

Research Article

Knowledge and Practices of Diabetic Patients Facing the Complications of Their Diseases: Cross-sectional and Analytical Study

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Abstract

Contexts: Knowledge of type 2 diabetes unequivocally contributes to glycemic control and therefore to the prevention of degenerative complications of diabetes. However, paradoxically, data on this subject are fragmented in sub-Saharan African countries. The objectives of this study were to measure the overall level of knowledge and to determine the practices of people with type 2 diabetes in managing their disease, particularly regarding diabetic complications. **Methods:** A cross-sectional and analytical study was conducted on type 2 diabetics followed at the Heal Africa Diabetes Clinic and the Association of Diabetics in Congo in Goma. A pretested questionnaire exploring the diabetics' knowledge and practices regarding diabetes complications was administered to all participants. **Results:** A total of 409 type 2 diabetics (59.2% male) were interviewed. Their mean age was 51.7 ± 13.7 years. Although the majority believed they were aware of the complications of diabetes, only 28% actively sought them out. The participants' score for good practice regarding complications was low, at 15.4%. A significant relationship was found between knowledge and practice and employment status, education level, regular blood glucose monitoring, and regular seeking of complications by diabetic patients. **Conclusion:** The overall level of knowledge among diabetics regarding the complications of their disease is unsatisfactory. Their practice depends on their level of education, their level of knowledge, and their awareness of potential complications.

Keywords

Knowledge, Practice, Complication, Type 2 Diabetes Mellitus, Macrovascular, Microvascular

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1. Introduction

Type 2 diabetes mellitus is characterized by hyperglycemia and is linked to abnormalities in carbohydrate, lipid, and protein metabolism, which lead to chronic macrovascular, microvascular, and neuropathy complications [1]. It is now recognized that type 2 diabetes mellitus is increasingly affecting developing countries and imposing a heavy economic and social burden on these countries [2].

Diabetes is a growing cause of morbidity and mortality in Africa, according to the World Health Organization (WHO) [3], and the African region has the highest proportion in the world of undiagnosed diabetics (59.7%) and of diabetes-related deaths occurring before age 60 (73.1%) [4].

In Sub-Saharan Africa (SSA) in particular, the cost of this multifactorial treatment is a major limiting factor [5].

The Democratic Republic of Congo (DRC), like any emerging country, is paying a heavy price for the consequences of complications from diabetes mellitus [6].

Regardless of the type, diabetes can lead to complications that affect multiple organs and increase the overall risk of premature death, and among the possible complications are myocardial infarction, stroke, kidney failure, amputations, and vision loss as well as nerve damage [7].

Effective self-management of type 2 diabetes mellitus (T2D) is crucial to reducing the risk of diabetes-specific complications, as improved glycemic control has been demonstrated with the active involvement of diabetic patients in their care [8].

Due to the chronic nature of type 2 diabetes, self-care activities have become an integral part of effective diabetes care worldwide. Glycemic control, measured in terms of glycosylated hemoglobin (HbA1c), has been associated with a significant reduction in diabetes-related complications and economic burden [4]. Educational programs must incorporate basic knowledge of the disease for patients to achieve ownership of diabetes education and treatment [7]. According to Achouri et al., the level of therapeutic adherence among type 2 diabetics is insufficient, hence the need for the implementation of therapeutic education programs in patient care [9].

The aim of this study was to measure the overall level of knowledge and to determine the practices of type 2 diabetics in dealing with their disease, in particular, regarding the complications of diabetes.

2. Methods

2.1. Type, Period, and Study Framework

This was a cross-sectional and analytical study conducted during the period from 01/04/2021 to 01/07/2021 in the diabetic clinics of Heal Africa and the Association of Diabetics in Congo, in the City of Goma in the Democratic Republic of Congo.

2.2. Study Population

Patients aged 35 years and over with type 2 diabetes mellitus regularly followed in the two institutions constituted the study population of the present study.

2.3. Inclusion and Exclusion Criteria

Included in this study were patients aged 35 years or older with a confirmed diagnosis of type 2 diabetes mellitus (T2D), followed on an outpatient basis in one of the two centers of our research, and who had given their signed informed consent.

The major difficulty in communicating with the research team was the exclusion criterion.

