



Patients Understanding of Diabetes and Self-Management in Kigali University Teaching Hospital (CHUK)

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HIGHLIGHTS

- The understanding of diabetes and self-care practices among patients who have diabetes was assessed.
- The mean knowledge score of the participants for diabetes was 12.2/20
- Mean score attitude and practice towards diabetes care were 5.2/6 and 6/10 respectively.
- Poor practice was highly noted on physical exercise.

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ABSTRACT

Non-communicable diseases, including diabetes, account for 36% of total deaths in Rwanda. Integration of diabetes self-management education improves patient glycemic control. This study assessed the understanding of diabetes and self-care practices among patients who have diabetes at Kigali University Teaching Hospital (Centre Hospitalier Universitaire de Kigali: CHUK). A descriptive cross-sectional study was conducted on people with diabetes attending CHUK from December 18th, 2017, to April 30th, 2018. Ninety-five participants were enrolled in this study, with a mean age of 56 years. 87.4% of participants had type 2 diabetes, 85.3% received information on diabetes from medical staff, and 40.0% had diabetes for less than 5 years. The mean knowledge score among the participants was 12.2±2.2/20 (range 5-16), however, the majority of participants did not know the etiology of diabetes and 45.3% did not know the role of the urine test. Only 36.8% of participants knew the recommended diabetic meal plan and 47.4% knew the normal fasting blood glucose range. The mean score for attitude and practice towards diabetes were respectively 5.2±1.0/6 and 6.2±1.4/10. Poor practice was observed in physical activity where 49.5% of participants never exercised. There was good knowledge, attitude, and practice regarding diabetes and self-management among participants in general. However, there exists inadequate knowledge on the etiology of diabetes, the role of regular urine tests, fasting blood glucose normal values and diabetic meal plan, and poor practice of exercise among participants. Programs that promote awareness of diabetes and self-management education among patients with diabetes should be developed, enhanced, and utilized for better disease control.

1. INTRODUCTION

In 2016, diabetes mellitus (DM) was globally listed as the seventh leading cause of death for both male and female gender (World Health Organization, 2020). In 2012, There were 1.5 million deaths reported to be caused by diabetes; however, the total deaths caused by high blood glucose are estimated to be 3.7 million (WHO, 2016). An estimated 1.6 million deaths occurred in 2016 directly due to diabetes (World Health Organization, 2020). In middle and low-income countries, premature mortality due to diabetes is common, where most of the deaths (43%) occur before the age of 70 (WHO, 2016). Worldwide diabetes rose from a prevalence of 4.7% in 1980 to 8.5% in 2014, numbering 108 million to 422 million patients with diabetes (WHO, 2016).

In Africa, the prevalence of diabetes was 3.1% in 1980 and increased to 7.1% by 2014 (WHO, 2016). Diabetes management is comprised of medical treatment, patient education, counseling, and regular follow-up appointments with a physician (WHO, 2016). Treating diabetes requires maintaining a near-normal range of blood glucose to avoid acute and chronic complications (World Health Organization, 2003). Achievement of this goal requires active participation in the management process by patients (World Health Organization, 2003). The primary aspects of patient self-care include home glucose monitoring, adjustment of food intake to meet daily needs and match with insulin, administration of medication, regular physical activity, foot care, and regular medical monitoring visits (World Health Organization, 2003). Integration of diabetes self-management education (DSME) and frequent contact of patients with physicians lead to improved blood sugar control (Norris et al., 2002). In Rwanda, diabetes care is established; there are essential medicines available for diabetes management, blood tests, other tests, and equipment necessary for the monitoring of diabetes (World Health Organization, 2016). Additionally, there exists a multidisciplinary healthcare team for diabetes care consisting of physicians, nurses, nutritionists, social workers, and psychiatrists [5]. In resource-limited areas, such as Rwanda, access to diabetes care may also be hindered by several factors like the lack of transportation, lack of appropriate food, lack of insulin and insulin storage knowledge and ability, and an inability to measure glycemia regularly at home (Flanders and Associates, 2011).

