavior regarding Diabetes Mellitus. A total of 164 males and 211 females were included in the study with a median age of 53.03 years. Following demographic information, the risk factors, duration of DM presence, practice regarding control, type of treatment taken, and the medical advice to manage the disease were observed as variables of the study. Risk factors such as hypertension 65%, dyslipidemia 41%, obesity 29%, and ischemic heart disease 33% were observed significantly. A high ratio of 62% among the study population did not control the disease properly. Only 35% of people knew the presence of the disease for 6-15 years. Only 26% of participants visited a general physician for medical advice regarding DM. Diabetes mellitus needs to be addressed due to lack of awareness, poor perception, and behavior among the diabetic community of urban slum areas. Further study on a large scale, considering a larger sample size and expanding the community area, may be helpful to establish guidelines to fight against this public health disaster.

Keywords. Diabetes mellitus, prevalence of diabetes, diabetic complications, diabetic awareness, urban slums communities

Introduction

Diabetes Mellitus (DM) is a non-communicable chronic disease also termed hyperglycemia, which is a raised blood glucose level in the body. This is because of the condition referred to as insulin resistance, in which insulin is not produced or does not work properly to convert glucose into energy. The main types of DM are listed as type 1, type 2, and gestational diabetes (Khali & Azar 2024; Solomen & Chew, 2017). This is estimated at present that about 537 million (3 in 4) of the adult world population are living with DM, and this

number is specifically rising so predicted that 643 million in 2030 and 783 million by 2045, as stated by IDF Diabetes Atlas. This scenario is more alarming in low and middle-income countries than in high-income countries. Another big challenge to global health is that DM is more prevalent globally due to the fact to remain the condition is uncontrolled or untreated (Mishra & Pandey, 2024). According to IDF, the prevalence of DM in the adult population in Pakistan, by 2021 is about 12-13 million (12.3%, 1 in 8 adults) and expected to rise to around 18-19 million (15.4%, 1 in 6 adults) by 2045.

This alarming condition made Pakistan a more targeted point regarding DM progression among the general adult population (Basit & Fawad, 2018). The adult diabetic population nearly 44.7% are living as undiagnosed and this is a cause of a global burden of socioeconomic scenario and needs to be addressed regarding effective prevention, early detection, and proper management of diabetes (Wali, Rafique, 2020; Tokhirovna, 2024). There are several risk factors of DM, are known as non-modifiable risk factors including family history, age, and ethnic background, but modifiable risk factors are a sedentary lifestyle, smoking dietary behavior, cardiovascular issues, hyperlipidemia, excessive alcohol consumption, and mental stress (Wang & Li, 2021). Complications of DM include serious conditions such as microvascular conditions such including diabetic retinopathy, diabetic nephropathy, and diabetic neuropathy, as well as macrovascular conditions, such as cardiovascular issues, stroke, and peripheral arterial diseases. Additionally, the population suffering from DM is expected to get infections and slower wound healing (Casqueiro & Casqueiro, 2012).

In a community-based study conducted in Nepal, hypertension was recorded as the leading risk factor for DM, in the list of global disease burdens of a public health issue of underdeveloped countries found as 29.4%, in this study, while 25% of individuals suffered from hypertension and < 50% were known about their diseaseⁱ. In the Chinese population, the rate of hypertensive conditions evolved to 26-29% among the adult population (Swedish Council on Health Technology Assessment, 2008). As a genetic and environmental factor of diabetes, obesity has been found a considerable increase in ratio worldwide (Ruze & Liu, 2023). Obesity and DM have a significant ratio of 29% among our study population mentioned already in the study. DM was also established as a strong risk factor for cardiovascular diseases and available research data explained the high prevalence of CVD as a result of both Type 1 and Type 2 DM and a cause of atherosclerosis as well as heart attack (Heather & Hafstad, 2022). Arterial fibrillation was also established as increasing in prevalence all over the world and a significant risk factor of sudden death in the Type 2 DM population of the older age group

> 75 years of age Mozaffarian, Kamineni, 2009; Volgman, & Nair, 2022). The study conducted by the American Diabetic Association settled a standard protocol to address the behavior, treatment, and comorbid conditions, and in older patients over the age of 65 years, this was established that in kidney diseases, the patient must be evaluated regarding kidney functions, also (Pecoits-Filho & Abensur, 2016).

Longer duration of uncontrolled and untreated DM represents the evidence of more complications resulting from DM (Park, & Cho, 2024). Better diet control established good glycemic control as a result of the best strategy to control Type 2 DM among the adult population, and in the middle age group including the overweight and obese population were best-treated population of higher body mass index which was moderately control of the DM scenario (Chiavaroli & Lee, 2021). The diabetic population has little knowledge about the disease, and 94% of people know about the disease, but only 17% know about the risk factors and preventive measures of DM. The knowledge about the disease was recorded higher among the diabetic population those have diabetes in their relatives and families (Tellawy & Alfallaj, 2021).

