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Research Article

The Impact Of Basic Diabetes Literacy On Daily Self-Management Practices Among Type 2 Diabetes Patients In Ejisu Municipality Of Ghana.

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Abstract

Background: Diabetes is a chronic disorder caused by elevated levels of blood glucose or insulin hormone deficiency. Diabetes is a common chronic illness and it is linked with a high rate of morbidity and mortality. Diabetes mellitus (DM) therapy is mostly dependent on patients' ability to self-care in their daily lives; hence the knowledge, attitude and practices (KAP) of a diabetic patient is generally regarded a vital component of DM management.
Objective: To assess the impact of basic diabetes literacy on daily self-management practices among type 2 diabetes patients.
Materials and Methods: The study used cross-sectional design where 120 participants were recruited. Data on socio-demographic characteristics, medical history, knowledge on diabetes and self-care practices were collected and analysed using SPSS version 25. Results were presented using descriptive, inferential, percentages and chi- square.
Results: The study recruited 120 participants where 102 (85%) were females and 18(15%) were males. Assessing educational level, 55.8 % of the participants attaining Junior High School level of education. About 51.7% of the participants had adequate knowledge when asked about the signs and symptoms of high blood sugar. Alarmingly, 84% of the participants were ignorant of the fact that a diabetic must check his or her feet regularly. Most of the participants (60%) had no knowledge about the normal fasting blood glucose level and 93.3 % either had no knowledge or inadequate knowledge about how often a diabetic should exercise. 97% and 96% of the participants failed to regularly check their blood pressure and glucose level respectively. Also, the study noted that, 83% and 89% exhibited poor self-care practices such as checking their feet regularly and visiting the eye doctor respectively. The study recommends that in order to improve disease management outcomes, healthcare workers intensify education on self-care management
Conclusion and implication: The study recommends that in order to improve disease management outcomes, healthcare workers intensify education on self-care management.

Keywords: basic diabetes literacy, daily self-management, practices, type 2 diabetes patients.

INTRODUCTION

Diabetes has emerged as a major public health concern globally. In 2017, approximately over 451 million individuals globally were diagnosed with diabetes. This figure is expected to accelerate to 693 million by 2045 according to International Diabetes Federation (**1,2**). Currently, 19 million adults in Africa have diabetes which is expected to rise to 47 million by 2045 (**3,4**). According to 5[**5**] 24 million people were living with diabetes in sub-Saharan Africa as of 2021 and the projected figure is likely to be 100% by 2045. Presenting the assertions further, WHO, reports that, Type 2 diabetes accounts for 90-95 percent of all diabetes cases worldwide (**6**). In Ghana, 2.4 million diabetics have been recorded with 5.3% of them having adult Type-2 Diabetes (7).

The motivation to control this surge is partly based on early awareness and adequate knowledge of diabetes management practices among diabetic patients. However, available research reports reveal that 69.2% of adults are unaware of their disease condition (**3,4**). High rates of undiagnosed diabetes mean that a significant portion of the population is likely living with chronic hyperglycaemia for years before diagnosis. This allows diabetes-related complications such as retinopathy, neuropathy, kidney failure, and cardiovascular disease to develop and worsen silently (**8**). Again, unaware individuals cannot take proactive steps to manage their health, resulting in higher rates of morbidity and mortality. In addition, lack of awareness may perpetuate the epidemic,

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as individuals may continue unhealthy dietary habits and sedentary lifestyles, unknowingly accelerating the disease progression (**9,10**). Equally, patients who are diagnosed, but have limited knowledge regarding diabetes management practices may be implicated in poor glycaemic control, further increasing the risk of acute emergencies like hypoglycaemia or diabetic ketoacidosis (**11 ,12,13**). Examining this gamut of health risks present fertile grounds to assess the knowledge and management practices of diabetic patients in Ghana.

Aside medication, many research outcomes have established that, effective DM management essentially depends on patients' basic knowledge and ability to self-care. Basic knowledge of diabetes improves care practices by enabling patients and healthcare providers to adopt more effective self-management strategies, resulting in better glyceamic control, fewer complications, and increased treatment adherence. Understanding the disease allows for necessary lifestyle modifications (diet and exercise), consistent monitoring, and proactive prevention of complications (**14**). Equally, self-care practices including diet, exercise, medication adherence, and blood sugar monitoring significantly improve glycemic control (lower levels), enhance insulin sensitivity, maintain target glucose levels, and improve overall quality of life (**15,16,17.18**) Diabetes knowledge and self-care among Ghanaians with Type 2 diabetes is generally poor, with nearly 47% showing limited understanding of the condition. While medication adherence is moderate (33.5–84.5%), self-management behaviours like blood glucose monitoring (0.5–2.2 days/ week) and foot care are suboptimal. Key challenges include limited specialized care and, for many, a reliance on general advice rather than personalized education (**19,20,21**) Other publications have revealed that, in Ghana, most people (with or without the disease) are unaware of the causes and complications of the disease and how to successfully manage the condition (**22, 23**). This could be attributed to low literacy rate of diabetes. According to (**24**) diabetic patients with low literacy may be at higher risk of poor health outcomes. Also, a study by (**25, 26**) noted that improving patient knowledge of diabetes mellitus and its consequences improves patient compliance with treatment, perhaps leading to a reduction in complications.