There is currently no research on knowledge, attitude, and practice (KAP) regarding diabetes and self-management at CHUK. Thus, this study aims to assess the knowledge, attitude, and practice among patients with diabetes at CHUK. KAP is the foundation for designing preventive and management strategies for diabetes and is, therefore, the catalyst for this study.

2. METHODS

In 2018, a descriptive cross-sectional study was conducted on ninety-five in- and out-patients with diabetes at Kigali University Teaching Hospital with reference number EC/CHUK/497/2017 from the CHUK ethics committee. The research tool used was developed based on different kind of literature, one similar research in Rwanda done by Madeleine et al. (Madeleine Mukeshimana et al., 2015). And the KAP tool developed by Subish et al. was also used with warranted written permission from P&T Journal, Medimedia USA (Subish et al., 2006). The questionnaire tool was composed of four parts (sections): personal identification and diabetes history, including nineteen items, twenty questions regarding knowledge, six questions on attitude, and ten questions regarding practice.

Participants enrolled in the study met the American Diabetes Association(ADA) guidelines for diabetes care and had diabetes for at least 6 months (American Diabetes Association, 2017). The diabetes type and current complications were confirmed by checking the patient's file. Correct answers in this tool are in accordance with ADA or International Diabetes Federation Africa guidelines, as our reference (American Diabetes Association, 2017; International Diabetes Federation Africa Region, 2006). For instance, patients with diabetes should exercise regularly, at least three days per week for 30 to 45 minutes; blood pressure should be measured once monthly. Additionally, the patient should be screened for retinopathy and receive a foot examination at least once a year (American Diabetes Association, 2017). Each correct question, those that indicated a positive attitude to diabetes or its management, and those that were in line with proper diabetes management were taken as correct answers and assigned a mark of 1. Wrong questions, those that indicated a negative attitude, and those that exhibited a practice that increases the risk of diabetes complications or poor management were deemed wrong answers and marked zero. Response to the knowledge, attitude, and practice questionnaire and their mean \pm SD scores were calculated. The maximum possible scores for knowledge, attitude and practice patients are 20, 6, and 10 respectively. The data in the study were analyzed using SPSS Version 25.

3. RESULTS

Ninety-five participants enrolled in our study had a mean age of 56 years with a standard deviation of 15. Women (63.2%) were predominately affected by diabetes compared to men (36.8%). Most participants were married (57.9%) followed by those who were widows or widowers (32.6%). Concerning the level of education, only 31.6% of participants attended secondary school and 3.2% higher education.

The duration of diabetes varied among participants, where 40.0% have had diabetes for 6 months to 5 years, 34.7% have had diabetes for 5 to 10 years, and 6.3% have had diabetes for more than 20 years. Many participants did not have a family history of diabetes (61.1%) and only 26% knew a family member with diabetes. The type of diabetic medication used by participants in the study were hypoglycemic tablets (36.8%), insulin (32.6%), a combination of insulin, and oral tablets (30.5%). Four participants (4.3%) reported treatment by traditional healers. 87.4% of participants had type 2 DM and 12.6% had type 1 DM. 11.6 % of participants were current consumers of alcohol and 21.1% had a smoking history. 58.9 % of participants had functioning glucose meters in their homes to allow for sugar monitoring. The main source of information for diabetes was from medical staff (85.3%); other sources were rarely used. Only 18.9% of participants did not present with chronic complications of diabetes. The other 81.1% presented with one or more complications of diabetes. Hypertension was the most common complication, both when considered alone (22.1%) and in conjunction with others. (Table 1).

