ORIGINAL ARTICLE

Awareness and Perception of Type 1 Diabetes Mellitus (T1DM) in Non-Diabetics at a Teaching Hospital in Lahore Pakistan

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ABSTRACT

Objective: T1DM is a chronic disease, with usual onset in children, caused due to autoimmune destruction of beta cells resulting in inability to produce insulin. To decrease morbidity and mortality caused by T1DM, it is pertinent to educate and spread awareness regarding this disease. The aim of the present study was to assess perception and awareness regarding diagnosis and management of T1DM among non-diabetics.

Methodology: An observational descriptive cross-sectional study was undertaken to evaluate perception and knowledge of T1DM in non-diabetics coming to OPD of CMA Hospital, Azra Naheed Medical College, Superior University Lahore Pakistan from March 2023 to May 2023. A 14-point predesigned questionnaire about T1DM knowledge was distributed among 50 non-diabetic participants, aged 20-50 years, of either gender. SPSS version 26.0 was used for analysis of data.

Results: The majority of the participants (28, 56.0%) were aged between 31 to 40 years. Fourteen participants (28.0%) were aged 30 years or younger, while 8 participants (16.0%) were older than 40 years. In terms of gender, 18 participants (36.0%) were female, and 32 participants (64.0%) were male. Regarding residential background, 14 participants (28.0%) were from urban areas, while 36 participants (72.0%) were from rural areas. Educationally, 21 participants (42.0%) were graduates, and 29 participants (58.0%) were undergraduates. When participants were asked about diabetes mellitus, 44 (88.0%) participants reported having heard about it. However, awareness of Type 1 Diabetes Mellitus (T1DM) was alarmingly low, with only 17 participants (28.0%) indicating they were familiar with it. Furthermore, only 12 participants (24.0%) knew that diabetes could affect children.

Conclusion: Awareness of T1DM is alarmingly low. To improve awareness of Type 1 Diabetes, it is recommended to integrate T1DM education into primary and secondary school curricula, develop

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targeted public health campaigns, and offer community-based workshops. Additionally, regular training for healthcare providers and promoting mobile health apps for diabetes management can enhance education and support for families.

INTRODUCTION

T1DM was previously called juvenile or insulin-dependent diabetes and is on the rise globally especially in the previous decade. T1DM is an autoimmune disease causing destruction of beta-cells in the pancreas resulting in deficient insulin production.[1] T1DM impacts the patient's life quality and health significantly, as its management relies on lifestyle modifications, injectable insulin replacement and regular monitoring of blood glucose. Mainstay of T1DM treatment is injectable insulin replacement.[2,3] Usually given two-to-four times per day, insulin therapy requires the patient to regulate both dietary intake and insulin dose. Over-use or under-use of insulin can lead to hypoglycemia and ketoacidosis respectively.[4] Having a mean age of disease onset as 8.8 years, the usual initial presenting feature in T1DM is diabetic ketoacidosis. Approximately 33 million people were suffering from diabetes mellitus in Pakistan which depicts a 70% rise since 2019.[5] Furthermore almost 4 million patients had T1DM.[5] Given the early age of onset of T1DM, these patients suffer from diabetes related complications later on in life such as nephropathy, retinopathy, neuropathy and cardiovascular disease.[1,3] It is therefore important, given the pandemic of diabetes, that public education and awareness regarding diabetes mellitus especially T1DM should be promoted.

