Knowledge and Self-Management Practice Among Diabetic Patients from the Urban Areas in Bangladesh

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Abstract

This study aims to determine the knowledge of self-management, prognosis, and the quality of daily life among adult patients with Type 1 and Type 2 diabetes in Bangladesh. Settings and Design: A descriptive cross-sectional study was conducted from April 2021 to August 2021 on diabetic patients from Dhaka City and Rangpur City in Bangladesh. A structured questionnaire was used to collect information from the respondents of this study. The data was collected via a phone interview by the researchers of this study. The data was analyzed using Python (Version 3.8), Pandas, ResearchPy (A Python package for research data analysis), and Microsoft Excel 2019. We found that 85% of the participants were aware of Bangladesh National Diabetes Management Guidelines and its recommendations, and males were better informed about diabetes and its management than females. Most participants (68.32%) experienced an onset of diabetic symptoms around 50-60 years of age, and 34.65% of participants were unaware of the type of diabetes they had. 91% were satisfied with the prognosis of their diabetes. However, the frequency of check-ups for hyperglycemia from serum was insufficient (less than once annually) despite the national guidelines' recommendation for quarterly check-ups. Participants were more eager to check for diabetes-associated symptoms (more than 3 times a year among 80.53%) rather than checking the serum hyperglycemia. Female participants were lenient to take physical exercise to self-manage diabetes. The healthcare centers across Bsangladesh need to make the information provided by Bangladesh National Diabetes Management Guidelines more reader-friendly for all socio-economic groups. Broader movements are needed to make patients feel more interested to learning, practicing, and following the guidelines.

Keywords: Bangladesh; Diabetes; Knowledge; Public Health Concern; Self-Management

Introduction

Diabetes is a health condition prevalent in both developed and developing countries. Diabetes is defined as the presence of constantly elevated serum glucose (hyperglycemia) that leads to a range of metabolic disorders (Mukai et al., 2012), the level of glucose is custom-defined for each ethnicity/ population (Kodama et al., 2013). Diabetes manifests in two major types: type I is medically termed diabetes mellitus, characterized by immune-

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Significance | A better understanding of the diabetes management

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Table 1: Summary of Basic Demographic Data from Participants (n=303)

Variables	Count (n)	Percentage (%)
Male	211	69.64
Female	92	30.36
Age Group		
16-35	15	4.95
36-50	108	35.64
51-65	157	51.82
66 and above	23	7.59
Marital Status		
Married	296	97.69
Unmarried	7	2.31
Education Level		
No Education	23	7.59
SSC	37	12.21
HSC	40	13.2
Undergraduate	34	11.22
Graduate	76	25.08
Post Graduate	93	30.69
Occupation		
Public Service	74	24.42
Homemakers	67	22.11
Retired	41	13.53
Private Service	36	11.88
School / College Teacher	24	7.92
Police and Defense Service	16	5.28
Bank and Financial Institution	8	2.64
Doctor / Physician	8	2.64
Govt. / Private University Teacher	7	2.31
Health Care Service Provider	6	1.98
Student	5	1.65
Others	11	3.63

Table 2: Basic Health Data from Participants

Questions	Counts (n)	Percentage (%)
At which age you diagnosed diabetes?		
Under 16 years	1	0.33
16 to 35	60	19.8
36 to 50	207	68.32
51-65	29	9.57
66 and above	6	1.98
What type of diabetes do you have?		
Type 1	71	23.44
Type 2	127	41.91
Don't know	105	34.65
Did you inject insulin within the first 3 months of being diagnosed?		
Yes	68	22.44
No	235	77.56
Did you continue injecting for more than one year after you first injected insulin?		
Yes	84	27.72
No	219	72.28

mediated destruction of pancreatic β-cells resulting in insulin deficiency (Webber, 2013). Type 2 diabetes, also called diabetes insipidus, refers to a group of disparate metabolic diseases typically characterized by insulin resistance in peripheral tissues and impaired insulin secretion from pancreatic β-cells (Webber, 2013). Patients with type 1 diabetes are more likely to have insulin resistance and cardiovascular issues, while type 2 diabetic patients have lower BMI, fewer cardiovascular issues, and lower C-peptide concentrations. Diabetes, in most cases, is caused by a loss of the physical or functional β-cell mass, primarily due to an autoimmune process (type 1 etiological process) and/or increased need for insulin due to insulin resistance (type 2 process). Type 2 diabetes is found in those with resistance to the action of insulin, usually because of obesity and deficient insulin secretion (Regina et al., 2022).

