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Explanatory Factors for Compliance to Self-Care Therapy among Type II Diabetics in Bandundu-Ville, Democratic Republic of the Congo

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Authors' contributions

This work was carried out in collaboration among all authors. Authors OKN, DLN and GNB designed the study, performed the statistical analysis. Authors TC, EE and NM wrote the protocol. Authors OKN and GNB wrote the first draft of the manuscript. Authors KK, DS and TC managed the analyses of the study. Authors CSL, DLN and GNB managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Diabetes is a real public health problem and a global economic burden that affects every country. Although its management is codified, most people with diabetes are unable to keep follow-up appointments. Thus, compliance with self-care, a concordance between therapeutic prescription and patient compliance, is therefore not limited to strict drug treatment. The purpose of this study

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was to identify the factors that explain compliance to self-care in patients with type II diabetes in order to reduce the incidence of complications related to this century's pandemic. The survey was carried out at the General Reference Hospital of Bandundu-Ville in the Urban-Rural Health Zone of Bandundu-Ville, Kwilu province, DRC. This cross-sectional study conducted from March to April 2018, involved Type II diabetics. The sample size was determined based on the Fischer formula. So, 138 subjects were selected. The semi-structured interview was used with closed and/or open-ended questions designed on a Likert-type scale with seven choices of answers in the design of the items.

The findings show that the age varies between 46 and 76 years with an average age of 50 ±13.7 years. However, 71.0% of respondents were married, 49.3% had a secondary education while 61.6% were in the private sector. The probability of compliance to self-care in self-care (diabetic patients) influences the perception of threats caused by the onset of the disease ($p>0.000$, $\chi^2 =20.1$, $\alpha = 0.05$).

In conclusion, the main determinants of compliance to self-care by diabetics to meet the time required by caregivers to take diabetes mellitus medications are in the following order of importance namely the perception of threats caused by the onset of the disease and expected outcomes. On the other hand, the sense of personal effectiveness is not significantly related to the compliance to self-care.

Keywords: Self-care; factors; type II diabetes; urban-rural health zone; Bandundu Ville.

1. INTRODUCTION

Diabetes has been considered a major public health problem worldwide for several decades because, according to the International Diabetes Federation, in 2003, 194 million people worldwide had diabetes. Thus, by 2025, 26333 million, or 6.3% of the world's population, will have been reached if no preventive care is provided [1]. Considering this fact, the WHO reported that by 2025, there would be more than 300 million people with diabetes in the world compared to the current 125 million of which 75% would live in developing countries. This suggests the importance of this public health concern and the economic burden it would represent to these countries in the forthcoming years [2]. Moreover, it is considered to be one of the most common chronic diseases in almost all patients, so it is a definitive pathological condition requiring lifelong treatment.

Like in other African countries, the Democratic Republic of the Congo (DRC) has more than one million people with diabetes, of whom 5 to 10% are children and adolescents, according to estimates from the National Program of Diabetes [3]. Diabetes mellitus is the most common cause of polyneuropathies. About 50% of individuals suffer from neuropathy within 25 years of diagnosis. In addition to its responsibility for 45% of all non-traumatic amputations, diabetes is the leading cause of blindness in adults. Thus, elderly people with diabetes are twice as likely to suffer from high blood pressure, cardiovascular disease and stroke as those without diabetes [4].

Self-care compliance is the concordance between the therapeutic prescription and the patient's compliance with it. It is therefore not limited to strict drug treatment. In diabetes, however, it can be applied to many non-pharmacological aspects, including compliance with dietary hygiene measures, self-monitoring of blood sugar levels, foot care and regular physical activity. The same complete source as 35 to 80% of diabetics does not follow their self-care compliance correctly [5]. This study is in the field of public health versus behavior change communication, aimed at preventing the consequences of Type II diabetes. Also, to increase the likelihood of better blood glucose control, many self-care treatments must be performed. Failure to perform the latter leads to more or less long-term, irreversible or even fatal chroniccomplications.

Despite the knowledge of these facts, the long-term compliance rate for diabetic self-care remains very low in healthcare settings in general in the city of Bandundu precisely. In diabetes, the compliance is likely to be applied to many non-pharmacological aspects such as compliance with dietary hygiene measures, self-monitoring of blood glucose levels, foot care, and regular physical activity. However, 35 to 80% of diabetics do not follow their self-care compliance correctly. People with this chronic condition are hospitalized twice as often as people without diabetes. As a result, they have longer hospital stays and more visits to ambulatory care services. The cost of health care per patient with diabetes is three

times higher than that of a non-diabetic patient [6].

