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Exploring diabetic symptomatology in Type 1 patients: a descriptive analysis

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ABSTRACT

Objective: The death rate among diabetic patients is rising due to complications brought on by diabetes. Common symptoms including increased thirst, frequent urination, intense hunger, unexplained weight loss, tiredness, irritation, hazy vision, slow-healing wounds, etc. can be used to diagnose the common complications. In order to create appropriate treatment choices for the most common consequences, this study was planned to evaluate the prevalence of clinical symptoms in type 1 diabetes patients.

Methodology: This multicenter, descriptive study was carried out using a non-probability sampling method. The duration of the study was about six months, from May 1st, 2023, to October 31st, 2023. A total of 95 type 1 diabetes patients, ranging in age from 40 to 65 years, were included in the study. Age, gender, socioeconomic status, co-morbidities (such as dyslipidemia, hypertension), and diabetic symptoms were noted. Demographic characteristics, for instance, gender, concurrent diseases, and clinical signs and symptoms associated with type 1 diabetes, were presented as frequencies and percentages. The means and standard deviations were documented for continuous variables.

Results: The study findings showed that 50 (5.6%) of the respondents were up to 50 years old, 55 (57.9%) of them were female. Moreover, the mean age of the respondents was 52.68±16.11 years.Around, 90 (94.7%) of type 1 diabetes patients urinated thrice at night, and 80 (84.2%) had light colored urine. Similarly, 50 (52.6%) type 1 diabetes patients reported having dry, cracked skin. Approximately, 60 (63.2%) reported having tingling or numbness in hands or feet, 55 (57.9%) reported having burning pain in legs or feet, 70 (73.7%) reported having muscular pain or cramps in legs or feet.

Conclusion: This study concluded that the people with type 1 diabetes were more likely to experience the majority of renal, respiratory, gastrointestinal, and neurological symptoms. Additionally, comorbid conditions like dyslipidemia, hypertension, and obesity raised a person's risk of developing type 1 diabetes.

Keywords: Type 1 diabetes, frequent urination, dry, cracked skin.

INTRODUCTION

Diabetes mellitus (DM) is one of the most frequently encountered concerns in worldwide public health. It is a condition of carbohydrate metabolism in which insulin secretion or its functional ability is reduced, resulting in a consistently high blood glucose level. It has two distinct types: type 1, which affects children and is typically caused by immune systems, and type 2, which affects

adults and is often brought on by pancreatic problems with older aged [1]. It is a financial and emotional cost on the patient as well as a social impact on the nation's economy due to the disease's rising incidence and fatality. DM is a significant contributor to mortality from heart disease, vision loss, kidney damage, depressive disorders, and suicides [2].

Both hereditary and environmental factors that result in immune-mediated death of pancreatic beta-cells and loss of beta-cell activity cause type 1 diabetes in humans. Following the onset of islet autoimmunity, the disease develops by a pre-symptomatic phase marked by indicators of autoimmunity and glucose intolerance, or referred to dysglycemia, resulting from a further decline of cellular activity, and eventually reaches a clinical stage characterized by diabetes signs and symptoms [3,4]. The time it takes for symptoms of the disease to appear after the development of cellular autoimmunity in children as well as adults can range from months to decades [3,4].

Type 1 diabetes prevalence differs by nation and location within nations [5]. Individual’s birth in the spring have a higher risk of developing the condition than those born during other seasons at northern latitudes [6]. Children between the ages of 10 and 14 experience the highest diagnostic rates [5,7]. Even Nevertheless, a lot of people develop type 1 diabetes as adults [8].

A fasting blood glucose level of greater than 7 mmol/L (126 mg/dL), a random blood glucose level of greater than 11 mmol/L (200 mg/dL), the presence of symptoms, or an abnormal oral glucose tolerance test result establish an identification of diabetes [9]. Additionally, a glycated hemoglobin (HbA1c) value over 48 mmol/mol (6.5%) can be used to diagnose diabetes. HbA1c is less sensitive than fasting or stimulated blood glucose measures for the diagnosis, nevertheless, because the progression of dysglycemia can happen quickly in type 1 diabetes patients [9].

Frequent signs of type 1 diabetes in children included a decrease in weight, polyuria, and polydipsia, and diabetic ketoacidosis exists in around a third of cases [10]. Adults who develop type 1 diabetes may not exhibit the typical symptoms that children do at the initial stages. Although type 1 diabetes was once thought to have a juvenile onset, it can now affect anyone at any age, with up to fifty percent of cases developing in adults [11]. Moreover, Individuals with type 1

diabetes may initially be mistakenly identified as having type 2 diabetes in up to 50% of cases [12].