Type 1 diabetes is the most common form of diabetes in children and adolescents in most countries, but other forms of diabetes also occur, including type 2 diabetes and monogenic diabetes. Type 1 diabetes is a complex condition to manage. Insulin injections are needed for survival, and good outcomes can only be achieved with multiple daily injections or an insulin pump. Successful insulin therapy requires self-monitoring of blood glucose, comprehensive diabetes education, and the support of skilled health professionals. Type 2 diabetes mellitus is defined by two fundamental abnormalities. The first anomaly in developing type 2 diabetes mellitus is insulin resistance, usually compensated for by increased insulin production. Second, type 2 diabetes mellitus is caused by a malfunction in insulin secretion, which prevents it from keeping up with the increased demands imposed by the insulin-resistant condition. Type 2 diabetes is the most common type of diabetes, accounting for over 90% of all diabetes worldwide, and Type 1 diabetes mellitus (T1DM) accounts for 5% to 10% (Bhowmik et al., 2021; Regina et al., 2022). The proportion of children and adolescents with type 2 diabetes has increased over the last one to two decades. Diabetes mellitus is a life-long condition, and appropriate management can improve an individual's quality of life (Foma et al., 2013).

The onset and management of diabetes are heavily reliant on the patient's activities. Knowledge of diabetes can assist diabetic patients in avoiding the development of chronic DM commodities, which impact their quality of life. Furthermore, people may use the information to estimate their diabetes risk, encourage them to seek appropriate treatment and care, and motivate them to manage their condition for the rest of their lives, a set of interventions from patients themselves, collectively called self-management (Fatema et al., 2017). Their diabetes risk, encourage them to seek appropriate treatment the Bangladesh Association of Diabetic Societies (BADAS), but the best management practices are yet to reach the majority. In Bangladesh, a few clinical studies on diabetes knowledge, attitudes, and practices among non-diabetic and diabetic patients have been conducted (Fatema et al., 2017).

According to the International Diabetes Federation (IDF), 537 million people worldwide had diabetes in 2021, ranging from 20 to 79 years. In addition, diabetes will affect 643 million adults by 2030 and 783 million by 2045. IDF projects that the number of people with diabetes in the South-East-Asia Region will increase by 68%, reaching 152 million by 2045. Over the same period, the prevalence of diabetes will increase by 30%. The proportion of undiagnosed diabetes is the third highest of the IDF Regions at 51.2% (*IDF Diabetes Atlas*). Bangladesh ranked 8th for the number of adults (20-79 years) with diabetes in 2021, with approximately 13.1 million adults. This number is expected to rise to 22.3 million by 2045 in Bangladesh. About 43.5% of adults between the age of 20-79 years with undiagnosed diabetes in 2021. The age-adjusted prevalence of people with diabetes (20-79 years) rate was 14.2% (*IDF Diabetes Atlas*). Asia had the highest occurrence (32%) and prevalent (31%) rates of type 1 diabetes while having 60% of the world's population (Green et al., 2021). In Bangladesh, self-management of diabetes is characterized by six features: acknowledging diabetes, regular check-up of serum/ urine glucose levels, assessing co-morbidities, adhering to a low-carbohydrate diet, maintaining an active lifestyle, and strict administration of medication. Self-management creates a patient-provider relationship to facilitate three self-management tasks: medical management, role management, and emotional management (World Health Organization, 2013).