Table 1. Participants' characteristics and Personal diabetes history

Questions	Responses	N (%)
Level of education	No schooling	19(20)
	Primary	43(45.3)
	Secondary	30(31.6)
	Higher	3(3.2)
Province of residency	City of Kigali	70(73.7)
	East	5(5.3)
	South	9(9.5)
	Western	2(2.1)
	Northern	9(9.5)
Duration of diabetes	More than 6 months and less than 5 years	38(40)
	5-10 years	33(34.7)
	10-15 years	8(8.4)
	15-20 years	10(10.5)
	More than 20 years	6(6.3)
Family member with diabetes	Yes	26(27.4)
	No	58(61.1)
	I don't know	11(11.6)

Current treatment of diabetes	Oral hypoglycemic tablets	35(36.8)
	Insulin injection	31(32.6)
	Insulin and oral tablets	29(30.5)
Traditional healers ^a	Never	91(95.8)
	One month ago	1(1.1)
	1 year ago	3(3.2)
Type of diabetes	Type 1	12(12.6)
	Type 2	83(87.4)
Home sugar monitoring ^b	Yes	56(58.9)
	No	39(41.1)

Economic status based on social categories in Rwanda (Ezeanya-Esiobu, 2017); a: Traditional healers or complementary therapists consultation for the management of diabetes; b: Do you have a functioning glucose meter at home for sugar monitoring?

Overall, the mean knowledge score of the participants was 12.2±2.2 (range 5-16). Every participant knew at least one symptom of diabetes, and 38.9% knew that increased frequency of urination, increased thirst and hunger, increased tiredness and slow healing of wounds were all symptoms of diabetes. The majority of participants (90.5%) knew that if diabetes is not treated, it could lead to problems with their eyes, kidney, heart, and foot. 86.3% of participants knew the risks of high blood pressure, including heart attack, stroke, eye problems, and kidney problems. 51.6% of participants knew they should measure their blood pressure once every month. 88.4% of participants knew the lifestyle modifications required for diabetes control, such as weight reduction, stopping smoking, and alcohol intake.

In terms of proper foot care, 74.7% of participants knew they should inspect and wash their feet daily, 12.6% knew to select the best footwear possible. When diabetes is controlled, 67.4% of participants believed that medicines should be continued for life, 11.6% thought they could stop medicines immediately, and 17.9% did not know what to do once diabetes is controlled.

Additionally, 86.3% of participants knew to manage hypoglycemic symptoms by ingesting sugar-containing food or drink. Concerning the period recommended for blood glucose testing, 22.1% of participants believed that testing should be completed when fasting, 41.1% of participants said testing should be done before meals, and 30.5% said testing should be done both fasted and before meals. Other responses related to knowledge assessment are listed in Table 2.

Table 2. Knowledge questions

Questions	Responses	N (%)
Diabetes is a condition in which the body contains	A higher level of sugar in the blood than normal.	57(60)
	A lower level of sugar in the blood than normal	3(3.2)
	Either a higher or a lower level of sugar in the blood than normal	13(13.7)
	I don't know	22(23.2)
Etiology of diabetes	An increased availability of insulin in the body	6(6.3)
	A decreased availability of insulin in the body.	7(7.4)
	The inability of the body to use insulin properly	12(12.6)
	I don't know	68(71.6)
The most accurate method of monitoring diabetes is:	With a decreased availability of insulin in the body, the inability of the body to use insulin	2(2.1)
	Checking blood glucose levels.	85(89.5)
	Checking urine sugar.	4(4.20)
	I don't know	6(6.3)
A diabetic patient should have his or her eyes checked:	once a year	36(37.9)
	Once every six months.	45(47.4)
	Need not check at all	14(14.7)
Regular urine tests will help in knowing:	The status of the liver function.	5(5.3)
	The status of kidney function	44(46.3)
	The control of diabetes.	3(3.2)
	I don't know	43(45.3)
A regular exercise regimen will help in:	Increasing blood circulation.	53(55.8)
	Enhancing insulin action.	5(5.3)
	All are true (Increasing blood circulation and Enhancing insulin action).	20(21.1)
The recommended diabetic meal plan is:	I don't know	17(17.9)
	Breakfast, Snack, Lunch, Dinner	8(8.4)
	Breakfast, Snack, Dinner, Snack before bedtime	8(8.4)
	Breakfast, Snack, Lunch, Dinner, Snack	35(36.8)
The recommended meal content is	Breakfast, Lunch, Dinner	44(46.3)
	Energy food ½; Proteins ¼; Vegetables and fruits ¼ ¼	2(2.1)
	Energy food ¼; Proteins ¼; Vegetables and fruits ½	89(93.7)
	Energy food ¼; Proteins ¼; Vegetables and fruits ¼	4(4.2)
Normal values of fasting blood glucose (mg/dl)	70-100	45(47.4)
	110-150	6(6.3)
	I don't know	44(46.3)