Diabetes patients may also have both chronic and acute neurocognitive alterations, including a reduction in cognitive ability with negative effects on attention, perception of sight, cognitive agility, and cognitive ability [13].

People with type 1 diabetes now have significantly lower risks of micro-vascular and macro-vascular challenges, and their outcomes have improved over the past 25 years [14,15]. Better glycemic control and improved management of related risk factors, such as hypertension and hyperlipidemia, have been major contributors to these advances. Numerous non-glycaemic risk factors for complications have been found in several investigations [16,17]. Studies on genetics revealed that there are no conclusive links between particular gene variants and the presence of complications. There is a significant association between high risks of micro-vascular and macrovascular problems with inadequate levels of education and earnings [16]. Sex also seems to affect risk, as women with type 1 diabetes have been found to have greater rates of early deaths from all causes and vascular complications than do males [17].

The incidence of the overall clinical manifestation of type 1 DM is still not well understood. Additionally, it is crucial to understand the early clinical signs of diabetes mellitus (DM) in the general population in order to diagnose the illness promptly. Therefore, the goal of this study was to evaluate the overall clinical symptoms of type 1 diabetes patients in multi-center settings.

METHODOLOGY

This multicenter, descriptive study was carried out using a non-probability sampling method. The ethical approval was obtained from the concerned hospital. The duration of the study was about six months, from May 1st, 2023, to October 31st, 2023. A total of 95 type 1 diabetes patients, ranging in age from 40 to 65 years, were included in the study. Whereas, individuals with type 2

diabetes, extreme decline of weight, decrease fasting glucose, low glucose tolerance, any surgical process, and those who experienced chemotherapy were excluded from the study.

Patients with T1DM were identified using the most recent HbA1c, a measure of glycemic control. Age, gender, socioeconomic status, physical condition, co-morbidities (such as dyslipidemia, hypertension), and diabetic symptoms were noted. Height and weight measurements were also used to calculate BMI. It was also determined whether stress, anxiety, and depressive symptoms were present. Blood pressure, respiration rate, and pulse were measured by researchers. Following three readings, the maximum blood pressure was calculated together with the mean of the pulse rates. A questionnaire was used to collect information on renal, respiratory, dermatological, oral, and, gastrointestinal symptoms related to diabetes. Additionally, a history of smoking and a lack of physical activity were also documented.

Data was entered and analyzed using SSPS version 20.0. Demographic characteristics for instance gender, concurrent diseases, and clinical signs and symptoms associated with type 1 diabetes were presented as frequencies and percentages. The means and standard deviations were documented for continuous variables.

RESULTS

The study result showed that 50 (5.6%) of the respondents were up to 50 years old, 55 (57.9%) of them were females, 45 (47.4%) of them were from middle class, 65 (68.4%) of them had positive history of hypertension, 70 (73.7%) of them had positive history of dyslipidemia, 20 (21.1%) of them had positive history of depression, 40 (42.1%) of them were smokers whereas 30 (31.6%) of them were physically active (table 1A).

Table 1A: Participant Profile (n=95).

Participant Characteristics	**Count (%)**
Age Group	
Up to 50 years	50 (52.6)
More than 50 years	45 (47.4)
Gender	
Male	40 (42.1)

Female	55 (57.9)
Socioeconomic Status	
Low	15 (15.8)
Middle	45 (47.4)
High	35 (36.8)
History of Hypertension	
Yes	65 (68.4)
No	30 (31.6)
History of Dyslipidemia	
Yes	70 (73.7)
No	25 (26.3)
History of Depression	
Yes	20 (21.1)
No	75 (78.9)
History of Smoking	
Yes	40 (42.1)
No	55 (57.9)
Physical Activity	
Yes	30 (31.6)
No	65 (68.4)

Moreover, the mean age of the respondents was 52.68±16.11 years, their mean weight was 66.11±14.70 kg, their mean height was 69.78±9.97 inches, their mean BMI was 21.88±6.74 kg/m^2, their mean respiratory rate was 18.26±5.90 per minute, their mean heart rate was 84.84±11.77 per minute, their mean duration of hypertension was 4.63±4.49 years whereas their mean number of cigarettes smoked per day was 3.47±5.59 (table 1B).