Currently, national guidelines for the management of diabetes consist of spreading awareness against diabetes, providing basic diagnostic facilities at district levels, and ensuring treatment options for common diabetic co-morbidities (e.g., Hyperlipidemia, hypertension, hypercholesterolemia, diabetic retinopathy, diabetic nephropathy, infertility), prevention of diabetic diseases through diet/exercise/medication. The Diabetic Association of Bangladesh (BADAS) advocates providing complete care to the most significant number of diabetics at any facility. The organization is sincerely committed to its goal that "no diabetic shall die untreated, unfed or unemployed, even if poor." Two programs, the Life for a Child Programme (LFAC) financed by the IDF and the Changing Diabetes in Children program, jointly developed by BADAS, Novo Nordisk, and the World Diabetes Foundation, have recently helped BADAS in its work for children and adolescents (Azad, 2015).

This study aimed to explore diabetes-related knowledge, self-management, attitudes, and practices of type 1 and type 2 diabetes Mellitus populations in Dhaka and Rangpur districts in Bangladesh.

Table 3: Self-reported health status from Participants with (n = 303) Diabetes

Questions	Count	Percentage
Overall health in the past 4 weeks?		
Good	134	44.22
0000Fair	94	31.02
Very Good	46	15.18
Poor	27	8.91
Excellent	2	0.66
Does diabetes affect day to day activities?		
Yes	165	54.46
No	138	45.54
Family history of diabetes		
Yes	187	61.72
No	116	38.28
Whether stayed in hospital overnight		
Yes	134	44.22
No	169	55.78
Reason for most recent stay in hospital		
Diabetes	11	3.63
Both diabetes and symptoms related to diabetes	86	28.38
symptom unrelated to diabetes	3	0.99
Something else	133	43.89
not stayed	70	23.1
Where do you go for diabetes check-up		
Hospital/clinic	136	44.88
Doctor's chamber	67	22.11
At home	54	17.82
Local pharmacy	44	17.82
Others	2	0.66
Number of diabetes check-ups in the last 12 month		
Three or more time	244	80.53
Twice	37	12.21
Once	8	2.64
None	1	0.33

Table 4: Concept of Self-management of diabetes among Participants (n=303)

Questions	Count	Percentage
How do you control your diabetes now?		
Insulin	83	26.6
Tablets	186	59.6
Diet	163	52.2
Physical Activity	136	43.6
Others	42	13.5
Do you take any medication for any other condition?		
Yes	230	75.91
No	67	22.11
Don't Know	6	1.98

Table 4 continued.

What type of medication do you take?		
Tablets for high blood pressure	109	34.9
Tablets for high cholesterol	66	21.2
Tablets for heart disease	99	31.7
No medication	73	23.4
Others	106	34
How often do you test your own blood glucose level per month?		
Less than once	236	77.89
Once a Day	22	7.26
4 or more times a day	3	0.99
2 or 3 times a day	2	0.66
Never	40	13.2
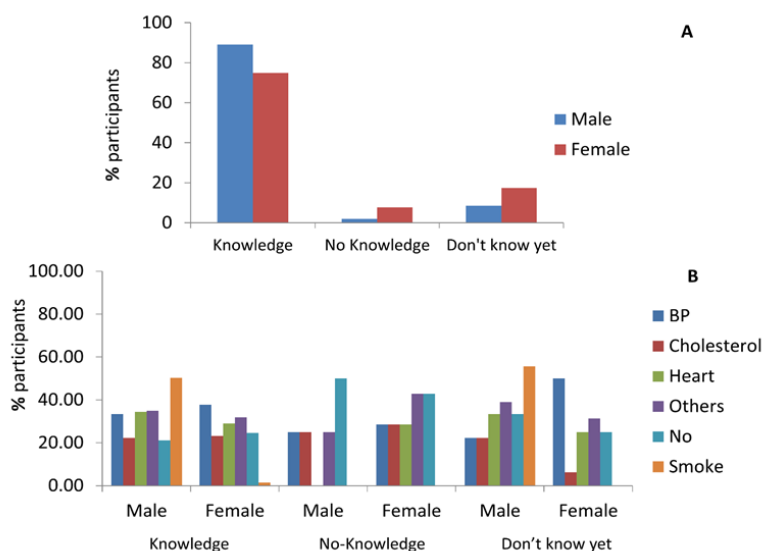
Figure 1: Distribution of participants on knowledge of self-management of diabetes across genders (A) and co-morbidities (B).
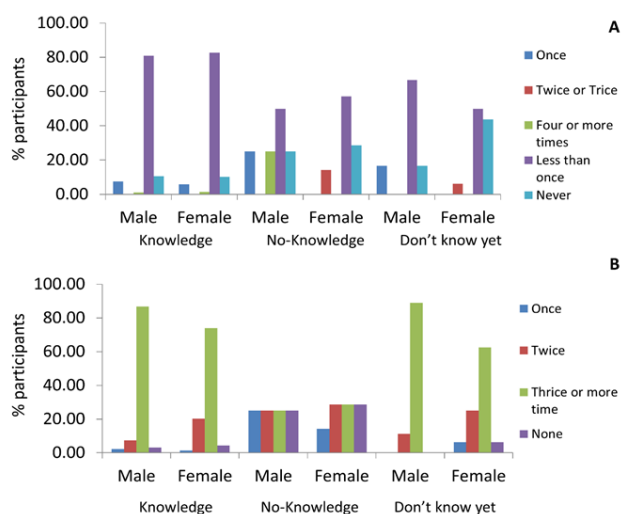

