TYPE 2 DIABETES IN PESHAWAR: A SURVEY OF PREVALENCE AND KEY RISK FACTORS

Original Research

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is a prevalent metabolic disorder characterized by insulin resistance and chronic hyperglycemia, leading to severe complications if not effectively managed. Its incidence is rapidly increasing, particularly in developing countries, due to genetic predisposition, sedentary lifestyles, and poor dietary habits. The disease is often accompanied by multiple comorbidities, impacting patients' overall health and quality of life. Identifying demographic patterns, lifestyle behaviors, and associated risk factors is crucial for developing targeted interventions to reduce the burden of T2DM.

Objective: This study aimed to assess the demographic distribution, lifestyle habits, dietary patterns, comorbidities, and physical health challenges among T2DM patients in Peshawar to provide insights into disease prevalence and associated risk factors.

Methods: A cross-sectional study was conducted on 400 diagnosed T2DM patients visiting the Complex Medical Laboratory and Diagnostic Centre, Peshawar, between February 2024 and January 2025. A structured questionnaire was used to collect demographic information, medical history, dietary intake, and lifestyle factors through face-to-face interviews and medical record reviews. Physiotherapy assessments, including balance, mobility, and muscle strength tests, were performed. Smoking prevalence was categorized into daily smokers, occasional smokers, and non-smokers. Data were analyzed using SPSS (version 22), with descriptive statistics presented in percentages and frequencies.

Results: Among the 400 participants, 69.5% were female and 30.5% were male. The highest proportion of cases (36.5%) was observed in the 41–50 age group, followed by the 51–60 age group (31.5%). Insulin dependency was noted in 34% of patients, while 49.25% engaged in regular physical activity. A family history of diabetes was reported in 76.5% of cases, and 16.25% had been hospitalized due to severe hyperglycemia. Dietary analysis revealed that 100% consumed wet fruits, while 72% reported milk consumption, 74% cereals, and 69.5% dry fruits. However, 61.5% consumed fried food regularly, indicating poor dietary habits. Comorbidities were prevalent, with depression affecting 91% of patients, followed by delayed wound healing (88%), fatigue (86%), and symptoms such as excessive thirst, hunger, and frequent urination (76%). Hypertension and osteoarthritis were present in 72% of patients, and 69% had cardiac disease. Regarding smoking habits, 25% were daily smokers, 4% occasional smokers, and 71% non-smokers. Physical assessments indicated that 64% had decreased muscle strength, while 58% experienced reduced physical endurance.

Conclusion: The study highlights the high prevalence of T2DM among middle-aged individuals, particularly females, with a significant association between the disease and family history, dietary choices, and comorbid conditions. The findings underscore the need for targeted interventions, including lifestyle modifications, dietary management, mental health support, and rehabilitation programs to improve patient outcomes. Implementing structured awareness campaigns and patient-centered rehabilitation strategies can contribute to better disease management and reduced complications.

Keywords: Comorbidities, Dietary Habits, Lifestyle Modifications, Metabolic Disorders, Physical Endurance, Type 2 Diabetes Mellitus (T2DM), Risk Factors.

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and impaired insulin secretion, leading to persistent hyperglycemia. It is the most prevalent form of diabetes and poses a significant public health concern due to its association with long-term complications. If not adequately managed, T2DM can result in severe and irreversible conditions, including neuropathy, nephropathy, retinopathy, and cardiovascular diseases, ultimately increasing the risk of premature mortality (1). The global burden of diabetes is rising at an alarming rate, with the prevalence being notably higher in developing nations due to a combination of genetic susceptibility and environmental factors. In developed countries, approximately 90-95% of diabetic patients have T2DM, whereas developing countries, including Pakistan, exhibit an even greater proportion of cases. According to the International Diabetes Federation (IDF), an estimated 537 million people worldwide were living with diabetes in 2021, with Pakistan alone contributing 33 million cases, underscoring the gravity of the situation in the region (2).