The International Diabetes Federation states that almost 1.1 million people younger than 20 years have T1DM globally. Following in the footsteps of T2DM pandemic, the prevalence of T1DM is also increasing almost 3-4% yearly especially in middle- and low-income countries of Asia and Africa which calls attention for promoting awareness, adopting preventing measures, prompt diagnosis and timely management. [3,5] Despite this, patients often lack awareness and knowledge regarding T1DM which leads to delays in diagnosis and thereby poor outcomes. In a recent study conducted to assess T1DM awareness among teachers, it was found that 84% of participants recognized polyuria and polydipsia as major signs of diabetes, but only 35.3% knew the definition of hypoglycemia, and 40% believed children with diabetes cannot exercise.[7] After the educational intervention, there was a significant improvement in knowledge ($p = 0.0001$), with a notable correlation between better knowledge and knowing someone with diabetes (aOR = 2.66, 95% CI: 1.51–4.70, $p = 0.001$).[7] Yousaf et al.[8] reported that only 62% of doctors were aware of the correct pathogenesis of T1DM, while 88.9% identified diabetic ketoacidosis (DKA) as a major complication; however, only 22% knew the mortality risk, 40% understood insulin's mechanism of action, and 55.6% were aware of how to adjust blood glucose levels and the cause of hypoglycemia.

In children and adolescents with T1DM, Olejniczak et al.[9] demonstrated that incorporating regular and structured educational programs, including both group and individual training sessions (attended by 58% of parents), significantly enhances parents' knowledge and skills in managing T1DM. With 92% of parents stressing the importance of consistent education and 96% rating the training as well-prepared, these efforts improve disease control, provide crucial familial support, and optimize patient outcomes.[9] In low-resource settings, the need for public awareness of T1DM is especially critical due to the limited access to healthcare services, medical supplies, and specialized care. Early diagnosis and treatment of T1DM are essential to managing the disease effectively and preventing life-threatening complications. Without adequate knowledge, individuals and families may fail to recognize the early symptoms of the disease, leading to delayed treatment and worsened outcomes. In these settings, where access to insulin and other necessary treatments may be scarce or prohibitively expensive, raising awareness is key to empowering communities to seek early intervention and manage

the disease. Public education campaigns tailored to low-resource contexts could reduce the risk of diabetes-related complications, improve quality of life, and reduce the burden on already strained healthcare systems. Thus, estimating the awareness level regarding T1DM helps to develop effective strategies so that patient education, management and outcomes may be improved. The objective of present study was to check the perception, awareness and knowledge of T1DM in non-diabetic young adults.

METHODOLOGY

To evaluate perception and knowledge of T1DM, this observational cross-sectional study was undertaken at OPD of CMA hospital, Azra Naheed Medical College Superior University Lahore Pakistan in non-diabetics from March 2023 to May 2023. The present study was conducted in accordance to the ethical standards laid down in the 1964 Declaration of Helsinki, revised in the year 2000. All the subjects were explained the purpose, benefits and process of the study. Assurance was given to protect the life, health, privacy, and dignity of the human study subjects. After taking informed consent, 50 non-diabetic participants attending OPD of CMA Hospital, aged 21 to 50 years, of either gender were enrolled in the study employing non-probability consecutive sampling technique. The sample size of 50 participants, while relatively small, was chosen due to practical constraints such as limited time, available resources, and the need to focus on a manageable group for an exploratory study. A larger sample size would have increased the statistical power and generalizability of the results. However, given the exploratory nature of the study and the specific focus on understanding initial levels of knowledge regarding Type 1 Diabetes (T1DM), this sample size was considered sufficient to capture preliminary trends and provide useful insights.

Participants with a present or past diagnosis of type 1 or type 2 DM were excluded from the study. Demographic information including age, educational status and residential background were noted. A structured questionnaire comprising of 14 points was filled by the participants under supervision of a doctor. The questionnaire used in this study was not pre-tested or validated in prior research. While this may affect the reliability and validity of the data, it is important to note that the questionnaire was designed specifically for this study, addressing key knowledge areas related to T1DM awareness. All the data was recorded. SPSS version 26 was used for the entry and analysis of the data.

RESULTS

The study enrolled 50 non-diabetic participants, with the majority (28, 56%) aged between 31 and 40 years, and a higher proportion of males (32, 64%) compared to females (18, 36%). Most participants came from rural areas (36, 72%), with 21 (42%) being graduates and 29 (58%) undergraduates. While a significant majority (44, 88%) of participants had heard of diabetes mellitus, awareness of Type 1 Diabetes Mellitus (T1DM) was low, with only 14 (28%) having heard of it and 12 (24%) aware that diabetes can affect children.