In addition to these financial aspects, there is physical and emotional suffering as well as several limitations affecting patients' personal, family and social lives. However, diabetic complications can force individuals to give up their work, a source of remuneration and individual self-esteem. Therefore, patient compliance with the care plan is one of the essential elements of good diabetes management. However, the non-compliance is an extremely frequent phenomenon, as it generally affects more than one in two patients, potentially affecting all aspects of treatment [7]. The treatment of diabetes is often the most complex and involves hygiene-dietary modifications in order to optimize the nutritional intake and increase the physical activity, as well as the initiation of pharmacological treatments (oral antidiabetic agents and insulin) to compensate for insulin deficiency and combat insulin resistance. Statistically, the optimal follow-up of treatment recommendations is associated with improved glycemic control (decreased glycated hemoglobin; HBA1c) but also reduces chronic complications of the disease and reduces its cost [8].

Despite the potential benefits of pharmacological treatment, the therapeutic compliance remains low and a poor compliance is reported to occur between 36 and 85% of diabetic patients, with the lowest results observed in patients receiving oral treatment. Notwithstanding, the most common factors affecting adherence or compliance to treatment are the complexity of treatment, frequency of drug administration, cost, staff training in treatment, depression and adverse events or fear from the patients themselves [8]. The various elements presented so far demonstrate that diabetes has a huge impact at various levels of life. Thus, to minimize these sequelae as much as possible, it becomes relevant to reduce acute and chronic complications. For this reason, it is important for health professionals, mainly nurses, to explain to individuals with diabetes the close link between complications and blood glucose abnormality to promote a better management.

2. MATERIALS AND METHODS

2.1 Study Area

The survey was conducted at the General Reference Hospital of Bandundu-ville, which is located in an urban-rural health zone of Bandundu-ville in the province of Kwilu, DRC. This hospital offers preventive, curative and promotional services.

2.2 Study Design and Sample Size

It is a cross-sectional study of the predictive correlational type. This non-probability study, conducted between March and April 2018, was conducted for convenience and concerned Type II diabetic patients. The sample size was determined based on Fischer's formula and 138 participants were selected for this study [9].

The semi-structured interview was designed according to the Likert-type scale having seven choices of answers in the design of items. This interview guide had closed and/or open-ended questions and it was in the local language named Kikongo.

2.3 Data Collection

Data collection was performed using an interview guide containing two scales validated in French in order to measure the self-efficacy sense and health beliefs.. An assessment questionnaire of compliance and an elaborated questionnaire helped to collect socio-demographic and health data were used. All these instruments were taken from Plante [6] and was adapted for this study. The pre-survey was carried out between February 5 and 14, 2018 with 25 diabetic subjects at Musaba health centre.

2.4 Data Analysis

Descriptive analyses (frequency, mean, standard deviation, minimum and maximum values, and finally percentage) were used to describe the sample profile. The correlational analysis using the Chi-square association test (X^2), the confidence interval of the Odds-ratio was performed between the different variables. At last, the simple linear regression was used to identify the explanatory factors that predict adherence to self-care therapy in diabetic subjects. Data analysis was performed using the SPSS software version 22.0. Probability values less than 0.05 were considered statistically significant.

3. RESULTS

3.1 Socio-demographic Characteristics

The sociodemographic characteristics of respondents are presented in Table 1.

The age varies between 46 and 76 years with an average age of 50 ±13.7 years. While, 71.0% of respondents were married, 49.3% had a secondary education level and 61.6% were in the private sector as professional activity.

3.2 Relationship between the Probability of Self-care Compliance and Perceptions on the Onset of the Disease

The relationship between self-care compliance and the perception of threats caused by the onset of the disease is presented in the Table below (Table 2).

The compliance to self-care (diabetic patients) influences the perception of threats caused by the onset of the disease (p>0.000, χ^2 =20.1, α = 0.05 at df=1).

Table 3 displays the relationship between the compliance to self-care and self-effectiveness sense

The compliance to self-care is not function of self-efficacy (p =0.113, χ^2 =0.45, α=005).

The relationship between the compliance to self-care and expected outcomes is displayed in the following (Table 4).

Treatment for type II diabetes positively influences the compliance to self-care (p>0.015, χ^2 =4.4, α = 0.05) at df=1.

The relationship between the compliance to self-care and the socio-demographic characteristics is presented in Table 5.