Table 1B: Participant Profile(n=95).

Participant Characteristics	**Mean±S.D.**
Age (Years)	52.68±16.11
Weight (kg)	66.11±14.70
Height (Inches)	69.78±9.97
BMI (kg/$m^{2)}$	21.88±6.74
Respiratory Rate (Per Minute)	18.26±5.90

Heart Rate (Per Minute)	84.84±11.77
Duration of Hypetension[1]	4.63±4.49
Cigarettes smoked/day[2]	3.47±5.59

[1]n=65

[2]n=40

Furthermore, 10 (10.5%) of them had history of frequent urination, 90 (94.7%) of them urinated thrice at night, 80 (84.2%) had light colored urine, 20 (21.1%) reported that their BP control has become worst, 50 (52.6%) reported swelling of feet/ankles/hands/eyes, 15 (15.8%) reported confusion/difficulty in concentrating,40 (42.1%) reported shortness of breath,30 (31.6%) reported dyspnea while climbing stairs, 55 (57.9%) reported moderate difficulty in breathing,25 (26.3%) reported chest tightness or pressure, 60 (63.2%) reported that their chest pain improved with rest, 20 (21.1%) reported that their dental surgery took longer to heel, 15 (15.8%) reported that their gums are red with swelling and pain,20 (21.1%) reported having dry mouth, 30 (31.6%) reported having burning sensation in mouth,20 (21.1%) reported increased occurrence and severity of infections,50 (52.6%) reported having dry cracked skin, 15 (15.8%) reported having light brown scaly patches on skin, 10 (10.5%) reported having yellow, reddish or brown patches on skin, 40 (42.1%) reported having dark area of skin that feels like velvet, 25 (26.3%) reported having blisters, 60 (63.2%) reported having tingling or numbness in hands or feet, 55 (57.9%) reported having burning pain in leg or feet, 15 (15.8%) reported their feet being too sensitive on touch,70 (73.7%) reported having muscular pain or cramps in leg or feet whereas 45 (47.4%) reported their symptoms to become worse at night (table 2).

Table 2: Clinical Characteristics of the Respondents

Clinical Characteristics (n=95)	**Count (%)**
Frequent urination	
Yes	10 (10.5)
No	85 (89.5)
Number of urination/night	
3 times	90 (94.7)
Every 2 hours	5 (5.3)
Every 1 hour	Nil
Color of urine	
Light Colored	80 (84.2)
Dark Yellow	15 (15.8)

Very Dark or Bloody	Nil
BP control became worst	
Yes	20 (21.1)
No	75 (78.9)
Swelling of feet/ankles/hands/eyes	
Yes	50 (52.6)
No	45 (47.4)
Confusion/difficulty in concentrating	
Yes	15 (15.8)
No	80 (84.2)
Shortness of breath	
Yes	40 (42.1)
No	55 (57.9)
Dyspnea Grading	
While climbing stairs	30 (31.6)
While walking for more than 6 hours in a day	25 (26.3)
While walking for less than 6 hours in a day	25 (26.3)
While at rest	15 (15.8)
Difficulty in breathing	
Mild	30 (31.6)
Moderate	55 (57.9)
Severe	10 (10.5)
Chest tightness or pressure	
Yes	25 (26.3)
No	70 (73.7)
Severity of chest pain	
Improves with rest	60 (63.2)
Need pain relieving medication	35 (36.8)
Requires hospital visit	Nil
Dental surgery took longer to heel	
Yes	20 (21.1)
No	75 (78.9)
Gums are red with swelling and pain	
Yes	15 (15.8)
No	80 (84.2)
Dry mouth	
Yes	20 (21.1)
No	75 (78.9)
Burning sensation in mouth	

Yes	30 (31.6)
No	65 (68.4)
Increased occurrence and severity of infections	
Yes	20 (21.1)
No	75 (78.9)
Dry cracked skin	
Yes	50 (52.6)
No	45 (47.4)
Light brown scaly patches on skin	
Yes	15 (15.8)
No	80 (84.2)
Yellow, reddish or brown patches on skin	
Yes	10 (10.5)
No	85 (89.5)
Dark area of skin that feels like velvet	
Yes	40 (42.1)
No	55 (57.9)
Hard thickened skin	
Yes	Nil
No	95 (100)
Blisters	
Yes	25 (26.3)
No	70 (73.7)
Tingling or numbness in hands or feet	
Yes	60 (63.2)
No	35 (36.8)
Burning pain in leg or feet	
Yes	55 (57.9)
No	40 (42.1)
Feet too sensitive on touch	
Yes	15 (15.8)
No	80 (84.2)
Muscular pain or cramps in leg or feet	
Yes	70 (73.7)
No	25 (26.3)
Symptoms worse at night	
Yes	45 (47.4)
No	50 (52.6)