Hypertension is a condition with DM type 2 and interlinked with each other, so the prevalence is increasing worldwide due to arteriosclerosis so be considered as an emerging cardiovascular disease (Balakumar & Maung, 2016). Moreover, data expressed that the association between high blood pressure and DM more significant cause of many other cardiovascular complications, so needs to be conscious for the treatment and control of hypertension and diabetes both together (Przezak, Bielka, & Pawlik, 2022). Dyslipidemia is another comorbid condition to be considered in patients with DM, due to the raised value of triglycerides and low high-density lipoprotein cholesterol (HDL-C), which is more prevalent and evident. The finding showed that cardiovascular diseases are also associated and have a high prevalence in the diabetic population (Kaze, & Santhanam, 2021) Ischemic heart diseases like cardiomyopathy, myocardial infarction, and heart attack have high mortality rates with DM type 2, and adopting a standard protocol to monitor diabetes and heart issues on regular basis (Shrivastava & Ramasamy, 2013), (Heather, & Hafstad, 2022). Duration of occurrence of DM is a more prevalent factor about 25% among the population of older age group as a main health burden, so has a higher risk of increasing in frequency in the next decades. This is now established from the data that normally the older age group of population has the more complications because in this group the duration of DM is directly associated with the growing age, eventually greater the age longer the duration of diabetes if present (Huang &

Laiteerapong, 2014; Izzo, Massimino, & Riccardi, 2021). The control of DM is directly associated with the lack of awareness of the disease, and lifestyle also has an impact on the control of DM. An active lifestyle may be very helpful in coping with the effects and complications of diabetes. Research showed that about 23% population takes care of and shows good response to the medication for the treatment of DM (Shrivastava & Shrivastava, 2013). The adherence rate also has a direct impact on treating diabetes among the population with pharmacological ways such as oral medication or insulin, so clinical depends upon the uptake of the machines as medical advice enhances good clinical outcomes (Alharbi & Alaamri, 2023).

The biology of type 2 DM is one of the risk factors, and the absence of enough production of insulin or insulin produced by the pancreas not being able to work properly. Accumulation of fat in the liver due to static lifestyle resulting in physical inactive behavior. Poor hygienic environment, social isolation, sleep disturbance, air, and noise pollution are the strong risk factors of DM. Smoke, green area elimination, burden of traffic cause severe stress, enhancing the disease condition. (Dendup & Feng, 2018). Strong associations of rapid population growth, unhealthy air quality index, urbanization, and thickly populated areas, specifically urban slums, are at high risk of developing worse condition of DM .among adult and especially in old age group in general population (Hankey & Marshall, 2017).

Materials and Methods

This cross-sectional study was conducted among the general population involving 375 individuals with a simple random sampling technique and calculated by the formula,

$$\begin{aligned}n &= Z^2 (p q) / d^2 \\&= Z^2 p (1-p) / d^2 \\&= (1.96)^2 \times 70.4 (100-70.4) / 5^2 \\&= 30.96 \times 70.4 (29.6) / 25 \\&= 8252 / 25 \\&= 330\end{aligned}$$

With a 10% attrition rate, $330 + 33 = 363$

For convenience, 375 individuals were included in the study.

All new and follow-up patients residing in urban slums of Lahore visiting Gulab Devi Teaching Hospital Lahore, with known patients of DM type 2, were included in the study for a dilated retinal examination in the eye department. A self-structured questionnaire was used to collect the data, and all patients for the study were interviewed with informed consent. After data collection, data were analyzed on SPSS version 26. Categorical variables were computed and presented in tables, charts, and graphs. In the descriptive analysis, frequency tables were generated. Cross tabulation and association of variables were done by chi-square test, P – P-value < 0.05 was considered as significant. ANOVA was used to analyze the difference between the mean of groups, and an independent sample t-test was used to analyze the difference between the means of two unrelated groups.