In Ghana, a lot of initiatives have been adopted nationally to help improve knowledge, attitude, and practices of diabetic patients (**1**). Despite these national interventions, there is paucity of information on status of basic knowledge and self-care practices among diabetic patients visiting the diabetic clinic at the Ejisu Government Hospital in Ghana. This study therefore seeks to assess the impact of basic diabetes literacy on daily self-management practices among type 2 diabetes patients in Ejisu municipality of Ghana

MATERIALS AND METHODS

Study design and approach

The study was a cross-sectional study with quantitative approach. A cross-sectional study with a quantitative approach is highly suitable for assessing the knowledge and self-care practices of diabetic patients because it offers an efficient, cost-effective way to measure the prevalence of specific health behaviours and knowledge gaps within a large population at a single point in time. This research design and approach allow for the statistical analysis of relationships between sociodemographic factors (like education or age) and self-care behaviours, such as diet, exercise, and blood glucose monitoring. Data collected through structured questionnaires, such as the summary of diabetes self-care activities, allows for standardized, objective-like, self-reported data that can be analyzed to evaluate how well patients manage their illness.

Study Population

The study population were known diabetic patients accessing healthcare at Ejisu Government Hospital and Onwe Government Hospital in the Ejisu Municipality of Ghana.

Inclusion criteria

The inclusion criteria were patients,

Ⅰ. who were 18 years and above.

Ⅱ. who have been medically diagnosed with diabetes

Ⅲ. Who frequently visited the Onwe and Ejisu Government Hospitals.

Ⅳ. who consented to participate in the study.

Exclusion criteria

The exclusion criteria were patients;

Ⅰ. Who were less than 18 years.

Ⅱ. who did not consent to be participants

Ⅲ. who had complicated health conditions with comorbidities

Sampling size and technique

Respondents were recruited by convenience from the Diabetic Clinics of Ejisu Government Hospital and Onwe Government Hospital. Respondents who met the inclusion criteria (n=120) were recruited. Recruitment was based on definite clinical diagnosis of diabetes by qualified medical personnel. Formal introduction, intentions and consents were sought after which questionnaires were administered.

Sample Size calculation

To achieve an 80% power to detect a 1% difference in HbAlC, the sample size was determined using the formula of (27) as shown below:

$$n = \frac{2[(a+b)^2 \times \sigma^2]}{(\mu_1 - \mu_2)^2}$$

Where n is the sample size, μ_1refers to the population mean in the intervention group (HbAlC = 9.9), μ_2 is the population means in the control group (HbAlC = 8.9), a = 1.96 for alpha (0.05), b = 0.842 for power (0.80) and ŏ is the population standard deviation of 1.6.

$$n = \frac{2[(2.579 + 0.842)^2 \times 1.6^2]}{(9.9 - 8.9)^2} = 59.82$$

The estimated sample size was 60. Therefore, 60 participants were recruited in each arm of the study. (control and interventional group).

Data Collection tools

The questionnaire used consisted of three sections. The first section covered questions on sociodemographic data. The second section covered questions relating to family and medical history. The third section covered questions relating to basic knowledge and basic daily practices of diabetic patients. The questions were adopted from (28).

Ethical Consideration

Ethical approval was sought from the Committee on Human Research, Publication and Ethics, School of Medical Sciences (CHRPE) of KNUST with the reference number (CHRPE/RC/168/22). The participants were told the direct and indirect benefits of participating in the research. They were not forced to take part in the study as participation was voluntary. They were also told they have the right to withdraw from the study at any time without any penalty. Also, they had the right not to answer any question they felt uncomfortable about. They were assured of confidentiality.

RESULTS

Sociodemographic Characteristics of Study Participants

The study included 120 participants, evenly distributed between Ejisu Government Hospital and Onwe Government Hospital, with each facility accounting for 50.0% of the total participants. The majority of the participants were aged 51 years and older (77.5%). Gender distribution showed that most participants were female (85.0%). The highest proportion of study participants were Akan (92.5%) and the least being Northerners (3.3%). Almost half of the participants were married (44.2%), while 30.8% were widowed, 16.7% divorced, and 8.3% single. Regarding education, 55.8% had completed JHS/MSLC, while 19.2% had no formal education. Religiously, the vast majority identified as Christians (95.0%), with a small percentage being Muslim (4.2%). More than half of the participants (60.0%) were self-employed. Table 1 displays the sociodemographic characteristics of the study participants.

Table 1. Sociodemographic Characteristics of Study Participants.

Variable	Frequency (n=120)	Percentage (%)
Facility		
Ejisu Government Hospital	60	50.0
Onwe Government Hospital	60	50.0
Age Group (Years)		
18-40	6	5.0
41-50	21	17.5
≥ 51	93	77.5
Gender		
Male	18	15.0
Female	102	85.0
Ethnicity		
Akan	111	92.5
Ewe	5	4.2
Northerner	4	3.3
Marital Status		
Single	10	8.3
Divorced	20	16.7
Widowed	37	30.8
Married	53	44.2
Educational Level		

No formal education	23	19.2
Primary	18	15.0
JHS/MSLC	67	55.8
SHS	4	3.3
Tertiary	8	6.7
Religious Affiliation		
Christian	114	95.0
Muslim	5	4.2
Traditionalist	1	0.7
Employment Status		
Unemployed	41	34.2
Self-employed	72	60.0
Employed	7	5.8