The prevalence of T2DM has escalated due to various modifiable and non-modifiable risk factors. While genetic predisposition plays a critical role, lifestyle choices such as sedentary behavior, poor dietary habits, and increased caloric intake significantly contribute to the development of insulin resistance. Globally, more than 170 million individuals are affected by T2DM, and the prevalence is expected to rise as urbanization and westernized dietary patterns continue to expand (3). In Pakistan, approximately 19% of the population is diagnosed with T2DM, with Khyber Pakhtunkhwa alone reporting a prevalence of 9-10% (4). The increasing burden of diabetes in this region emphasizes the urgent need to understand the risk factors driving its progression. Numerous studies have identified key contributors to T2DM, including obesity, hypertension, dyslipidemia, and metabolic syndrome. Additionally, specific risk factors such as a family history of diabetes, advancing age, and a body mass index (BMI) exceeding 23 kg/m² further exacerbate susceptibility. Women who have given birth to macrosomic infants, weighing over 4,000 grams, are also at a heightened risk of developing T2DM later in life (6).

Given the rising incidence of diabetes and its associated complications, it is imperative to conduct comprehensive epidemiological studies to assess the prevalence and determinants of T2DM, particularly in regions with limited healthcare access. Identifying the underlying causes and risk factors is essential for developing targeted prevention and intervention strategies. This study aims to evaluate the prevalence of T2DM in Peshawar and examine the key risk factors contributing to its progression within the population. By investigating these aspects, this research will provide valuable insights into the current trends of diabetes in the region and aid in formulating evidence-based public health measures to mitigate its impact (5).

METHODS

This cross-sectional study was conducted on a total of 400 patients diagnosed with type 2 diabetes mellitus (T2DM) who visited the Complex Medical Laboratory and Diagnostic Centre, Peshawar. Participants were selected using a random sampling technique over a period from February 2024 to January 2025. Prior to data collection, verbal informed consent was obtained from all participants to ensure ethical compliance. A self-structured questionnaire was employed to gather relevant information. The inclusion criteria comprised individuals clinically diagnosed with T2DM based on medical evaluations and blood glucose levels, whereas those with type 1 diabetes, gestational diabetes, or other metabolic disorders were excluded from participation.

Demographic, clinical, and lifestyle-related data were collected through structured face-to-face interviews and medical record reviews. The questionnaire encompassed various parameters, including demographic details such as age, gender, marital status, and family history of diabetes. Lifestyle-related variables were also assessed, including exercise habits, smoking status, social media usage, and the prevalence of consanguineous marriages. Medical characteristics such as insulin dependency, hospitalization history, and associated comorbidities were documented. Dietary habits were evaluated based on the consumption of specific food items, including milk, dry fruits, fresh fruits, meat, fish, cereals, and fried foods. The frequency of intake was recorded to analyze dietary patterns among T2DM patients. Physiotherapy assessments, including balance, mobility, and muscle strength tests, were also conducted to assess physical health status. Participants were categorized into six age groups: 21–30, 31–40, 41–50, 51–60, 61–70, and 71–80 years. Additional patient

characteristics, including education level and exercise frequency, were documented to explore potential correlations with disease severity and management.

The presence of comorbidities such as hypertension, fatigue, visual disturbances, excessive thirst and hunger, osteoarthritis, depression, cardiac disease, and delayed wound healing was evaluated. Smoking habits were categorized into three groups: daily smokers, occasional (monthly) smokers, and non-smokers, and the prevalence of smoking among T2DM patients was analyzed accordingly. The study employed statistical analysis using SPSS software (version 22). Descriptive statistics, including percentages and frequencies, were applied to summarize the findings, which were presented in bar charts and tabular formats for clarity and better interpretability.