Results and Analysis

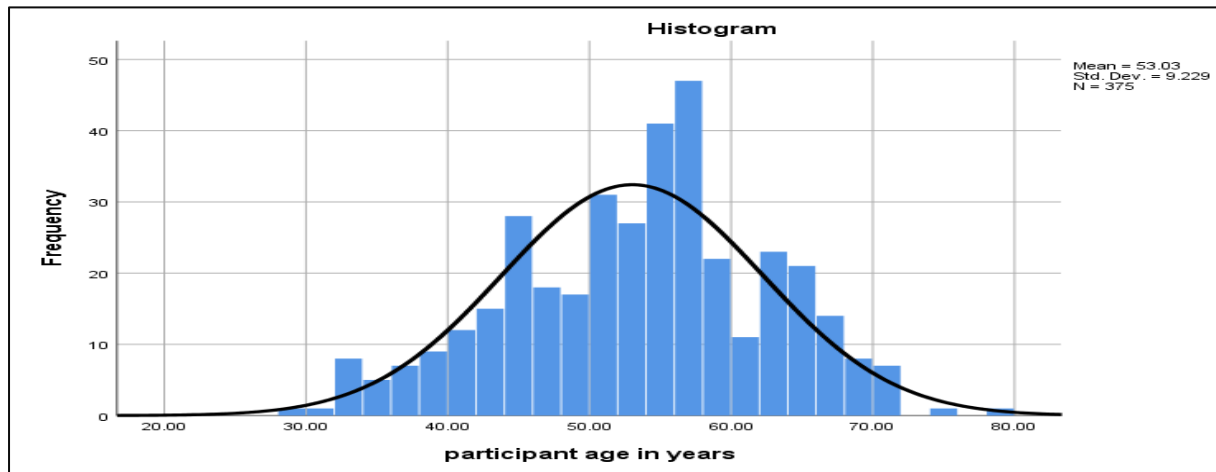


Figure 1: Age Distribution of the Participants

Figure 1 shows the age and gender of the study population and explains that the median age was 53.03 years, with a standard deviation of 9.23. The total number of participants included in the study was 375.

Table. 1 Demographic Presentation of the Participants

	Category	<i>f</i>	%
Gender	Males	164	43.73
	Females	211	56.26
Educational Status	Illiterate	132	35.2
	Primary	72	19.2
	Secondary	113	30.13
	Graduate	58	15.46
	Govt. Job	31	8.26
Profession	Private job	35	9.33
	Labor	34	9.06
	Retired	39	10.4
	Housewife	176	46.93
	Unemployed	60	16

Out of 375 participants in the study, 164 (43.73%) were males, and 211(56.26%) were females. The ratio of females was higher than that of males. The educational status of the participants was as follows: 132 (35.2%) illiterate, 72 (19.2%) primary level, 113 (30.13%) secondary level, and 58 (15.46%) were graduate.

The professional status of participants was recorded as Govt. Job 31 (8.3%), Private Job 35 (9.3%), Labor 34 (9.1%), Housewives 176 (56.9%), Retired 39 (10.4%), and Unemployed 60 (16.0%) (Table 1).

Table 2 Major Risk Factors of Diabetes Mellitus

Risk Factors	<i>f</i>	%
Hypertension	244	65.06
Dyslipidemia	155	41.33
Obesity	109	29.06
Ischemic Heart Disease	123	32.8

This table explains the co-morbidities of DM, as hypertension was evident in 244 (65.1%), dyslipidemia in 155 (41.3%), obesity in 109 (29.1%), and ischemic heart diseases in 123 (32.8%) (Table 2).

Table 3 Duration of Diabetes Mellitus

Duration in years	<i>f</i>	%
3-5	81	21.6
6-10	129	34.4
11-15	128	34.13
16-20	30	8.0
>20	7	1.86

Table 3 shows the duration of the diabetes best known by the individual was observed in the category of 3-5 years 81 (21.6%), 5-10 years 129 (34.4%), 11-15 years 128 (34.1%), 16-20 years 30 (8.0%), and more than 20 years 7 (71.9%).

Table 4 Control of Diabetes mellitus

Control	<i>f</i>	%
Very Strict	16	4.26
Strict	126	33.6
Not Strict	230	61.33

Table 4 explains the behavior towards the control of the DM, and data was recorded as individuals who control the disease very strictly were 16 (4.26%), strictly 129 (34.4%), and not strictly 230(61.33%).

Table 5 Type of Treatment Adopted by Individual

<i>Treatment taken</i>	<i>f</i>	%
Pills	244	65.06
Insulin	71	18.93
No medication	60	16

The table 5 shows the practice regarding taking any treatment to control the disease as 244 (65.06%) were on oral medication, 71 (18.93%) were insulin-dependent, and 60 (16.0%) were not taking any treatment to control the disease.

Table 6 Visit to General Physician

<i>Visit to Physician</i>	<i>f</i>	<i>%</i>
Regular	97	25.86
Not Regular	267	73.6
Never	11	2.93

The table 6 shows that participants 97 (25.86%) visited regularly, 267 (73.6%) not regularly, and 11 (2.9%) never visited to physician to take advice for the disease.