The mean score attitude towards diabetes care was 5.2 ± 1.0 (range 1-6). Participants' responses are listed in Table 3.

Table 3. Participants' attitude towards Diabetes Questions

Questions	Responses	N (%)
Should a patient with diabetes exercise regularly?	Yes	86(90.5)
	No	2(2.1)
	I don't Know	7(7.4)
If yes, how often	Every day	78(82.1)
	Once weekly	8(8.4)
	Missing	9(9.5)
Does a subject with diabetes follow a controlled and planned diet?	Yes	90(94.7)
	No	1(1.1)
	I don't Know	4(4.2)
If yes, how often?	Always	82(86.3)
	Sometimes	7(7.4)
	Rarely	1(1.1)
Do you think missing taking the doses of your diabetes medication will have a negative effect on your disease control	Missing	5(5.3)
	Yes	88(92.6)
	No	6(6.3)
Will you let your blood sugar levels fall below normal when you are taking drugs?	I don't Know	1(1.1)
	Yes	13(13.7)
	No	80(84.2)
Do you think you should keep in touch with your physician?	I don't Know	2(2.1)
	Yes	90(94.7)
	No	5(5.3)

The mean practice score for diabetes management was 6.2 ± 1.4 (range 3-9). The majority (71.6%) had tested for eyes within six months. Concerning physical activity, 49.5% of participants reported never exercising and those who were engaged in physical exercise 32.6% were physically active for less than 10 minutes per day, 27.4% were active for 10 to 20 minutes per day, 13.7% were active for 20 to 30 minutes per day, and 7.4% were active more than 30 minutes per day. Further practice responses are in Table 4.

Table 4. Practice for diabetes management

Questions	Responses	N (%)
When was your blood pressure checked last?	One week ago	63(66.3)
	One month ago	22(23.2)
	Six months ago	7(7.4)
	One year ago	3(3.2)
	One month ago	42(44.2)
When was your last urine exam done?	Six months ago	16(16.8)
	One year ago	7(7.4)
	Two years ago	18(18.9)
	Not done at all	12(12.6)
When was your last visit with your physician?	One month ago	79(83.2)
	Six months ago	9(9.5)
	One year ago	7(7.4)
When was your blood sugar checked?	One month ago	74(77.9)
	Six months ago	12(12.6)
	One year ago	6(6.3)
	Two years ago	1(1.1)
Many people tend to forget to take medications. Do you miss taking the doses of your diabetes medication?	Not done at all	2(2.1)
	Yes	30(31.6)
	No	65(68.4)
How often have you done physical work or exercise in the last six months?	Never	47(49.5)
	Once a week	30(31.6)
	2-3 times a week	16(16.8)
How often do you eat vegetables on every meal?	Once a week	6(6.3)
	Nearly every day	32(33.7)
	Every day	57(60.0)
	Never	1(1.1)
	Once a month	2(2.1)
How often do you eat fruits on every meal?	Once a week	9(9.5)
	Nearly every day	24(25.3)
	Every day	58(61.1)
	Missing data	1(1.1)

Table 5. Mean scores

Variable	Mean	Std.Dev.	Min.	Max.
Knowledge	12.24211	2.171948	5	16
Attitude	5.273684	1.004692	1	6
Practice	6.2	1.388402	3	9
Overall	23.71579	3.347477	11	30

4. DISCUSSION

This study aimed to assess the knowledge, attitude, and practices regarding diabetes and self-management among adult diabetic patients at CHUK. Many participants answered knowledge, attitude, and

practice questions correctly concerning diabetes care, however, there were some gaps. These findings are similar to that of Amudha et al. in Malaysia (Amudha Kairvelu et al., 2012). Contrary to Dinesh et al. in Nepal (Dinesh K Upadhyay et al., 2007) and Sonika et al. in India (Sonika Sangra et.al, 2016) who found low KAP scores among patients with Diabetes.