The compliance to self-care is positively associated with the age of diabetic patients (OR=0.710 with p=0.024, X^2=4.4, α, 005) and (OR)=[0.358; 1.404]. But this is not dependent on the marital status (p<0,391, X^2=5.5, α=0.05). The probability of self-care compliance is significantly associated with patients' education levels (p>0.043, X^2 = 13.9, α=0.05). At last, the probability of self-care compliance is significantly related to the professional activity of diabetic patients (p>0.000, X^2=9.6, α=0.05).

3.3 Regression Model to Establish a Relationship between Variables

The regression analysis for predicted variables from the compliance to self-care is presented in the (Table 6).

Table 1. Socio-demographic characteristics

Socio-demographic characteristics	Frequency	%
Age (years)		
19-45	*65*	*47.1*
46-76	*73*	*52.9*
Total	***138***	***100***
Marital status		
Married	98	71.0
Single	29	21.0
Divorced	7	5.1
Widow**(er)**	4	2.9
Total	***138***	***100***
Education level		
Illiterate	15	10.9
Primary	34	24.6
Secondary	68	49.3
University	21	15.2
Total	***138***	***100***
Professional activity		
Public	53	38.4
Private	85	61.6
Total	***138***	***100***

Table 2. Relationship between the probability of self-care compliance (PO) and the perception of threats caused by the onset of the disease

Perception of threats caused by the onset of the disease	Compliance to self-care		OR	$IC_{95\%}$ (OR)	
	High compliance	Low compliance			
	n (%)	n (%)		-im<	-im>
Positive perception	40 (70.2)	25 (30.9)	5.271	.520	1.022
Negative perception	17 (29.8)	56 (69.1)			
Total	**57 (100)**	**81 (100)**			

Compliance to self-care (diabetic patients) influences the perception of threats caused by the onset of the disease (p>0.000, χ2 =20.1, α = 0.05 at df=1).

Table 3. Relationship between compliance to self-care and self-effectiveness

Sense of personal effectiveness	Compliance to self-care		OR	$IC_{95\%}$ (OR)	
	High compliance	Low compliance			
	n (%)	n (%)		Lim<	Lim>
High effectiveness	37(64.9)	48 (59.3)	1.272	0.631	2.566
Low effectiveness	20(35.1)	33 (40.7)			
Total	**57 (100)**	**81 (100)**			

The compliance to self-care is not a function of self-effectiveness (p =0.113, χ2 =0.45, α, 005). X2=0.45 at df=1, p=0.113

Table 4. Relationship between the compliance to self-care and the expected outcomes

Expected outcomes	Compliance to self-care		OR	$IC_{95\%}$	(OR)
	High compliance	Low compliance			
	n (%)	n (%)		Lim<	Lim>
A positive outcome	35 (61.4)	35 (43.2)	2.091	1.048	.173
A negative outcome	22 (38.6)	46 (56.8)			
Total	**57 (100)**	**81(100)**			

Table 5. Relationship between the compliance to self-care and socio-demographic characteristics

Socio-demographic characteristics	Compliance to self-care		χ^2	df	p	Decision
	High compliance	Low compliance				
Age (years)	**n (%)**	**n (%)**				
19-45	24 (42.1)	41 (50.6)	4.4	1	0.085	DS
46-76	33 (57.9)	40 (49.4)				
Total	**57 (100)**	**81 (100)**				
Marital status						
Married	41 (71.9)	57 (70.4)	5.5	3	0.391	DN
Single	11 (19.3)	18 (22.2)				
Divorced	5 (8.8)	2 (2.5)				
Widow	0 (0.0)	4 (4.9)				
Total	**57 (100)**	**81 (100)**				
Level of education						
Illiterate	5 (8.8)	10 (12.3)	13.9	4	0.043	DS
Primary	23 (40.4)	11 (16.6)				
Secondary	22 (38.6)	46 (56.8)				
University	7(12.3)	12(14.8)				
Total	**57 (100)**	**81(100)**				
Professional activity						
Public	25 (43.9)	32 (39.5)	9.6	3	0.000	DS
Private	32 (56.1)	49 (60.5)				
Total	**57 (100)**	**81(100)**				

Table 6. Results of regression analysis for predicted variables from ORP to self-care

Variables	β	t	ρ
Variables of the conceptual model		*5.0*	
Perception of threats caused by the disease onset	*.383*	*4.906*	*.000*
Sense of personal effectiveness	*-.103*	*-.151*	*.250*
Expected outcomes	*.198*	*2.310*	*.022*