Discussion

Awareness and socio-economic status are both directly influencing factors of increasing diabetes in the adult population. (Saeed & Saleem, 2018). In our study, we concluded that the individuals involved in the study were of a median age of 53.03 years with a standard deviation of 9.23, which predicts the condition that the prevalence was significant in the old age group. It was also observed that the ratio of female patients was high at 53% as compared to female participants were 43%. Our data established a higher ratio of 35.2% in the illiterate category, the category of the primary level was 19.2%, and secondary level was 30.1%, the graduate level was recorded as 15.5%. Socio-economic and literacy status were considerable factors in this study. The profession also affects the behavior and practice to control and prevent non-communicable diseases as the busy schedule in many professions, awareness and self-care strategies are the main factors established in studies. (Agha & Usman, 2014) The professional status of participants was recorded in our research, as Govt. Job 31 (8.3%), Private Job 35 (9.3%), Labor 34 (9.1%), Housewives 176 (56.9%), Retired 39 (10.4%), and Unemployed 60 (16.0%). In this study, the highest ratio was recorded among housewives (56.9%), and the second largest group was recorded among the unemployed population. The larger group of housewives was the dominant group of participants in the study.

The comorbidities were experienced in this study, including hypertension 244 (65.1%), dyslipidemia 155 (41.3%), obesity cases 109 (29.1%), and ischemic heart diseases 123 (32.8%). In a study done on Madrid's general population, the comorbid conditions were found

to be hypertension 70%, dyslipidemia 67%, and obesity 32%, in the study. (Barrio-Cortes & Mateos-Carchenilla, 2024). This study showed the equal proportions of results as suggested by other researchers. The results found that the duration of DM was also a significant factor in the emergence of many complications. The data has been recorded in this research regarding the duration and presence of the disease as among the categories of 3-5 years 81 (21.6%), 5-10 years 129 (34.4%), 11-15 years (128 (34.1%), 16-20 years 30 (8.0%), and more than 20 years 07 (1.9%). The highest ratio among the group 11-15 years was 34% among the population under observation during the study conducted in this study. Meta-analysis established in a survey declared that the duration of DM is evident due to glycemic conditions among the diabetic population (Stolar, 2010; Hemmelgarn, 2011).

The data regarding behavior among the study population has been recorded to control the diabetic condition as very strict control 4.26%, strict control 129 (34.4%), and not strict control 230 (61.3%), and as in the low-income population, the control of DM type 2 is behavior dependent, so knowledge and practices to overcome diabetes and its complications are significant among diabetic population (Papatheodorou, Banach, 2018). A study established that general health awareness, lifestyle changes, and following the right treatment plan remained good to control diabetes (Gruss & Nhim, 2019). The findings of this study also showed the situation of practice and behavior of the participants regarding control of DM type 2. Our research expressed that only a small group controls the condition, and 61% of individuals were not serious regarding their disease due to lack of knowledge. A larger group was on oral medication, taking medication by mouth 65%, insulin 18.93%, and 16% were not taking any treatment.

The study also witnessed that 11 (2.9%) participants did not visit a general physician, 267 (71.2%) visited but not regularly, while only a small group 92(25.9%) visited regularly for medical advice or treatment. Lack of knowledge and awareness hinders the perception of taking advice on medical care about diabetic control (Nagelkerk, Reick & Meengs, 2006). his is also stated by data that practitioners face difficulties in treating a patient of DM due to a lack of knowledge about the disease. Healthcare providers make decisions while considering DM to treat the patient, so decision-making is very important for the treatment with pills, insulin, or both (Chimoriya & MacMillan, 2024)Furthermore, medical advice acceptance is very crucial for diabetic control as the treatment plan or strategy prescribed by the health care practitioner leads to better control and prevents complications in advanced age if the disease remains untreated or uncontrolled (Najafipour & Farjami, 2021).

The control and prevention of diabetes is a public health concern for the community all over the world as well as regional situations. The practice and perception of controlling the disease is not ideal, and the presence of the undiagnosed or untreated disease is the cause of many complications (Hamid, Akash & Rehman, 2021). Our study strongly overlooked the status regarding complications as a result of untreated or uncontrolled DM type 2 and found a very crucial scenario in which only 15% of participants visited a specialist doctor to take advice regarding any complication introduced as a result of diabetes. This is also evidence of a lack of knowledge regarding diabetes and its complications. The group of participants who did not visit a specialist for an expert opinion regarding complications was as crucial as other groups. This group is also at risk of diabetic complications.

Recommendations

- Establishing a public health issue, specifically among the diabetic community, needs to be considered as a public health disaster due to the increasing mortality rate and compromising quality of life among the diabetic population.
- Lack of awareness is a barrier to controlling and managing the scenario regarding behavior, perception, and practices among the community.
- Further studies may lead to follow-up guidelines to address the issue on a larger scale and benefit the population of other areas.

Limitations of the study

Lack of awareness and socio-economic factors remained the limitations, while follow-up visits. A small sample size was considered for the study, but further research may be continued in the future involving a large sample size, expanding the scope of study at the community level. Due to its significance and severity, this public health issue must be treated as a disaster.

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