Figure 2: Frequencies of annual check-ups for serum glucose (A) and diabetic-associated pathologic conditions (B) among the participants.
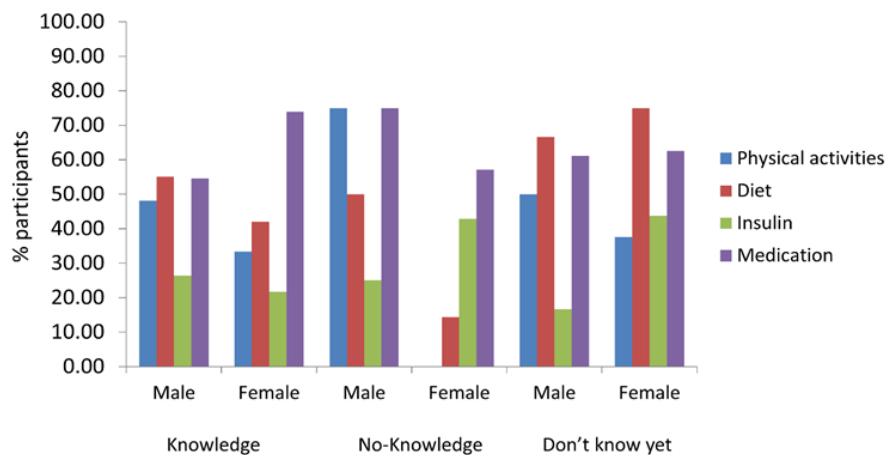
Figure 3: Control measures taken to self-manage diabetes by participants across the three knowledge groups.
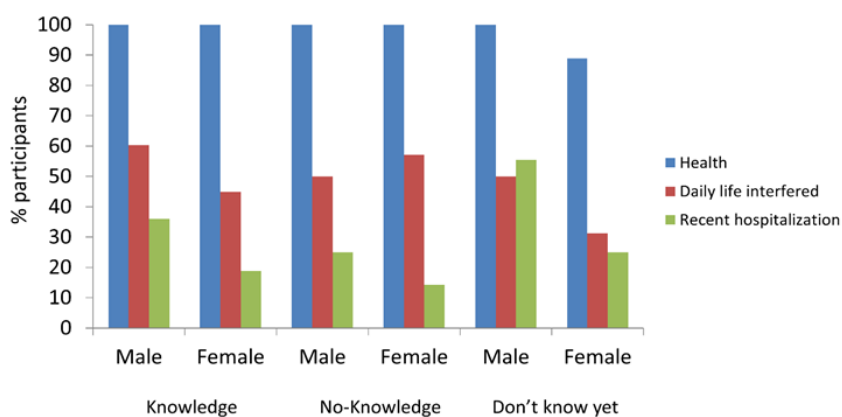

Figure 4: Outcomes of diabetes prognosis across all three knowledge groups among participants

Materials and Methods

Site Selection

One healthcare center in Dhaka city and one in Rangpur city were selected as study sites since these 2 healthcare centers are committed to public engagement and community-based awareness drives.