As demonstrated in Table 1, the questionnaire responses revealed several key findings: 41 (82%) of participants recognized excessive thirst and urination as symptoms of diabetes, and 36 (72%) knew about foods to avoid for individuals with diabetes. However, awareness of T1DM specifics was limited, as only 16 (32%) had heard of a person becoming unconscious due to T1DM, and 16 (32%) believed it could be treated. Alarmingly, only 14 (28%) knew the importance of regular blood glucose monitoring for people with T1DM, and 20 (40%) did not consider regular medical check-ups as important for T1DM patients. These results highlight the need for increased public education and awareness about Type 1 Diabetes, especially in rural areas.

Table 1: Awareness questionnaire for T1DM

Questions related to T1DM	Participants Response	
	Yes n (%)	No n (%)
Have you ever heard about diabetes?	44 (88.0%)	06 (12.0%)
Have you ever heard about type 1 diabetes?	14 (28.0%)	36 (72.0%)
Have you ever heard of diabetes in children?	12 (24.0%)	38 (76.0%)
Has there been any member in your family who have been diagnosed with diabetes between the age of 14-16 years?	05 (10.0%)	45 (90.0%)
Have you seen any educational programs about type 1 diabetes?	11 (22.0%)	39 (78.0%)
Have you attended any educational campaigns about type 1 diabetes?	07 (14.0%)	43 (86.0%)
Are feeling thirsty and increased urination symptoms of diabetes?	41 (82.0%)	09 (18.0%)
Has any child in your family between the age of 5 -16 years had a blood glucose test?	05 (10.0%)	45 (90.0%)
Do you know which foods should be avoided by the people having diabetes?	36 (72.0%)	14 (28.0%)
Do you know about insulin injection use in people suffering from diabetes?	47 (94.0%)	03 (6.0%)
Have you ever heard of a person going unconscious and then being diagnosed as having type 1 diabetes mellitus?	16 (32.0%)	34 (68.0%)
Is it possible to treat type 1 diabetes?	16 (32.0%)	34 (68.0%)
Is diabetes a curable disease?	13 (26.0%)	37 (74.0%)
Are regular medical check-ups during type 1 diabetes important?	30 (60.0%)	20 (40.0%)
Is regular blood glucose monitoring important for people suffering from type 1 diabetes?	14 (28.0%)	36 (72.0%)

DISCUSSION

Deficient production of insulin is the hallmark of T1DM. Therefore T1DM treatment requires insulin administration on a regular basis. Diabetes is a major cause of renal failure, blindness, stroke, myocardial infarction and lower limb amputation which may be preventable by diet modification, physical activity and anti-hyperglycemic medication in addition to scheduled screening for complications.[5,10] Harding et al.[5] reported that there is a paucity of data regarding T1DM, particularly in middle- and low-income countries such as the Asian region. It has

been reported that despite this increase in occurrence of T1DM, awareness regarding this illness and its treatment remains low in the general population.[11] In Makkah Saudi Arabia, Zowgar et al. reported high diabetes knowledge in only 4.7% where as average knowledge was seen in 66.1% and 29.2% had low knowledge.[1] In the present study, awareness of type 1 diabetes mellitus was low (28.0%) and only 24.0% were aware that diabetes can affect children highlighting that non-diabetic adults have insufficient awareness regarding T1DM and its treatment due to lack of as access to information on T1DM.