More than half of the participants had diabetes for five years and above. A study done in the Demographic Republic of Congo found that the longer the duration with diabetes was associated with understanding of the disease (Ntontolo PN et.al, 2017), though we did not analyze this in our study. The number of participants using oral hypoglycemic tablets, insulin injections, and combined insulin and oral tablets were nearly the same. This might be because we had both type 1 and type 2 DM participants. Even though type 2 DM was the dominant form of diabetes in this study, some of the participants were taking insulin may be due to having uncontrolled diabetes. People with type 1 DM need insulin daily to control their glycemia and those with type 2 DM require oral medication in addition to lifestyle changes, but insulin can be prescribed if glycemia continues to rise (Nam Han Cho et.al., 2015). The majority of participants had chronic complications related to diabetes. This again reflects a delayed diagnosis as well as poor control of diabetes. As such, since 41.1% of participants did not possess a glucometer at home, monitoring glycemia may be difficult for these patients and may play a role in poor diabetes control.

Most of our participants did not have a positive family history of diabetes, only 27.4% had. Compared to a similar study in Pakistan, with most of the patients having a positive family history of diabetes (60%), our prevalence was low (Kanwal et al., 2015). However, 11.6% in our study did not know if there was a family member with diabetes, so this could have skewed some of our data regarding family history. In Rwanda, some people die without knowing the cause, despite advancements in Non-Communicable Diseases (NCD) preventive measures being promoted worldwide and nationally. The majority of participants received diabetes information from medical staff, this could elucidate that patients value health information from medical personnel rather than other means. This reinforces that doctors, pharmacists, and nurses who meet with patients frequently should be well-trained about diabetes self-care and ready to provide adequate information to patients. Madeleine et al. in the study done in Kigali highlighted the need to train nurses about delivering diabetes

education to patients (Madeleine Mukeshimana et al., 2015). A study done in India revealed that when a clinical pharmacist participate in counseling patients, their knowledge improved (Subish et al., 2006), this practice is also encouraged in Rwanda.

In this study, the participants showed overall poor knowledge of the major causes of diabetes. It has been well described that the primary causes of diabetes include a lack of insulin in the blood (type 1 DM) or the inability of the body to use insulin (type 2 DM) (Nam Han Cho et.al., 2015). The reported importance of regular urine checks, following the recommended diabetic meal plan, and staying in the normal range of blood glucose displayed some gaps in all participants. Thus, this finding suggests that the participants did not usually follow the diabetes standards of care, such as checking urine for renal function at least once every six months or following a diabetic meal plan consisting of breakfast, lunch, dinner and, two snacks (International Diabetes Federation Africa Region, 2006; Madeleine Mukeshimana et al., 2015). Participants were not able to report the importance of urine checks even though they gave urine for testing. This supports the practice of some physicians who request tests and fail to communicate to the patients their utility. Sharing health information between the healthcare provider and patient should be enhanced. In a study at a private diabetic clinic in Kigali, 88.7% of patients have shown adequate knowledge regarding the normal range of blood glucose. This finding differs from our study, but participants in that study also displayed different variations on the frequency of glucose testing, as seen in our study (Madeleine Mukeshimana et al., 2015). In a study by Kanwal et.al, it was discovered that many participants had poor knowledge of diabetes etiology and blood glucose range, similar to our study (Kanwal et al., 2015).