Setting the questionnaire

The questionnaire was prepared based on a literature review of similar studies conducted in different parts of the world with some modifications in the questions based on common practices in Bangladesh. The questionnaire was separated into four sections: participants' demographic information, self-reported diabetes type, self-management of diabetes, and the level of knowledge regarding diabetes. The data was collected through phone interviews with every participant with their consent. The sample questionnaire is presented in supplementary material 1.

Enrolment of participants

The eligibility criteria for participants' enrolment are:

1. Participants must be Bangladeshi.
2. Should be a long-term resident of Dhaka or Rangpur and be registered with the local Diabetic network.
3. Should be above 16 years or above.
4. Should answer the complete questionnaire correctly.

Data collection for the survey

The data was collected through phone interviews with every participant with their consent.

Inclusion-exclusion criteria

Participants who answered all questions to the best of their knowledge and enthusiasm were included in the study. Participants who were not enthusiastic or 'couldn't answer all questions knowledgeably/ truthfully were excluded from the study.

Study design

A cross-sectional study was carried out from April to August 2021 of diabetic patients from Dhaka and the Rangpur district of Bangladesh towards knowledge of diabetes, self-management, and the effects of diabetes on their daily activities.

Statistical analysis

Data were exported as Excel file and analyzed by Pandas (A Python package for data manipulation). Descriptive statistics, such as frequencies and percentages, were used to present the data. The Tables 1,2,3 and 4 were generated using ResearchPy (A python package for research data analysis). Finally, the comparative figures 1,2,3 and 4 were generated using Microsoft Excel 2019.

Ethics

This study adhered to the most significant ethical standards imaginable, and participants gave informed consent. Informed consent was also obtained from the guardian of each participant under 18 years of age. The Helsinki Declaration was observed in all procedures. We obtained ethical approval for this study from the Ethical Review Committee of CHIRAL Bangladesh (Reference No: CHIBAN21MAR2021-0003)

Supporting information

Supplementary material 1. This is the supplementary material for the sample questionnaire.

Results

Demographic summary

The demographic profile of the individuals in this study is shown in (Table 1). The study included 303 respondents of them, 211 (69.64%) were male, and 92 (30.36%) were female. Most were married (286, 97.69%), and few were unmarried (7, 2.31%). Their ages ranged from 20 to 80, with a mean age of 52.53. 157 (51.82%) of the respondents were aged 51-65 years, 108 (35.64%) were aged 36-50 years, 23 (7.59%) were aged 66 years or over, 15 (4.95%) were aged 16-35 years. 74 (24.42%) were engaged in public service, 67 (22.2%) were homemakers, 41 (13.53%) were retired, 36 (11.88%) were private service-holders, 24 (7.92%) were teachers,16 (5.28%) were doing police and defense service, 8 (2.64%) were employed in Bank and Financial Institution, 8 (2.64%) were Physician, 7 (2.31%) were private or public university teacher, 6 (1.9%) were health care service provider, 5 (1.65%) were Student, and 11 (3.63%) were engaged in other professions. A number of studies attempt to associate lifestyle disorders with education and occupation (Carlsson et al., 2020). According to Table 1, almost half our participants were highly educated (graduate and post-graduate) whereas almost all participants were found to be engaged in sedentary profession as opposed to a small percentage in services requiring physical action (5.28% in law-enforcement and defense).