2.4. Sampling and Sample Size

This was a simple random probability sampling that recruited diabetics frequenting the sites of our research. The minimum sample size was calculated using Fisher's formula below: $n \geq (Z^2 \times p) (1-p) / d^2$ with: n = sample size, $z = 1.96$ (confidence coefficient), p = prevalence of good knowledge about complications of diabetic foot not known, i.e., $p=0.5$, $d = 0.05$ (margin of error or margin of error reflecting the desired degree of absolute precision).

The sample size thus calculated was $n \geq (1.96)^2 \times 0.5 \times 0.5 / (0.05)^2 = 384$. By adjusting with a non-response rate of 10%, we obtain a sample of 427 diabetics.

2.5. Data Collection

Data collection was conducted by the principal investigator with the assistance of two research assistants. Prior to the data collection, participants were informed of the purpose and objectives of the research and asked to sign an informed consent form. The questionnaire was developed based on those used in previous studies in Ghana and India [10, 11]. It was self-administered in French, with the interviewer providing translation based on the participant's preference.

2.6. Variables of Interest

The variables of interest for this research were:

- 1) the level of participants' knowledge about the complications of type 2 diabetes;
- 2) their attitude towards the complications of type 2 diabetes;
- 3) and their practices regarding the prevention of complications of type 2 diabetes.

2.7. Statistical Analyses

The data was entered using EXCEL software and analyzed in SPSS for WINDOWS version 24 and STATA version 3.6.

Data were presented as mean and standard deviation for

normally distributed quantitative data and as median (inter-quartile range: IQR) for non-normally distributed quantitative data. Qualitative variables were presented as absolute and relative frequencies.

Pearson's chi-squared test or Fisher's exact test was used to compare proportions. Student's t-test compared means, and the Mann-Whitney U test compared medians.

2.8. Ethical Considerations

The study was approved by the Ethics Committee of the Protestant University in Congo (UPC) under Reference Number CEUPC0085. All authorizations to collect data were obtained from the Medical Director of the Heal AFRICA Hospi-

tal for the Heal AFRICA Diabetes Clinic and from the representative of the Diabetes Association in Congo. All patients had given informed consent before enrollment. The anonymity of identified patients and the confidentiality of the data were guaranteed.

3. Results

3.1. General Characteristics of the Study Population

Table 1 lists the general characteristics of the studied population according to the study site.

Table 1. General characteristics of the studied population according to site.

Variables	All n=409	HA n=217	AD n=192	P
Age, years	51.7 ± 13.1	49.9 ± 12.5	53.6 ± 13.1	0.004
Age range (years)				0.026
<45	121 (29.6)	67 (30.9)	54 (28.1)	
45-59	171 (41.8)	100 (46.1)	71 (37.0)	
≥60	117 (28.6)	50 (23.0)	67 (34.9)	
Sex				0.280
Male	242 (59.2)	125 (57.6)	117 (60.9)	
Female	167 (40.8)	92 (42.4)	75 (39.1)	
Occupation				0.149
Unemployed	92 (22.5)	43 (19.8)	49 (25.5)	
Informal	193 (47.2)	100 (46.1)	93 (48.4)	
Formal	124 (30.3)	74 (34.1)	50 (26.0)	
Marital status				0.531
Married	283 (69.2)	151 (69.6)	132 (68.8)	
Bachelor	33 (8.1)	20 (9.2)	13 (6.8)	
Divorced/Widower	93 (22.7)	46 (21.2)	47 (24.5)	
Level of education				0.662
Primary	114 (27.9)	60 (27.6)	54 (28.1)	
Secondary	193 (47.2)	99 (45.6)	94 (49.0)	
University	102 (24.9)	58 (26.7)	44 (22.9)	

The data are expressed as mean ± standard deviation (n) absolute frequency and % relative frequency.

A total of 409 patients were interviewed. This table summarizes the characteristics of the surveyed population. The

mean age of the respondents was 51.7 ± 13 years. The majority of patients were male (59.2%), and most of the respondents worked in the informal sector (47.2%). The majority were married (69.2%), and nearly half had a secondary education (47.2%).

3.2. Assessment of General Knowledge of Diabetics About Type 2 Diabetes

Table 2 summarizes the general knowledge of diabetics about type 2 diabetes.