RESULTS

The study was conducted to assess the prevalence if in patients. Among 400 T2DM patients, the highest prevalence was in the 41–50 age group (36.5%), with 69.5% of patients being female and 76.5% having a family history of diabetes. Lifestyle factors revealed that 34% were insulin-dependent, 25% smoked daily, and 49.3% exercised regularly. While 100% consumed wet fruits and 74% ate cereals, 61.5% reported fried food consumption. Depression (91%), delayed healing (88%), and fatigue (86%) were the most common comorbidities, alongside high rates of hypertension (72%) and cardiac disease (69%). Additionally, 64% of patients experienced reduced muscle strength, highlighting the impact of T2DM on physical health and the need for comprehensive management strategies.
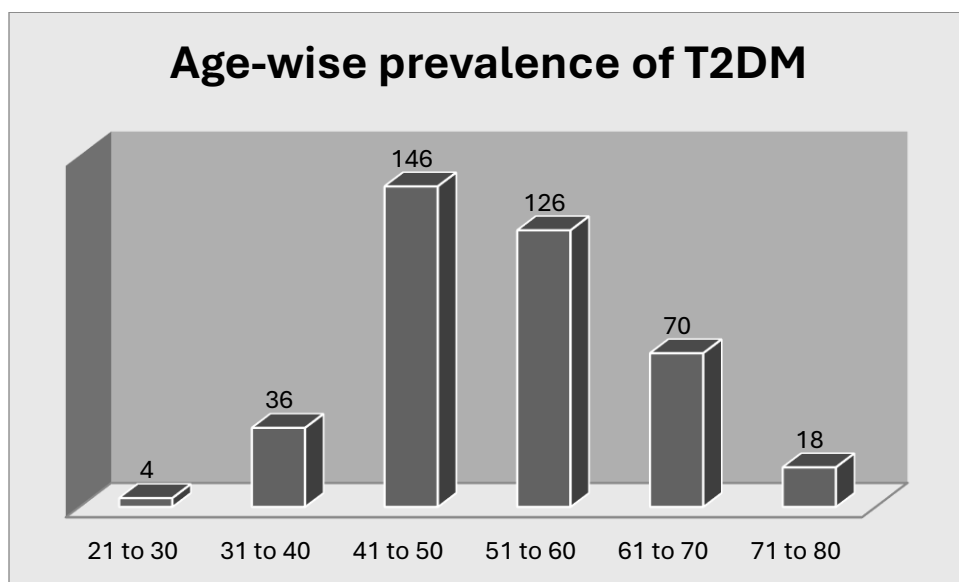

Figure 1: Age wise prevalence of T2DM

Age wise prevalence: The figure 1 illustrates the age-wise prevalence of T2DM. The highest number of cases is observed in the 41-50 age group (146 cases), followed by the 51-60 age group (126 cases), indicating that middle-aged individuals are at the greatest risk. The prevalence declines in older age groups, with 70 cases in the 61-70 range and 18 cases in the 71-80 range. Younger age groups, including 21-30 (4 cases) and 31-40 (36 cases), have the lowest prevalence. This trend suggests that T2DM risk increases with age, peaking in middle age before gradually declining in older individuals.

Table 1: Character wise prevalence of T2DM

Characters	Yes	No	Total participants
Insulin dependent	136	264	400
Exercise	197	203	400
Education	295	105	400
Marital status	394 (married)	06(unmarried)	400
Family history with DM	306	94	400
Hospitalized for diabetes	65	335	400
Social media use	275	125	400
Cousin marriage	299	101	400

The table 1 presents the character-wise prevalence of T2DM among 400 participants. A total of 136 patients (34%) were insulin-dependent, while 197 (49.3%) engaged in regular exercise. Most patients were educated (73.8%, 295 individuals) and married (98.5%, 394 individuals). A significant proportion (76.5%, 306 patients) had a family history of diabetes. Hospitalization due to diabetes was reported by 16.3% (65 patients). Additionally, 68.8% (275 patients) were social media users, and 74.8% (299 patients) had a history of cousin marriage. These findings highlight the influence of genetic, lifestyle, and social factors on T2DM prevalence.

Table 2. Type 2 diabetic patients' intake of food

Foods	Food consumption by No. of diabetic patients	Percentage (%)	Total participants
Milk	289	72%	400
Dry fruits	278	69.5%	400
Wet fruits	400	100%	400
Meat	245	61%	400
Fish	253	63%	400
Cereals	294	74%	400
Fried food	246	61.5%	400

Dietary Habits of T2DM: The table 2 presents the dietary habits of T2DM, showing the percentage of participants consuming different food items. All 400 participants (100%) consumed wet fruits, while cereals (74%), milk (72%), and dry fruits (69.5%) were also widely consumed. Fish consumption was reported by 63% of patients, followed by meat (61%) and fried food (61.5%). The data indicate that while many patients incorporate healthy food choices such as milk, fruits, and cereals, a significant proportion also consume fried food, which may negatively impact diabetes management. These findings highlight the need for dietary interventions to promote healthier eating habits among diabetic patients.