Note: *Data presented as frequency and percentage. Abbreviations: JHS: junior high school/ middle school leaving certificate; SHS: senior high school.*

Medical History and Clinical Characteristics of Study Participants

Medical history and clinical characteristics of study participants is displayed in **Table 2**. A notable 66.7% of the participants reported having a family history of diabetes, with parents being the most commonly affected relatives (35.0%). Interestingly, 22.5% of those with a family history indicated that both their parents and siblings were affected. 40.0% of study participants lived with diabetes for six years or more while 39.2% for 2-5 years, and 20.8% for less than two years. Metformin was the most commonly used diabetes medication, with 69.2% of participants relying on it. However, 27.5% of the participants were on a combination of metformin and glibenclamide with a very small percentage (0.8%) on insulin. Majority of participants (76.7%) had other non-communicable diseases (NCDs) with all participants with another NCD having hypertension.

Table 2. Medical History and Clinical Characteristics of Study Participants.

Variable	Frequency (n=120)	Percentage (%)
Family History of Diabetes		
No	40	33.3
Yes	80	66.7
Specific Family Member (If Yes)		
Parent	28	35.0
Siblings	22	27.5
Grandparents	1	1.3
Uncle	4	5.0
Auntie	7	8.8
Parent and Siblings	18	22.5
Duration of Diabetes (Years)		
< 2	25	20.8
2-5	47	39.2
≥ 6	48	40.0
Diabete Drugs		
Metformin	83	69.2
Glibernclamide	3	2.5
Metformin and glibenclamide	33	27.5
Insulin	1	0.8
Do you have any other NCDs		
No	28	23.3
Yes	92	76.7
Specific Other NCD (If Yes)		
Hypertension	92	100.0

Data presented as frequency and percentage. NCDs: non-communicable diseases

Knowledge Level on Diabetes Among Study Participants

A significant number of participants (53.3%) recognized frequent urination as a symptom of hyperglycaemia, with 45.0% identifying extreme thirst. However, awareness of symptoms like blurred vision (32.5%) and tiredness/fatigue (31.7%) was lower. A worrying 65.8% of participants admitted they didn't know how to treat hypoglycaemia, while only 21.7% mentioned using juice or soft drinks like Coke or Fanta, and 12.5% suggested hard candy or sweets as a treatment method. Foot care is grossly neglected, with 71.1% of participants not checking their feet at all. Furthermore, 80.8% didn't understand the importance of foot checks in preventing neuropathy-related complications. Eye health was also under-prioritized, with 85.8% of participants only seeing an eye doctor when necessary, and only 14.2% having an annual eye check-up.

Knowledge about normal blood glucose levels and HbA1C ranges was shockingly low, with 60.0% and 94.2% of participants, respectively, unable to identify the correct ranges. Regarding the long-term complications of diabetes, while 45.0% of participants were aware of the risk of blindness, fewer recognized the dangers of cardiovascular disease (40.8%) or amputation (26.7%). Almost all study participants (99.2%) did not recognize the importance of dietary intervention in controlling blood glucose levels (**Table 3**). Overall, the majority of the study participants (81.7%) had inadequate knowledge of diabetes, while only 18.3% demonstrated adequate knowledge of the condition as shown in **Figure 1**.

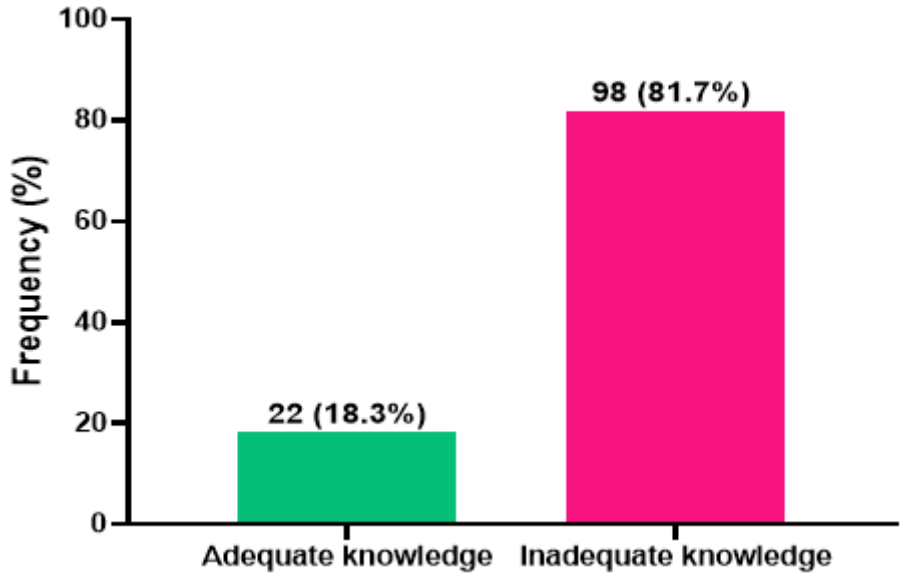
Table 3. Knowledge on Diabetes among Study Participants.