Table 2 shows the estimation of the diabetes type of the respondents. The participants of this survey were asked at which age they diagnosed diabetes; 207 (68.32%) said 36-50 years, 60 (19.80%) said 16-35 years, 29 (9.57%) said 51-65 years, 6 (1.98%) said 66 years and above, and 1(0.33%) said Under 16 years. In addition, respondents reported that 71 (23.43%) had Type 1 diabetes, 127 (41.91%) had Type 2 diabetes, and 105 (34.65%) said that they didn't know.

Table 3 shows that 187 (61.72%) have a family history of diabetes, and 134 (44.22%) stayed in the hospital overnight. The reasons for the most recent hospital admission were the direct effect of diabetes (11, 3.63%), symptoms related to diabetes (86, 28.38%), symptoms unrelated to diabetes (3, 0.99%), and something else (133, 43.89%). On the other hand, 70 (23.10%) did not recently stay in the hospital. 136 (44.88%) of the participants go to a hospital or clinic to check up on diabetes, 67(22.11%) doctor's chamber, 54 (17.82%) at home, 44 (17.82%) local pharmacy, 2 (0.66%) others. Thus, most of the 244 (80.53%) had check-up diabetes three or more times in the last 12 months, 37 (12.21%)

twice, 8 (2.64%), and 1 (0.33%) of them did not have check-up diabetes.

The results of knowledge and attitudes toward diabetes are presented in (Table 4). Most respondents knew when to take medication, but 11.12% did not know. The respondents also showed a positive attitude toward medicine. Among the participants, 65.02% were non-smokers, and 34.98% were smokers.

Figure 1 grouped the participants into 3 categories: i) participants who know about diabetes, its risks, and self-management from their healthcare centers, ii) participants who are not aware of the information on diabetes, its risks, and self-management from their healthcare centers, iii) participants who know their healthcare centers have the information package on diabetes, its risks, and self-management, but don't know that information. Figure 1 (A) distributed participants based on their gender, and Figure (B) shows the occurrence of co-morbidities among the 3 categories of participants based on knowledge. The co-morbidities 'don't vary significantly across groups.

Figure 2 reveals majority of participants across all knowledge groups check for serum glucose less than once a month (Figure 2A). Still, they check for diabetes-related co-morbidities three or more times per month.

The knowledge of self-management of diabetes prompts physical activities and diet in male participants but to a lesser extent in females. The uptake of insulin and medication was similar across all knowledge groups (Figure 3).

All three knowledge groups experienced identical outcomes of the prognosis of diabetes. There was no significant difference in basic health parameters among the genders across the groups; all three groups underwent deterioration of the quality of daily life and hospitalization due to diabetes-associated co-morbidities (Figure 4).

Discussion

This study shows the below-satisfactory level of dissemination of knowledge related to self-management of diabetes among participants from Dhaka city and Rangpur (Figure 1A). This finding is similar to a study by Islam et al. (2014) conducted in rural Bangladesh, but inconsistent results were also discovered in two other studies by Fatema et al. (2017) and Siddique et al. (2017) (Fatema et al., 2017; Islam et al., 2014; Siddique et al., 2017). 85% of all participants are fully aware of the national diabetes management guidelines from their healthcare centers, but 15% are not fully acquainted with the guidelines. Females are lagging in participation (30%) and knowledge group (75%) compared to males (69% and 89%, respectively) (Table 1 and Figure 1 A). This finding is also supported by earlier studies where men scored higher in knowledge and attitude (Fatema et al., 2017; Mahzari et al., 2022). Almost half the participants (51.82%) reported the onset and diagnosis of diabetes between 50 to 60 years of age, followed by the group of young adults (35.64%) (Table 2). Nearly one-third of the participants 'didn't know which type of diabetes they had (Table 2). While most participants were happy with their health over the last 4-weeks before the survey, 8.91% were unhappy about their health (Table 2). Most participants depended on healthcare facilities of different capacities for measuring serum glucose (44.88% in clinics, 22.11% in private chambers of doctors, 17.82% at local pharmacies) in contrast to 17.82% of people who check blood sugar at home (Table 3). 80.53% of participants take at least 3 check-ups for blood sugar annually (Table 3). 59.6% of participants were dependent on drugs (e.g., metformin, pramlintide, sulfonylurea, glinides) for control of hyperglycemia, 88% were aware of diet changes, and 89.11% were aware of the importance of physical activities to manage diabetes (Table 4) and 35.98% were smokers.