Table 3. Type 2 Diabetic patients with associated diseases

Disease	No. of diabetic patients	Percentage (%)	Total participants
B. P	289	72%	400
Fatigue	343	86%	400
Trouble in vision	223	56%	400
Thirst, hunger, frequent urination	304	76%	400
Osteoarthritis	289	72%	400
Depression	367	91%	400
Cardiac disease	275	69%	400
Delayed healing	353	88%	400

Prevalence of Associated Diseases: The table 3 presents the prevalence of associated diseases among 400 Type 2 Diabetes Mellitus (T2DM) patients. Depression was the most common comorbidity, affecting 91% (367 patients), followed by delayed healing (88%, 353 patients) and fatigue (86%, 343 patients). Thirst, hunger, and frequent urination were reported by 76% (304 patients), while 72% (289 patients) had both high blood pressure (B.P.) and osteoarthritis. Cardiac disease was observed in 69% (275 patients), and trouble in vision affected 56% (223 patients). These findings highlight the high burden of comorbidities in T2DM patients, emphasizing the need for comprehensive disease management strategies.

Table 4. Smoking Habits among T2DM Patients

Smoking	No. of diabetic patients	Percentage (%)	Total participants
Daily	102	25%	200
Monthly	15	04%	200
Non-Smoker	283	71%	200

Smoking Habits of T2DM: The table 4 presents the smoking habits of 200 T2DM patients. Among them, 25% (102 patients) were daily smokers, while 4% (15 patients) smoked occasionally on a monthly basis. The majority, 71% (283 patients), were non-smokers. These findings indicate that a significant proportion of diabetic patients engage in smoking, which is a known risk factor for worsening diabetes-related complications, emphasizing the need for smoking cessation interventions in diabetes management programs.

Physiotherapy and Mobility Assessments: Balance and mobility issues were prevalent, with 64% of patients experiencing reduced muscle strength and 58% reporting impaired physical endurance, further emphasizing the impact of T2DM on overall health and functional independence.

DISCUSSION

T2DM is a growing health concern, particularly in developing countries like Pakistan, where genetic predisposition and lifestyle factors contribute significantly to its prevalence. This study provides an in-depth analysis of various risk factors, lifestyle habits, dietary patterns, and associated comorbidities among T2DM patients. The study found a higher prevalence of T2DM in females (69.5%) compared to males (30.5%). This aligns with previous studies suggesting that hormonal differences, obesity, and sedentary lifestyles contribute to increased diabetes prevalence in women (8). The highest percentage of diabetic cases was in the 41-50 age group (36.5%), followed by 51-60 years (31.5%), indicating that middle-aged individuals are at greater risk. Aging is a well-established risk factor for T2DM due to metabolic slowdown, insulin resistance, and decreased physical activity (9). Our findings revealed that 34% of patients were insulin-dependent, while 49.25% engaged in regular physical activity. Physical inactivity is a major contributor to T2DM, and studies have shown that regular exercise improves insulin sensitivity and glucose metabolism (10). A significant proportion (76.5%) had a family

history of diabetes, confirming the genetic predisposition associated with the disease (11). Additionally, 16.25% of patients required hospitalization due to uncontrolled diabetes, indicating poor disease management among certain individuals.

Dietary habits play a crucial role in diabetes management. The study showed that 100% of patients consumed wet fruits, while high consumption of milk (72%), cereals (74%), and dry fruits (69.5%) was also observed. These findings suggest that most diabetic patients consume healthy foods rich in fiber and essential nutrients, which are beneficial for glycemic control (12). However, 61.5% of participants reported consuming fried food, which can lead to obesity and worsen insulin resistance (13). This highlights the need for awareness programs promoting a balanced diet among T2DM patients.