Variable	Frequency (n=120)	Percentage (%)
Signs and Symptoms of Hyperglycaemia		
Extreme thirst	54	45.0
Frequent urination	64	53.3
Blurred vision	39	32.5
Tiredness/Fatigue	38	31.7
Weight lost	24	20.0
Signs and Symptoms of Hypoglycaemia		
Hunger	32	26.7
Nervousness/Jitteriness	33	27.5
Confusion	25	20.8
Mood swing irritability	23	19.2
Sweaty fast heart rate	19	15.8
How to Treat Hypoglycaemia		
Don't know	79	65.8
Hard candy/Sugar/Sweet	15	12.5
Juice/Coke/Fanta	26	21.7
Frequency of Foot Checking		
None	91	71.1
Once a month	7	5.5
Once a week	9	7.0
Once a day	21	16.4
Importance of Foot Checking		
Don't know	97	80.8
Prevent morbidity due to neuropathy	23	19.2
Frequency of Seeing an Eye Doctor		
When needed	103	85.8
At least once a year	17	14.2
Normal Range of Fasting Blood Glucose		
4.0-5.9 mmol/L	18	15.0
6.0-10.00mmol/L	30	25.0
Don't know	72	60.0
Normal Range of HbA1C		
4.0-6.5%	5	4.2

7.0-8.0%	2	1.7
Don't know	113	94.2
Long Term Complication of Diabetes		
Blindness	54	45.0
Kidney damage/dialysis	1	0.8
Amputation	32	26.7
Neuropathy/Impotence	0	0.0
Gastroparesis	0	0.0
Cardiovascular disease	49	40.8
Is Dietary Intervention Important in Controlling Blood Glucose		
Yes	1	0.8
No	119	99.2

Data presented as frequency and percentage. HbA1C: glycated hemoglobin.

Figure 1. Proportion of Knowledge Level on Diabetes among Study Participants.



Sociodemographic and Clinical Factors Associated with Knowledge on Diabetes among Study Participants

This study assessed sociodemographic and clinical factors associated with knowledge on diabetes among study participants. It was observed that gender (p=0.0150), family history of diabetes (p=0.0080), and specific family member with diabetes (p<0.0001) were significantly associated with diabetes knowledge level (**Table 4**).

If the duration of diabetes (years since diagnosis) is not statistically significant to a patient's knowledge of the disease, it implies that experience with the disease does not automatically translate into improved knowledge. Ideally, a longer duration should lead to better disease management, but a lack of correlation suggests that passive experience is inferior to active, structured education

Table 4. Sociodemographic and Clinical Factors Associated with Knowledge on Diabetes Among Study Participants.

	Knowledge Level				
Variable	**Total (n=120)**	**Adequate (n=22)**	**Inadequate (n=98)**	**Test Statistics**	***p*-value**
Age Group (Years)				0.018	0.9910
18-40	6 (5.0)	1 (4.5)	5 (5.1)		
41-50	21 (17.5)	4 (18.2)	17 (17.3)		
≥ 51	93 (77.5)	17 (77.3)	76 (77.6)		
Gender				5.976	**0.0150**
Male	18 (15.0)	7 (31.8)	11 (11.2)		
Female	102 (85.0)	15 (68.2)	87 (88.8)		
Ethnicity				0.135	0.9350

Akan	111 (92.5)	20 (90.9)	91 (92.9)		
Ewe	5 (4.2)	1 (4.5)	4 (4.1)		
Northerner	4 (3.3)	1 (4.5)	3 (3.1)		
Marital Status				2.861	0.4140
Single	10 (8.3)	1 (4.5)	9 (9.2)		
Divorced	20 (16.7)	2 (9.1)	18 (18.4)		
Widowed	37 (30.8)	6 (27.3)	31 (31.6)		
Married	53 (44.2)	13 (59.1)	40 (40.8)		
Educational Level				3.038	0.5520
No formal education	23 (19.2)	2 (9.1)	21 (21.4)		
Primary	18 (15.0)	4 (18.2)	14 (14.3)		
JHS/MSLC	67 (55.8)	14 (63.6)	53 (54.1)		
SHS	4 (3.3)	0 (0.0)	4 (4.1)		
Tertiary	8 (6.7)	2 (9.1)	6 (6.1)		
Religious Affiliation				4.511	0.1050
Christian	114 (95.0)	20 (90.9)	94 (95.9)		
Muslim	5 (4.2)	1 (4.5)	4 (4.1)		
Traditionalist	1 (0.8)	1 (4.5)	0 (0.0)		
Employment Status				0.118	0.9430
Unemployed	41 (34.2)	8 (36.4)	33 (33.7)		
Self-employed	72 (60.0)	13 (59.1)	59 (60.2)		
Employed	7 (5.8)	1 (4.5)	6 (6.1)		
Family History of Diabetes				7.124	**0.0080**
No	40 (33.3)	2 (9.1)	38 (38.8)		
Yes	80 (66.7)	20 (90.9)	60 (61.2)		
Specific Family Member (If Yes)				27.584	**< 0.0001**
Parent	28 (35.0)	1 (5.0)	27 (45.0)		
Siblings	22 (27.5)	5 (25.0)	17 (28.3)		
Grandparents	1 (1.3)	0 (0.0)	1 (1.7)		
Uncle	4 (5.0)	2 (10.0)	2 (3.3)		
Auntie	7 (8.8)	0 (0.0)	7 (11.7)		
Parent and Siblings	18 (22.5)	12 (60.0)	6 (10.0)		
Duration of Diabetes (Years)				4.876	0.0870
< 2	25 (20.8)	1 (4.5)	24 (24.5)		
2-5	47 (39.2)	9 (40.9)	38 (38.8)		
≥ 6	48 (40.0)	12 (54.5)	36 (36.7)		

Data presented as frequency (percentage). P-values were computed by chi-square/Fischer exact test. P-values bolded and < 0.05 were considered statistical significance.