Existing literature from Pakistan also supports these findings, indicating that awareness of Type 1 Diabetes is generally low, particularly in rural and low-resource settings. For example, a study by Ali et al.[12] in Pakistan found that only 32% of participants had adequate knowledge of T1DM, like the 28% observed in this study. Similarly, research by Sulaiman et al.[13] highlighted low awareness of T1DM symptoms, particularly among rural populations, where access to education and healthcare is more limited. Yousaf et al.[8] reported that only 62% of doctors were aware of the correct pathogenesis of T1DM, while 88.9% identified diabetic ketoacidosis (DKA) as a major complication; however, only 22% knew the mortality risk, 40% understood insulin's mechanism of action, and 55.6% were aware of how to adjust blood glucose levels and the cause of hypoglycemia.

The aim of T1DM management is to achieve optimal glycemic control through diet regulation and exercise, blood glucose monitoring and insulin administration.[14,15] Although this continuous regimen is demanding, it is challenging for adolescents and young adults especially due to additional factors such as family conflict, risk-taking behavior, living away from home, peer influence and starting school/college/work.[14,16] Based on the findings of our study, we highlight the need to increase awareness regarding T1DM. There should be seminars regarding T1DM in primary and secondary schools so that young kids can know about the disease and inform their parents as well.[17] We ought to clear the myths regarding T1DM like it being an impossible disease to treat, by conducting campaigns especially in rural areas. Blood Glucose Tests should be conducted in children as a routine investigation so that the disease can be diagnosed at its early stage. More Facilities and hospitals should be made especially in rural areas so that people have access to knowledge about the disease and its treatment.[17] Health messages and campaigns should be held to increase its awareness among the population. Awareness about Diabetic Ketoacidosis and its fatal consequences should be spread among the masses. Broadcasts on social media, radio and television can also be generated to increase awareness about Type I Diabetes Mellitus.

The study has several limitations that should be considered when interpreting the findings. First, the small sample size of 50 participants limits the generalizability of the results to a broader population. Additionally, the use of non-probability consecutive sampling introduces potential selection bias, as participants were not randomly selected, which may affect the representativeness of the sample. The study also relied on self-reported data, which could lead to response biases, such as over- or underreporting of knowledge and behaviors. The lack of prior validation of the questionnaire used, however, could have led to some inconsistencies in responses, as participants might interpret questions differently. For future studies, pre-testing or adapting a validated tool would help improve the accuracy and consistency of the data collected. Furthermore, the assessment of diabetes knowledge was limited in scope, focusing on only specific aspects, and may not have captured the full range of understanding necessary for effective diabetes management. Lastly, the results may be influenced by contextual factors, such as regional healthcare accessibility and socioeconomic conditions, which may not be applicable to other populations or settings.

Regarding biases, participants were recruited from outpatient departments (OPD), which may introduce selection bias. OPD patients are more likely to have

regular access to healthcare and may be more health-conscious compared to the general population, leading to potentially higher levels of awareness and knowledge about health conditions like T1DM. As a result, the findings may not fully represent the broader community, especially in regions with limited healthcare access. Additionally, the study used non-probability consecutive sampling, meaning participants were not randomly selected, which can further increase the risk of selection bias. This method, while convenient, limits the ability to generalize the findings to all populations. Future research should consider using random sampling to ensure a more representative sample and minimize potential biases.

CONCLUSIONS

The findings of this study indicate that while general awareness of diabetes mellitus is relatively high, knowledge of T1DM is critically low, and awareness that T1DM can affect children is even lower. This suggests a significant gap in public knowledge about the specific characteristics and impact of T1DM. To address this gap, it is crucial to implement targeted public health initiatives, including educational campaigns, seminars, and media broadcasts through platforms such as radio, television, and social media. These efforts should aim to enhance awareness and understanding of T1DM, particularly focusing on its potential impact on children, to encourage early detection and support for those affected by the condition.

Authors' Contribution: This study was conceived and designed by MWR, SA, BW and NIB. MWR, MSA, TU and SA did the initial literature research. MWR, MSA, BW and SA did the data collection, assembly and patient assessment. Data analysis and interpretation were done by NIB, BW and MSA. MWR, TU and SA were involved in manuscript writing. NIB, BW and MSA did the final critical review and corrections.

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