*$R^{2, 144}$; F= (dll : 1) 5,0 ; *p<0.05*

After regression analysis, the predicted variables allow to explain that 5.0% of the compliance to self-care to diabetic patients with (R^2=0.144) followed by ANOVA test (F= (df=1)= 5.0; *p<0.05). The findings specify that the main determinants of compliance to self-care by diabetics in order to meet the time required by medical personel to take medications against diabetes mellitus following this order of importance, namely the perception of threats caused by the onset of the disease (β=0.383; p<0.05), expected outcomes (β=0.198; p<0.05). On the contrary, the sense of personal effectiveness (β=-0.103; p<0.05) is not significantly related to the compliance to self-care. Then, the hypothesis that the perception of threats caused by the onset of the disease, the expected outcomes and the sense of personal effectiveness are partially validated.

4. DISCUSSION

Perceptions of the threats caused by the onset of the disease and the expected outcomes of treatment made it possible to predict compliance with diabetic self-care with patients. The study identified some socio-demographic variables which were significantly associated with adherence to self-care therapy in patients with type II diabetes on which interventions could be developed.

4.1 Psycho-Socio-demographic Characteristics of Subjects

The age of the subjects ranged from 46 to 76 years with an average age of 50±13.7 years. These findings are consistent with the literature on type II diabetes, and this is due to the continuous progression of diabetes in the DRC. It is, therefore, the result of several risk factors namely increased physical inactivity, obesity, longer life for some people and poor eating habits for others [10]. On the other side, these findings differ from Mafuta and Kayembe study who reported that 68.6% of their respondents were aged between 20 and 34 years old (in the health zones of Equateur (Ecuador) and Katanga) [11].

More than two-thirds of the respondents were married (71.0%). As to the education level, most of the respondents had a high school education level (49.3%), but it should be noted that 10.9% of the selected population is illiterate. Similarly, in Mali, a study found that the vast majority of its study population had never attended school, notably 73.3% of daughters-in-law, 86.2% of mothers-in-law and 65.8% of spouses [12]. In Benin, illiteracy among pregnant women was observed in 67% of pregnant women interviewed during the study. Concerning the professional activity, it was found that most of respondents (61.6%) have their own activities i.e. private professional activities [13]. Besides, a study on the use of sulfadoxine-pyrimethamine among the pregnant women surveyed, the majority of them have their activities at home, i.e. 78.7% compared to 21.3% who have them out of the home [14]. Diwambazila reported that 40% of respondents in his study were employed while 40% of the population had an independent occupation [15].

4.2 Explanatory Factors for Adherence to Self-care in Type II Diabetes

The findings indicate that the probability of self-care compliance (diabetic patients) influences the perception of threats caused by the onset of the disease (p>0.000, χ2 =20.1, α = 0.05). These findings are consistent with Plante [6] who believes that improving and prolonging life through better diabetes control is possible through the implementation of recommendations and prescribed treatment. These recommendations should be tailored to the needs of each person having diabetes, including a healthy diet on a regular schedule, a minimum of exercise three to four times a week for at least 20 minutes at each session, a healthy body weight, capillary glucose monitoring, regular drug administration, periodic check-up of their skin and feet. The same source adds that the success of blood glucose control depends largely on the compliance of people with diabetes to achieve the points mentioned above. However, these activities that they should start and carry out on

their own are called self-care. The desired blood glucose control cannot be achieved without the active, permanent and daily participation of the affected individuals. On the other hand, self-monitoring of blood glucose may be useful for most people with diabetes. Its potential benefits, such as reducing glycated hemoglobin, preventing and recognizing hypoglycemia and a more flexible lifestyle, are greater when the person is taught to adapt his/her food choices, physical activities and drug treatment based on the results obtained [16].

Yet, the above findings show that the probability of self-care compliance is not a function of self-effectiveness (p =0.113, χ^2 =0.45, α, 005). These findings are not consistent with those of Karter et al. [16] who reported that in people with type 1 diabetes, the self-monitoring of blood glucose is an essential aspect of daily diabetes management. In a large cohort study in patients who tested their blood glucose at least three times daily, there was a statistically and clinically significant 1.0% of reduction in HbA1c. The same author notes that the patient often needs to have more frequent blood glucose tests to have the information necessary to reduce the risk of hypoglycemia, modify his/her treatment and make appropriate lifestyle choices [16]. Although the expected outcomes of treatment for type II diabetes positively influence the compliance to self-care (p>0.015, χ^2 =4.4, α = 0.05), one study corroborates with our findings which state that adherence to medication, diet, regular exercise, urinary tests and foot care is thus combined with glycated hemoglobin, blood glucose, fasting triglycerides and glycosuria results. The most significant correlation of compliance was identified with the perception of severity followed by benefits, vulnerability and barriers. The authors also find a significant association with action signals that explain 6.5% of the compliance variance. However, the family support analyzed separately accounts for 4.3% of the variance, and this variance is usually integrated into the action signals. The combination of both gives the variance rate of 10.8% [17].