Sociodemographic and Clinical Predictors of Knowledge on Diabetes Among Study Participants

Table 5 depicts sociodemographic and clinical predictors of inadequate diabetes knowledge. In the univariate logistic regression model, female participants were 3.69 times more likely to have inadequate knowledge compared to their male counterparts [crude odds ratio (cOR) = 3.69, 95% confidence interval (CI) (2.17-39.62), p = 0.0030]. Also, participants who had a family history of diabetes had decreased odds of demonstrating inadequate knowledge of diabetes [cOR = 0.16, 95% CI (0.04-0.71), p = 0.0170]. However, participants with parent [cOR = 54.99, 95% CI (5.84-498.96), p = 0.0080] and siblings [cOR = 6.80, 95% CI (1.68-27.52), p < 0.0001] as family members with diabetes had increased odds of inadequate diabetes knowledge as compared to those with both parents and siblings.

After adjusting for possible confounders in the multivariate logistic regression analysis, being female [aOR = 9.27, 95% CI = (2.17-39.62), p = 0.0030], having a family history of diabetes [aOR = 0.07, 95% CI = (0.01-0.43), p = 0.0040] and having a sibling with a history of diabetes [aOR = 8.66, 95% CI = (1.81-41.31), p = 0.0070] were identified as independent predictors of inadequate knowledge of diabetes (**Table 5**).

Table 5. Sociodemographic and Clinical Predictors of Knowledge on Diabetes Among Study Participants.

Variable	Inadequate Knowledge (n=98)	cOR (95% CI)	p-value	aOR (95% CI)	p-value
Age Group (Years)					
18-40	5 (5.1)	1.00	-	1.00	-
41-50	17 (17.3)	0.85 (0.08-9.44)	0.8950	90638.28 (0.00-inf)	0.9980
≥ 51	76 (77.6)	0.89 (0.10-8.16)	0.9210	2.99 (0.00-inf)	0.9970
Gender					
Male	11 (11.2)	1.00	-	1.00	-
Female	87 (88.8)	3.69 (1.24-11.03)	0.0190	9.27 (2.17-39.62)	0.0030
Ethnicity					
Akan	91 (92.9)	1.52 (0.15-15.35)	0.7240	-	-
Ewe	4 (4.1)	1.33 (0.06-31.12)	0.8580	-	-
Northerner	3 (3.1)	1.00	-	-	-
Marital Status					
Single	9 (9.2)	2.93 (0.34-25.33)	0.3300	-	-
Divorced	18 (18.4)	2.93 (0.60-14.33)	0.1860	-	-
Widowed	31 (31.6)	1.68 (0.57-4.92)	0.3450	-	-
Married	40 (40.8)	1.00	-	-	-
Educational Level					
No formal education	21 (21.4)	3.50 (0.40-30.34)	0.2560	-	-
Primary	14 (14.3)	1.17 (0.17-8.19)	0.8770	-	-
JHS/MSLC	53 (54.1)	1.26 (0.23-6.94)	0.7890	-	-
SHS	4 (4.1)	53849.16 (0.00-inf)	0.9990	-	-
Tertiary	6 (6.1)	1.00	-	-	-
Religious Affiliation					
Christian	94 (95.9)	1.00	-	-	-
Muslim	4 (4.1)	0.85 (0.09-8.03)	0.8880	-	-
Traditionalist	0 (0.0)	0.00 (0.00-inf)	> 0.999	-	-
Employment Status					
Unemployed	33 (33.7)	1.00	-	-	-
Self-employed	59 (60.2)	1.10 (0.41-2.93)	0.8480	-	-
Employed	6 (6.1)	1.46 (0.15-13.85)	0.7450	-	-
Family History of Diabetes					
No	38 (38.8)	1.00	-	1.00	-
Yes	60 (61.2)	0.16 (0.04-0.71)	0.0170	0.07 (0.01-0.43)	0.0040
Specific Family Member (If Yes)					
Parent	27 (45.0)	54.00 (5.84-498.96)	0.0080	1.78 (0.00-inf)	0.9970
Siblings	17 (28.3)	6.80 (1.68-27.52)	< 0.0001	8.66 (1.81-41.31)	0.0070
Grandparents	1 (1.7)	323094.97 (0.00-inf)	> 0.999	7.92 (0.00-inf)	0.9990
Uncle	2 (3.3)	2.00 (0.22-17.89)	0.5350	2.97 (0.22-40.57)	0.4150
Auntie	7 (11.7)	323094.97 (0.00-inf)	> 0.999	1.58 (0.00-inf)	0.9980
Parent and Siblings	6 (10.0)	1.00	-	1.00	-
Duration of Diabetes (Years)					
< 2	24 (24.5)	1.00	-	-	-
2-5.	38 (38.8)	0.18 (0.02-1.48)	0.1100	-	-
≥ 6	36 (36.7)	0.13 (0.02-1.03)	0.0530	-	-