Vision assessment of the respondents revealed that 30 (31.6%) of them had visual disturbances, 25 (26.3%) of them had blurred vision, 30 (31.6%) of them had vision loss, 20 (21.1%) of them had blind spots, 5 (5.3%) of them had vision distortion, 5 (5.3%) of them hadpoor vision at night, 10 (10.5%) of them had dark spot/streaks in vision whereas 55 (57.9%) had trouble in reading/seeing faraway objects (table 3).

Table 3: Vision Assessment of the Respondents

Vision Assessment (n=95)	**Count (%)**
Visual disturbances	
Yes	30 (31.6)
No	65 (68.4)
Blurred vision	
Yes	25 (26.3)
No	70 (73.7)
Vision loss	
Yes	30 (31.6)
No	65 (68.4)
Flashes	
Yes	Nil
No	95 (100)
Blind spots	
Yes	20 (21.1)
No	75 (78.9)
Vision distortion	
Yes	5 (5.3)
No	90 (94.7)
Poor vision at night	
Yes	5 (5.3)
No	90 (94.7)
Dark spot/streaks in vision	
Yes	10 (10.5)
No	85 (89.5)
Trouble in reading/seeing faraway objects	
Yes	55 (57.9)
No	40 (42.1)

Moreover, appetite assessment of the respondents revealed that 55 (57.9%) of them had loss of appetite, 30 (31.6%) of them wereconcerned about appetite loss, 25 (26.3%) of them had insomnia, 35 (36.8%) of them had increased thirst, 75 (78.9%) of them had fatigue, 10 (10.5%) of them had increased hunger, 60 (63.2%) of them had unexplained weight loss, 50 (52.6%) of them reported that their cuts/wounds have delayed healing, 30 (31.6%) of them had sweet smelling breath, 30 (31.6%) of them had cold sweeting, 70 (73.7%) of them felt tired and weak occasionally whereas 55 (57.9%) of them reported irritability or other mood changes (table 4).

Table 4:Appetite Assessment of the Respondents

Appetite Assessment (n=95)	**Count (%)**
Loss of appetite	
Yes	55 (57.9)
No	40 (42.1)
Concerned about appetite loss	
Yes	30 (31.6)
No	65 (68.4)
Insomnia	
Yes	25 (26.3)
No	70 (73.7)
Increase thirst	
Yes	35 (36.8)
No	60 (63.2)
Fatigue	
Yes	75 (78.9)
No	20 (21.1)
Increased hunger	
Yes	10 (10.5)
No	85 (89.5)
Unexplained weight loss	
Yes	60 (63.2)
No	35 (36.8)
Cuts/wounds have delayed healing	
Yes	50 (52.6)
No	45 (47.4)
Sweet smelling breath	
Yes	30 (31.6)
No	65 (68.4)

Cold sweeting	
Yes	30 (31.6)
No	65 (68.4)
Feel tired and weak occasionally	
Yes	70 (73.7)
No	25 (26.3)
Irritability or other mood changes	
Yes	55 (57.9)
No	40 (42.1)

DISCUSSION

The death rate is rising among diabetic patients owing to complications brought on by diabetes. Neuropathy, nephropathy, retinopathy, foot ulcers, sluggish wound recovery, renal dysfunction, amputation, organ failure, recurrent infections, sepsis, dermatological conditions, diminished hearing, coronary artery disease, etc. are some of the prevalent complications. Some typical symptoms, such as more thirst, frequent urination, intense hunger, unidentified loss of weight, weariness, irritation, hazy vision, slow-healing wounds, etc., can be used to diagnose these complications [18]. In order to create effective treatment choices for the most common symptoms of type 1 diabetes, this study established the prevalence of several overall clinical features in this disease.

One of the studies observed that the mean age of diabetes patients upon presentation was 50 ±11 years. A patient with diabetes usually suffers from the condition for 8.5 years, and most diabetic patients (37%) have it for at least 10 years [19]. These results corroborated Ahmed et al. study's finding that the median age of diabetic patients was 54 years old [20]. The present study was partially consistent with the above-reported studies and revealed that the mean age of the type 1 diabetes patient was 52.68±16.11 years. Whereas the duration of diabetes was not mentioned in this study.