Most respondents (77.5%) do not know of any reliable test

other than blood glucose monitoring to determine their glyce-mic control. The average duration of diabetes among those surveyed is 6 years, with a significantly longer duration of 7 years at the clinic of the Congolese Diabetes Association (ADIC).

Table 2. General knowledge of diabetics about type 2 diabetes according to the Heal Africa clinic and the Diabetic Association in Congo.

Variables	All n=409	HA n=217	AD n=192	P
DS duration	6.5(6.0-7.0)	5.9(5.4-6.5)	7.1(6.4-8.0)	0.022
Age range (years)				0.271
<5	163(39.9)	90(41.5)	73(38.0)	
≥5	246(60.1)	127(58.5)	119(62.0)	
Knowing the balance of their DS				0.134
Yes	306(74.8)	157(72.4)	149(77.6)	
No	103(25.2)	60(27.6)	43(22.4)	
Knowledge of the DS equilibrium balance				0.307
Blood glucose	257(84.0)	127(80.9)	130(87.2)	
HbA1c	45(14.7)	28(17.8)	17(11.4)	
Acetonuria	4(1.3)	2(1.3)	2(1.3)	
Knowledge about the normal value of the tests				0.490
No	237(77.5)	121(77.1)	116(77.9)	
Yes	69(22.5)	36(22.9)	33(22.1)	
Reliable review				0.037
No	322(78.8)	163(75.1)	159(82.8)	
Yes	87(21.3)	54(24.9)	33(17.2)	
Reliable review				0.230
HbA1c	44(51.2)	30(55.6)	14(43.8)	
Glucosuria	12(14.0)	5(9.3)	7(21.9)	
Blood glucose	30(34.9)	19(35.2)	11(34.4)	

3.3. Assessment of Diabetics' Knowledge of the Type of Complications According to the Site

Table 3. Diabetics' knowledge of the types of complications of type 2 diabetes.

Variables	All n=409	HA n=217	AD n=192	P
Knowledge about complications				0.213
Yes	348 (85.1)	188 (86.6)	160 (83.3)	
No	61 (14.9)	29 (13.4)	32 (16.7)	
Known complications				
Renal	268 (65.5)	158 (72.8)	110 (57.3)	0.001

Variables	All n=409	HA n=217	AD n=192	P
Eyepiece	338 (82.6)	183 (84.3)	155 (80.7)	0.203
Diabetic foot	350 (85.6)	190 (87.6)	160 (83.3)	0.142
HTA	352 (86.1)	188 (86.6)	164 (85.4)	0.415
Erectile dysfunction	257 (62.8)	126 (58.1)	131 (68.2)	0.021
Stroke	257 (62.8)	122 (56.2)	135 (70.3)	0.002
Coma	311 (76.0)	150 (69.1)	161 (83.9)	< 0.001

HTA: Hypertension, Stroke: Cerebrovascular Accident

Table 3 lists the knowledge of diabetics about the type of complications of type 2 diabetes according to the website of Heal Africa and the Association of Diabetics in Congo.

The results show that the majority of subjects (85%) reported having heard of the complications of diabetes mellitus. However, the most frequently cited complications were high blood pressure (86.1%), diabetic foot (85.6%), ocular complications (82.6%), and coma (76.0%). A statistically significant difference was observed between the two hospital settings, particularly renal complications (more frequently cited in the

HA setting), while erectile dysfunction, stroke, and coma were more commonly reported in the AD setting ($p < 0.05$).

3.4. Knowledge of Respondents Combined with Good Practices

The association of respondents' knowledge with good practices is presented in Table 4.

Table 4. Knowledge associated with good practices.

Variables	Bad practice n=346	Good practice n=63	P
Seniority of DS (years)			0.007
<5	147(42.5)	16(25.4)	
≥5	199(57.5)	47(74.6)	
Knowledge about the balance of the DS			0.081
Yes	254(73.4)	52(82.5)	
No	92(26.6)	11(17.5)	
Knowledge about complications on DS			<0.001
Yes	286(82.7)	62(98.4)	
No	60(17.3)	1(1.6)	
Regular blood glucose monitoring			<0.001
Yes	257(74.3)	61(96.8)	
No	89(25.7)	2(3.2)	
Regular monitoring for complications			<0.001
Yes	81(23.4)	32(50.8)	
No	265(76.6)	31(49.2)	

A duration of diabetes mellitus exceeding 5 years is significant for good practice in managing complications ($P = 0.007$).