A diabetic meal plan may not be followed due to several factors including poverty, poor eating habits in older people, or inadequate diabetes management education. In Nigeria, a study found that 25% and 39% of elderly people skip meals or avoid certain foods, respectively (Olayiwola, Olarewaju, Adelekan, & Arigbede, 2013). Interestingly, most of our participants knew recommended meal content and they were consuming vegetables and fruits every day or nearly every day with every meal. According to the Stepwise approach to the NCD surveillance survey among Rwandans, the consumption of fruits and vegetables totaled less than five servings per day in

99.1% of participants (Ministry of Health, 2015). This finding differs from our study may be due to study low population or promotion of vegetables and fruit consumption by medical personnel should be playing a role in awareness among patients who have diabetes.

A small number of participants paid attention to selecting the best possible footwear to ensure proper foot care. People with diabetes should bear in mind that they need to consider dressing style, avoiding tight socks or shoes (American Diabetes Association, 2017). In this study, few participants thought it was okay to miss medication doses or that diabetes could be cured, and few participants consulted traditional healers or complementary therapists as a way to help cure their diabetes. It is suggested that this finding may contribute to insufficient glycemic control. A study done in London revealed that patients who abandoned diabetes medication, such as insulin and instead adopted complementary medicines, later presented with acute and chronic complications (Gill, Redmond, Carraft, & Paisey, 1994). In our context, the cause may be wrong information from people who advertise that diabetes is curable as well as cultural beliefs held by the patients; a result of a lack of education by physicians who do not explain to their patients that medications for diabetes are to be taken for the remainder of their lifetime and lack of family members role in assisting with treatment adherence. Skelly et al. in a study on beliefs about diabetes among people at risk, some old people thought that diabetes could be cured and some believed in God's intervention for cure (Skelly et al., 2006). Duke N and Wigley W found that the spirituality of people with type 2 DM influences their self-management behaviors of diet, exercise, and medicine adherence (Duke N and Wigley W, 2016). This aspect should be studied in another research.

Among the participants, there was the poor practice of physical activity. Even those who attempted physical activity did not meet the recommended duration. Similar findings were observed in a study done in Pakistan (Kanwal et al., 2015) and another in Nigeria (Awotidebe et.al, 2016). In another study regarding physical activity among adults with diabetes in Rwanda, more than a third (39%) of the participants were categorized as inactive, and active participants were significantly younger than those categorized as inactive (Kabanda and Phillips, 2011). In the general population of Rwanda, few people do recreational physical activity. Even then, the majority of their physical activity was work-related (Ministry of Health, 2015). In this study, participants understood the role of exercise, such as improved blood circulation as

well as enhancing insulin activity. Participants demonstrated positive attitudes towards exercise but did not engage in exercise activities. There may be other factors involved, such as a lack of motivation or an inability to access a special area for sports, in the case of elderly patients. Additionally, many of the daily jobs in Rwanda require manual labor, contributing to a decreased exercise tendency.

The practice of regular consultation (monthly) for renewing prescriptions, checking blood sugar, and checking blood pressure has been well reported in the majority of participants. However, there were a few conflicting responses, such as participants claiming urine and eye exam were checked monthly or that the last checkup was unknown. Additionally, patients may confuse a routine physician exam for an eye exam with an ophthalmologist consultation. This is a very crucial finding about maintaining proper diabetes care recommendations.

5. CONCLUSION

In general, participants showed good knowledge about diabetes and diabetes self-care. However, the etiology of diabetes, the role of a regular urine test, diabetic meal plan, and the normal range for blood sugar were not understood. The attitude of participants towards diabetes and self-management was good. Participants were mostly consistent with engaging in recommended practices and poor practice was only observed in physical activity.

6. Recommendations

We recommend updated education and awareness programs regarding diabetes etiology, risk factors, management, complications, lifestyle modifications, and the role of self-management to be provided to diabetic patients before every consultation and in mass to achieve better disease control. Programs that enhance exercise among elderly diabetic patients should be encouraged and increased. Dietary education should base on local context. Finally, further diabetes research is recommended to explore the relationship of diabetic knowledge and the length of the disease, correlation of KAP and diabetes control, spirituality and diabetes self-management, and research on nutrition among patients with diabetes.

Competing Interests

There was no competing interest or external funding for this study.

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