Likewise, another study reported that the type 2 diabetics were observed to have a 39.84% overall prevalence of hypertension [21].In contrast, earlier research conducted in Pakistan found hypertension (40.45%) [22]. However, compared to studies conducted in Turkey (29%), and India

(25.6%), these findings showed a significant prevalence of high blood pressure among type 2 diabetes patients [23,24]. Differences in the socio-demographics, research methodology, and kind of study group, sample size variation, and level of knowledge could all be used to explain discrepancies in the results. According to the present study, 65 (68.4%) type 1 diabetes patients displayed higher rates of hypertension, indicating that the presence of comorbidities increases the chance of developing diabetes.

Similarly, another cross-sectional study was conducted in a tertiary care hospital of Karachi. The study included 160 diabetic participants, who ranged in age from 11 to 90. There were 108 women and 52 men among the 160 patients. Of all participants, 124 (78%) had type 2 diabetes, while 57 (36%) had type 1 diabetes. 117 (73%) exhibited perplexity of mind, 105 (66%) had hypertension, 106 (66%) had damage to the eyes (retinopathy), 96 (60%) experienced trouble concentrated vision, and 70 (44%) had experienced seizures, 68 (43%) exhibited wounds on foot and delayed wounds healing, 49 (31%) suffered from kidney failure (nephropathy), 79 (49%) had cramps in legs or knee, 35 (22%) and 26 (16%) exhibited cardiac issues and liver disease respectively. Some patients, such as 99 (62%) patients exhibited increased appetite, 118 (74%) were experiencing frequent urination, 138 (86%) displayed tiredness, 123 (77%) observed thirst, 35 (22%) had vomiting, 30 (19%) had a frequent cold, 36 (23%) had problems with the skin, and 17 (11%) patients displayed episodes of vomiting. [25]. The present study showed inconsistency with the above-mentioned study and indicated that urinary symptoms such as more urination at night in 90(94.7%) were more pronounced. Additionally, swelling of feet 50 (52.6%), shortness of breath, 40(42.1%), dry, cracked skin 50(52.6%), tingling or numbness in hands or feet 60(63.2%), muscular pain or cramps in legs or feet 70(73.7%)were also observed. Besides, gastrointestinal issues such as appetite loss were noticed in 55(57.9%), fatigue in 75(78.9%), unexplained weight loss in 60(63.2%), delayed wound healing 50(52.6%), feeling tired and weak occasionally in 70(73.7%) type 1 diabetes patients.

Xerosis is one of the most prevalent dermatological symptoms in diabetic individuals and is thought to affect up to 40% in another research [26]. The medical name for an unusually dry epidermis is xerosis. Affected skin may appear rough, scaled, or have fissures in it. These skin alterations are commonly found on the ankles of diabetic patients. According to reports, obese diabetic people have foot hypohidrosis that is more severe [27]. Xerosis frequently occurs in

diabetic patients with microvascular problems [28]. These findings supported the present study and revealed that more than half of the type 1 diabetic patients 50 (52.6%) had complained of dry, cracked skin, which typically affected their ankles.

Likewise, another study conducted in China observed the prevalence of Cardiovascular Autonomic Neuropathy (CAN) in people with diabetes. About 2,048 people were chosen at random, with 73 receiving a T1DM diagnosis and 1975 receiving a T2DM diagnosis. The most common CAN symptoms were lethargy (28.6%), vertigo (23.4%), repeated urination (19.6%), sweating (18.3%), and nighttime urination (15.9%) [29]. The present study contradicted earlier studies and revealed a significant prevalence of fatigue (78.9%), nighttime urination (94.7%), and cold sweats (30.6%).

The study's limitations include its small sample size. One of the study's shortcomings in methodology is unevenly representations of the gender. In order to effectively manage type 1 diabetes, it is crucial to accurately determine the severity of diabetes-related complications.

CONCLUSION

This study concluded that the people with type 1 diabetes were more likely to experience the majority of renal, respiratory, gastrointestinal, and neurological symptoms. Additionally, comorbid conditions like dyslipidemia, hypertension, and obesity raised a person's risk of developing type 1 diabetes. The health and quality of life of people with diabetes mellitus must be improved through patient education and lifestyle changes.

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