The study identified depression (91%) as the most prevalent comorbidity, followed by delayed wound healing (88%), fatigue (86%), and hypertension (72%). Depression in diabetic patients is well-documented, with evidence suggesting a bidirectional relationship where diabetes increases the risk of depression, and vice versa (14). Hypertension and cardiac diseases were present in 72% and 69% of patients, respectively, consistent with studies indicating that diabetes increases the risk of cardiovascular complications (15). The presence of osteoarthritis (72%) further emphasizes the impact of diabetes on musculoskeletal health, likely due to obesity and inflammation (16).

Our study also assessed smoking habits, revealing that 25% of diabetic patients were daily smokers, while 4% smoked occasionally. Smoking exacerbates diabetes complications by increasing insulin resistance, oxidative stress, and cardiovascular risks (17, 18). The high percentage of non-smokers (71%) suggests that awareness about the negative impact of smoking on diabetes may be improving, but targeted interventions are still necessary (19). These findings highlight the urgent need for lifestyle modifications, dietary education, mental health support, and comprehensive rehabilitation programs for T2DM patients. Structured awareness campaigns focusing on smoking cessation, healthy eating, and regular physical activity should be implemented. Moreover, genetic screening for high-risk individuals could aid in early diagnosis and prevention. Future research should explore long-term interventions and their effectiveness in diabetes management.

A recent comparative study conducted in India by Singh et al. (2022) explored the relationship between lifestyle factors, dietary habits, and comorbidities among T2DM patients in urban and rural settings, highlighting key differences in disease prevalence and management strategies. The study, involving 600 participants (300 urban and 300 rural), found that urban residents exhibited a significantly higher prevalence of T2DM (42.7%) compared to their rural counterparts (29.3%), likely due to sedentary lifestyles, increased consumption of processed foods, and limited physical activity. In contrast, rural populations had a lower prevalence but a higher reliance on traditional diets rich in whole grains and vegetables, contributing to better glycemic control. The study also revealed that insulin dependency was more prevalent in urban patients (41.2%) than in rural ones (27.5%), suggesting that disease progression was more aggressive in urban settings due to poor lifestyle choices. Additionally, comorbidities such as hypertension (68.9% vs. 53.4%) and cardiovascular diseases (47.1% vs. 32.8%) were significantly higher in urban participants, aligning with dietary patterns that included a higher intake of fried foods, sugary beverages, and fast food. Physical activity levels were markedly different, with 61.5% of rural participants engaging in regular moderate-to-intense physical activity compared to only 35.4% of urban individuals. These findings reinforce the importance of promoting healthier dietary choices and active lifestyles, particularly in urban settings where modernization has led to a decline in traditional health-protective behaviors. The study further suggested that community-based interventions tailored to specific population needs, such as urban diet regulation and rural health awareness programs, could significantly improve diabetes management. These results offer valuable insights for addressing the growing burden of T2DM and highlight the necessity of targeted prevention strategies to mitigate disease complications in diverse populations (20).

CONCLUSION

This study highlights the demographic distribution, lifestyle factors, dietary habits, and associated comorbidities among Type 2 Diabetes Mellitus (T2DM) patients. The highest prevalence of T2DM was observed in the 41–50 age groups. A significant proportion of patients had a family history of diabetes, was married, and used social media. Dietary patterns showed high consumption of milk, cereals, and fruits, while a notable number also consumed fried food. Depression, fatigue, and delayed healing were the most common associated conditions. Additionally, a quarter of the patients were daily smokers, which may contribute to disease complications. These findings emphasize the need for targeted interventions, lifestyle modifications, and rehabilitation strategies to improve diabetes management and patient well-being.

Author Contribution

Author	Contribution
Tasleem Orakzai	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Rafia Nazar	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Hira Shakoor	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Muhammad Zulfiqar Ali	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Rabia Shafiq	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Zarak Speen	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Shumaila Khan	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Muhammad Adnan*	Writing - Review & Editing, Assistance with Data Curation Has given Final Approval of the version to be published
Muhammad Umair*	Writing - Review & Editing, Assistance with Data Curation Has given Final Approval of the version to be published

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