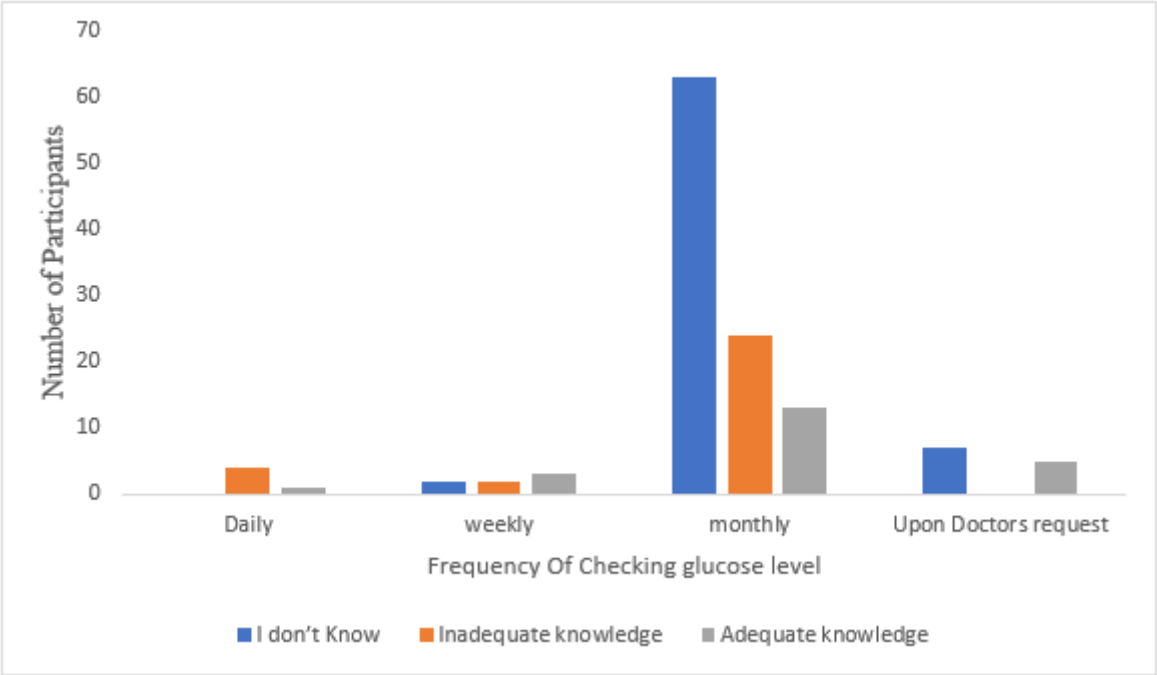
P values were computed using univariate and multivariate logistic regression. p < 0.05 was considered statistically significant. Abbreviations: aOR, adjusted odds ratio; cOR, crude odds ratio; CI, confidence interval; inf, infinity.

Participants' knowledge on normal fasting blood glucose and frequency of laboratory checks

The study accessed the participants knowledge on normal fasting blood glucose and frequency of glucose level checks. Over

65% of the participants did not know it is important to check their glucose level, whiles 20.5% had inadequate knowledge as shown in **Figure 2**.

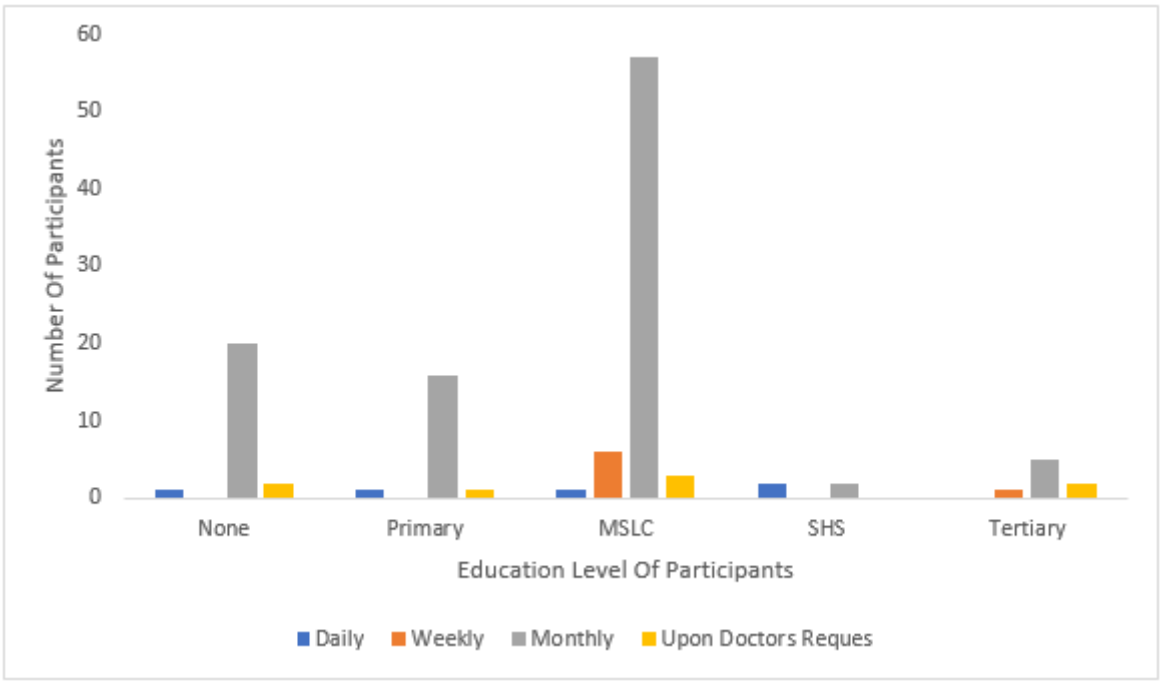
Figure 2. A graph showing the relationship between participants' knowledge of normal fasting blood glucose and how often diabetics check their blood glucose level.