All three knowledge groups had similar occurrences of co-morbidity factors associated with diabetes (Figure 1B). Figure 2A shows a deviation in the frequency of annual check-ups for blood sugar among patients. Patients across all knowledge groups check for blood sugar less than once a year. At the same time, the Bangladesh National Guidelines on Diabetes Management recommends check-ups once every three months, requiring 4 check-ups per year. Similar to earlier research studies, DM patients were more focused on taking their medications and monitoring their diet than they were about managing their hyperglycemia (Huang et al., 2014). Also, patients were more focused on the management of symptoms caused by diabetes (weight, markers of kidney function, check-ups for diabetic food lesions) (Figure 2b), which is consistent with the principle of the national guidelines to provide symptomatic relief from health damages rather than holistic management of the diabetic patients.

Females in the no-knowledge group 'didn't assume physical exercise to control diabetes (Figure 3), but self-management of diet, medication and insulin administration was comparable across all 3 knowledge groups. This also contradicts the national guidelines for diabetes management since the guidelines identify physical exercise as the second most important lifestyle change to control hyperglycemia. All 3 knowledge groups experienced similar health status, deterioration in daily lives, and frequencies of hospitalization due to diabetic-related complications (Figure 4). Since the data presented in this article are qualitative, the accuracy and confidence is subject to persistence, consistence, triangulation of methodology and investigation, confirmability and dependability (Ryan et al., 2013). The persistence and consistency of our data is determined by our inclusion-exclusion criteria which accounts for completeness and truthfulness of participants as an inclusion criteria. The accuracy of the answers were validated

by multiple questions rephrased to verify response. Methodologic triangulation was maintained by simultaneous analysis of the cleaned data by 3 tools (Pandas, ResearchPy and Microsoft Excel). Triangulation of investigators was maintained by collection and checking of the answers by a team of 4 trained investigators who verified the data manually for strict adherence to the preset inclusion-exclusion criteria. Confirmability and dependability were validated by contacting 5% of the participants at random for cross-checking the responses. Our findings corroborate with the reports from Akter et. al. 2014, Khan et. al. 2022 and Akhtar et al. 2020 on the following aspects:

-diabetes is not managed satisfactorily in urban areas of Bangladesh despite national guidelines and health network initiatives

-10% to 18.4% patients could successfully manage diabetes in urban areas (Akhtar et al. 2020 and Rahman et al. 2014 respectively)

- the age of onset of diabetes was found to be 35-39 years (Akter et al. 2014)

This study suffers from few limitations including too little participants for a meaningful statistical inference in the perspective of public health. The absence of a control group of non-diabetic participants was absent. Also, inclusion of participants from urban and rural areas from all 8 administrative divisions across Bangladesh could have generated information more representative of Bangladeshi population.

Conclusion

The healthcare centers across Bangladesh need to make the information provided by Bangladesh National Diabetes Management Guidelines more reader-friendly for all socio-economic groups, so patients feel more interested to learn, practicing, and following the guidelines. We identified few exceptions between actions recommended for diabetic patients by BADAS and actual practice by participants (Figure 4, Table 3, 4). Therefore, this study is informative in reshaping the policies regarding dissemination of self-management of information for controlling diabetes and ensuring proper response from diabetic patients in Bangladesh.

Author Contributions

M. J. H. – Conceptualization and grant management, S. T. T. – Manuscript writing, S. A. – Data analysis and proofreading, M. S. – data collection, T. R. – data collection, B. A. – data analysis and manuscript writing, T. A. d. N. – scientific and public communications

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Competing financial interests
The authors have no conflict of interest.

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