Good knowledge of complications is also significant for good practice in diabetic patients ($P < 0.001$). Regular blood glucose

monitoring and regular screening for complications are associated with good practice in managing complications of type 2 diabetes mellitus.

4. Discussion

The results of this study highlight a low rate of good practices (15.4%) in dealing with type 2 diabetes complications among patients followed in the two clinics studied.

This finding is consistent with several previous studies conducted in sub-Saharan Africa, where insufficient knowledge and weak adoption of practical recommendations contribute to an increased risk of degenerative complications [12, 13].

In our series, we have highlighted a positive correlation between a high level of education (secondary and university) and the adoption of good practices, corroborating the observations of Xiling et al. [1] and Alsous et al. [2], who also note that access to education promotes self-management and improves understanding of the issues of the disease.

Belonging to a formal profession also appears to be a determining factor, nearly tripling the probability of good practice, presumably thanks to better access to information and health coverage.

Our study also highlights the importance of regular blood glucose monitoring and systematic screening for complications, two behaviors associated with a significant increase in the rate of good practices. This aligns with international recommendations that place self-monitoring of blood glucose and early detection of complications at the heart of diabetes management [14].

The finding of poor knowledge of additional tests other than blood glucose in nearly 77.5% of participants reflects the need to intensify therapeutic education for patients, as suggested by Allah et al., [3] self-monitoring of blood glucose and detection of complications should be supported by educational programs adapted to the local socio-cultural context.

Furthermore, the high prevalence of hypertension, diabetic foot, and ocular complications as known complications demonstrates both partial awareness and potential gaps in understanding of other major complications such as renal failure or neuropathies, requiring comprehensive management, while, as Fasil et al. [7] note, diabetic nephropathy is becoming a universal cause of end-stage renal disease and is recognized as an independent risk factor for cardiovascular disease.

Furthermore, a diabetes duration of more than five years is significantly associated with better management practices, likely due to the progressive increase in knowledge acquired during consultations. However, this gain in experience does not compensate for the lack of structured training; many patients, even those followed for a long time, remain insufficiently equipped to deal with the risks.

Strength of the study

By conducting this survey, we believe we have contributed to improving respondents' understanding of the complications of diabetes.

Weakness of the study

This study has weaknesses that must be considered when interpreting the results. These are inherent to the study's limited scope, encompassing only two hospitals (and therefore not applicable to all diabetics), and to the self-reporting nature of the data, which lacked the possibility of verifying the claims. Nevertheless, these are important data points that should be used to better inform therapeutic education for diabetic patients in this region.

5. Conclusion

The diabetic patients in our study, in whom we noted a duration of more than 5 years, have good practices in dealing with the complications of type 2 diabetes mellitus. Knowledge of complications of diabetes mellitus; regular screening for complications of type 2 diabetes mellitus, and regular blood glucose control are significant for good practices in dealing with the complications of their diseases.

Diabetic patients with a university or secondary education have good practices for managing complications of their disease. A patient's good knowledge of complications is correlated with good practices and an appropriate attitude towards these complications. Daily self-monitoring of blood glucose and regular monitoring for complications by diabetic individuals are good practices for managing complications of type 2 diabetes.

In short: The study allowed us to assess the level of knowledge and its influence on the practices of diabetic patients in a preventive context regarding the complications of their disease. A positive correlation exists between a certain social status, the lifestyle of diabetic patients, their level of education, and their knowledge and practices regarding the complications of type 2 diabetes.

Abbreviations

n	Absolute Frequency
%	Relative Frequency
HTA	Hypertension (Arterial Hypertension)
Stroke	Cerebrovascular Accident
MD	Doctor of Medicine
M.Med	Master of Medicine (Family Medicine)
WHO	World Health Organization
ASS	Sub-Saharan Africa
DRC	Democratic Republic of Congo
DT2	Type 2 Diabetes Mellitus
HbA1c	Glycated Hemoglobin
UPC	Protestant University in Congo

Author Contributions

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James Munguiko Macali: Investigation
Sylvie Kahindo Bembeleza: Investigation
Ernest Sumaili Kiswaya: Supervision
Jean-Pierre Fina Lubaki: Visualization
Aliocha Nkodila: Software
Phippe Ngwala Lukanu: Validation

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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