Education Level of diabetics and how often they check their glucose level

The study accessed the educational level of diabetics and frequency of glucose checks. Chi Square analysis was done to determine the relationship between a person's education level and practices. Most of the participants irrespective of their educational levels mostly checked their blood glucose level at the wrong time (monthly) as shown on **figure 3**.

Figure 3. A graph showing the relationship between Education Level of diabetics and how often they check their glucose level.



DISCUSSION

The sociodemographic information of the participants is presented in table 1, a total of 120 participants took part in the study. Overwhelming majority of the participants were females and this is in line with other research findings which had more female diabetic patients than males. This shows that females have a higher risk of developing diabetes than males (**29,30,23**). It is believed that male subjects generally live healthy lives as compared to their female counterparts who were more overweight (**31**). The finding is consistent with four studies conducted in Ghana, India, Pakistan and Ethiopia (**32,33,34,31**). As much as three-quarters of the respondents represented the 50+ age group, with less than one-fourth representing the ages group of 41-50. These values are consistent with other studies which prove that the aged are more likely to be diagnosed with diabetes (**29**). Regarding the participants' marital status, a majority were married. This has double edged implications. A study on diabetes knowledge and self-care practices where the majority of participants are married has significant implications for family-centred care, as spouses are the primary source of social support, diet regulation, and medication management. While marriage often provides a supportive environment, studies also show that being married can sometimes introduce barriers, such as complex household dynamics, or, conversely, act as a facilitator of better self-care, particularly when spousal support is high (**35, 36**)

In term of educational status, more than two-thirds of the participants had moderate educational level of primary through JHS to SHS. The primary implication of majority of participants having only a moderate education is that standardized diabetes education and practice are likely ineffective for this specific population. This creates a critical gap between clinical guidelines and the patients' actual ability to implement self-care. This is consistent with the study outcome of (**20**) which reported that, diabetic patients with lower educational levels often possess poor knowledge, resulting in inadequate self-care practices, particularly regarding blood glucose monitoring and foot care. While medication adherence may be high, low literacy frequently hinders dietary management and long-term glyceamic control (**37,20**).

The study found that, a little over half of the respondents had a history of diabetes in their families. Majority with diabetic family members reported that it was their parents who had the disease. This claim is consistent with research conducted by (**38**) which suggested that diabetes could be a hereditary disease. Diabetes as a hereditary disease can be attributed to hereditary hemochromatosis (HH). The genetic disorder hereditary hemochromatosis (HH) results in an iron overload due to the uncontrolled absorption of iron from the intestines which is believed to primarily cause a defect in the early response of insulin to glucose (**38**).

This study initially sought to assess diabetes knowledge among participants. The study observed that over two-thirds of the participants had inadequate knowledge about diabetes. This prevalence is higher than that of a study conducted in Ghana which observed almost half of the participants had inadequate knowledge of diabete (**39**). This high prevalence may be explained by the low educational and socioeconomic status of the current study population. It is worth noting that, there was a significant association between gender and knowledge of diabetes. Women had 9.27 odds of having inadequate knowledge compared to men. This finding is consistent with two previous studies conducted in Ghana that reported women being less likely to have adequate knowledge compared to men (**39, 23**). This study also revealed that participants with a family history of diabetes were 9.10 times less likely to have inadequate knowledge on diabetes. Individuals with a family history of diabetes are often exposed to discussions and medical consultations related to the condition within their households and thus have higher diabetes knowledge

Further outcome reveals that half of the participants had adequate knowledge when asked about the signs and symptoms of high blood sugar, and one-third of the respondents had inadequate knowledge relating to the same subject matter. In a study conducted in Pakistan to assess the knowledge of diabetic patients, it was found that knowledge about diabetic symptoms, risk factors, complications, and presentation substantially correlated with one's degree of education (**31**). In our study most of the participants had at least a basic level of education and so it is quite appreciable as to why half of them had adequate knowledge about the symptoms. On the other hand, when asked about the symptoms of low blood sugar 50% of the population had no idea and the remaining 50% either had inadequate knowledge or adequate knowledge. Another interesting finding of this research was that a little over two-thirds of the participants had no idea on how to treat hypoglycaemia. Astronomically, majority of the participants were ignorant of the fact that a diabetic must check his or her feet regularly and as high as 80.8 % of the participants did not know the importance of a diabetic patient regularly checking his feet. Most of the participants (more than half) had no knowledge about the normal fasting blood glucose level, a quarter had inadequate knowledge and only 15% of the participants knew the correct normal fasting blood glucose level. Regarding participants' normal HbAIC almost all the participants had no idea about it. Only 6.7 % of participants were aware of the times a diabetic should exercise within a week. The remaining larger participants either had no knowledge or inadequate knowledge about how often a diabetic should exercise.

Lastly when asked about their knowledge on the long-term complications of uncontrolled diabetes the statistics are as follows that a little over one-third each of the participants had no knowledge, inadequate knowledge and adequate knowledge.

Regarding Participants' practices two-thirds of the participants ate on time while the remaining participants were not consistent with their eating times or frequently starved themselves. Skipping breakfast is linked to obesity and a higher risk of type 2 diabetes. People with later chronotypes, who favour later bed and wake times, frequently skip breakfast. Research conducted to assess the validity of the above claim concluded that participants who usually skipped breakfast had significantly higher HbA1C levels, higher body mass indices (BMI) than those who are consistent with their breakfast eating time (**40**). Also, regarding the intake of salt among diabetics, 85% showed a positive attitude by resisting the temptation of adding extra salt to already prepared food. Out of 120 participants only one gave a negative attitude answer when asked whether he smokes or not, all the participants (100%) were not in any way exposed to passive smoking. Also, a significant number representing 87.5% of the participants did not consume alcohol. Among the basic practices of a diabetic patient, as high as 83% and 89% never visited an eye clinic and never checked his or her feet respectively. Lastly, on the questions asked to assess the practices among diabetics, only 4.2% and 3.3 % daily checked their blood glucose level and blood pressure level respectively. Approximately 83.3% checked their blood glucose levels monthly and 85% also checked their blood pressure monthly.

In relating the educational level of participants to how often they check their glucose level, it was discovered that most of the participants usually checked their blood glucose levels on a monthly basis and it is attributed to the fact that most of them had their education level terminated at the pre tertiary level or had no education background at all. To further confirm that education has a significant impact on patients' knowledge of their illness, the research of (**22**) in the northern part of Ghana showed a strong correlation between educational attainment and the participants' degree of knowledge about diabetes. Also, according to (**22**) participants with tertiary education demonstrated a much better level of knowledge than their less educated colleagues. This fact contrasted with our study as none of the 8 participants who had tertiary education checked their glucose levels regularly. A study in Khulna Diabetic Centre, Khulna, Bangladesh also showed a substantial difference between educational groups regarding understanding of the ideal blood glucose level for DM control (**41**). In their studies 122 out of the184 participants had little or no education and 62 were well educated. Out of the 122 with little or no education only 22 which represented 18% percent had an idea of the correct blood glucose level, also out of the 62 only 21 of them knew the correct blood glucose range (**41**).

The study assessed the relationship between knowledge of normal fasting blood glucose and how often diabetics check their blood glucose level. From the graph it clearly shows that most participants had no idea about what the normal fasting blood sugar is and with a p value of 0.008 it significantly impacted how often they check their blood sugar level. With a p value of less than 0.001, participants knowledge on how often they should visit the eye clinic affected how often they visited the hospital. A total of 84 participants had either inadequate knowledge or no knowledge on how often they should visit the eye clinic with 60 participants never having visited the eye clinic. Also, with a p-value of 0.001 it clearly showed that the knowledge participants had on the normal HbAIC significantly impacted how often they check their blood pressure level. Knowledge of diabetes has been recognized as an important factor in adherence to the self-care practices of diabetes. The probability of a patient to be informed about a particular action or step in the management process of diabetes depends on the patient's knowledge of the illness. Thus, those who are likely to comprehend their sickness and engage in self-management practices such as exercise, blood sugar testing, diet, regular foot examinations and many others are patients who have more knowledge about the illness (**42**). It has been demonstrated that diabetic self-care behaviours are influenced by diabetes health literacy, which is a measure of knowledge (**43**). In consistency with the above results relating to the knowledge levels of a diabetic patient and their practices, a study conducted by (**43**) looked at the mediating role of diabetes knowledge in the relationship between diabetes health literacy and self-care practices. This study found that lower health literacy was significantly correlated with less diabetes knowledge, lower levels of physical activity, higher glycated haemoglobin (HbA1c) levels and less self-control of glucose levels (**43**). In a study conducted at Korle-bu Teaching Hospital in Accra, Ghana, it was discovered that out of the 390 diabetic patients who volunteered to undertake the research, only 26.4 percent knew the type of diabetes they had and only 3.8 percent of those with diabetes mellitus were aware that it could impact eye refraction; no patient mentioned that diabetes mellitus could result in cataract or diabetic retinopathy (**44**). In considering years of experience with diabetes and knowledge, the study found no significant association. If the duration of diabetes (years since diagnosis) is not statistically significant to a patient's knowledge of the disease, it implies that experience with the disease does not automatically translate into improved knowledge. Ideally, a longer duration should lead to better disease management, but a lack of correlation suggests that passive experience is inferior to active, structured education

CONCLUSION

Most of the participants demonstrated low knowledge level when they were assessed and this negatively impacted their attitude and self-care practices. The concludes that having a high knowledge about diabetes is a major step in the treatment and management process of diabetes and must be of a greater concern to both health care practitioners and the patients.

Limitations

Participants in our study were chosen from a hospital's diabetic clinic, where they had the opportunity to learn a little bit about managing diabetes from the doctors and clinic staff. Therefore, their opinions might not be representative of all people with diabetes, including those who are undiagnosed and those who seek out non-biomedical treatments.

Recommendations

We recommend that health care providers intensify education on self-care and management or selfcare practices to prevent diabetic complications. The level of awareness of diabetic complications among diabetic patients will increase with the organization of health education programs and health outreaches on preventive measures including adjusting to lifestyle and dietary alterations.

Declarations

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Data Availability

All data generated or analyzed during this study are included in this article and raw data can be requested from the corresponding author.

Competing Interests

The authors declare no conflicts of interest.

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