Analysis of the above findings provides sufficient evidence that the compliance to self-care is positively associated with the age of diabetic patients (p=0.024, X^2=4.4, α=005). Several studies support these findings, precisely one which indicates a better overall compliance in older patients with type II diabetes [18]. Furthermore, older diabetics (65 years and older), compared to younger diabetics, consult more for their eyes and feet, eat more fruits and vegetables and less fat, eat more for pleasure and have fewer episodes of hyperphagia [19].

In addition, older patients rate their health status as worse than younger patients and that they have a higher number of hospitalizations and complications related to diabetes. Besides, it would be not only age itself that could predict compliance, but also the perceived severity of diabetes, the number of complications and associated hospitalizations [18-19]. But the compliance is not dependent on the marital status (p<0,391, X^2=5.5, α=005). The compliance to self-care is significantly associated with patients' education level (p>0.043, X^2 = 13.9, α=005). The majority of researchers agree that being more educated is associated with better adherence to treatment, including medication, physical activity and more frequent self-monitoring of blood glucose levels. For example, among type II diabetics with high school education, 40% report no physical activity [19].

At last, the probability of self-care compliance is significantly related to the professional activity of diabetic patients (p>0.000, X^2=9.6, α=005). Low income coupled with lack of health insurance coverage is related to lower compliance with oral antidiabetic medication. Di Matteo's [20] study also shows a positive and significant relationship between Neuron-Specific Enolase and medication compliance, especially in studies with adults using a numerical income measure. Besides, the situation becomes more complicated in the presence of co-morbid pathologies (costs of combination therapy, limits of coverage of insurance programs [20].

4.3 Regression Model to Establish a Relationship between Variables

The findings indicate variables predicted by patients for self-care compliance to type II diabetes, can explain 5.0% of the compliance for diabetic self-care in patients with type II diabetes with (R^2=0.144) followed by ANOVA of (F= (df: 1) = 5.0 ; *p<0.05). The results specify that the main determinants of compliance to self-care by diabetic patients in order to meet the time required by health personels to take medications against diabetes mellitus are in the following order of importance: The perception of threats caused by the onset of the disease (β=0.383; p<0.05), the expected outcomes (β=0.198; p<0.05) and the sense of personal effectiveness

(β=-.103, $p<0.05$). But they are not significantly related to the probability of self-care compliance.

Our results are contrary to the one found by Bandura [21] who reports that an individual may or may not be behaving following his belief according to the effectiveness of this latter in achieving the desired results. This element is already represented in the health belief model by the variable "benefits". The patient's conviction in adopting appropriate conduct to achieve the expected results is absent in this model [20,21]. Moreover, a person's belief in personal effectiveness is crucial because it influences all aspects of behavior namely the acquisition of new concepts; the more confident a subject is in his abilities, the more initiative he shows, the more effort he makes and the more perseverance he shows in dealing with obstacles and threatening situations [22].

Similar results have been found by Rosenstock [22] who reported that the perception of control provides the individual with the motivation to take action. The first step is the individual's acceptance of his predisposition to present the disease or its complications: perceived vulnerability. From denial to considering the statistical possibility, to feeling really at risk of complications, the level of perceived vulnerability varies among individuals. Many people with diabetes refer to the fact that they do not feel sick or that they take the fact that they have diabetes lightly. Some of them are experiencing widespread anxiety about being diagnosed with diabetes. Others evoke a strong fear of complications, for example, by remembering that a family member who also has diabetes has had an amputation [22].

For Nelson [19], the perception of the severity of the disease is strongly influenced by the emotional state and the difficulties anticipated by being ill. The individual perceives hisllness as serious when he is afraid or sees the medical consequences and daily activities. Fear of death, complications or loss of autonomy are all anticipated medical consequences for people with diabetes. The implications of the disease are complex daily and influence the perceived severity.

Besides, Karter et al. [16] reported that it seems rather difficult for nurses to increase their perception of control, that is, to have some control over the factors that facilitate or hinder the use of behavior by patients. This perception of control will be possible if means are put in place by managers in order to facilitate their use and reduce barriers to its use. One of these ways would certainly be to involve community health workers in the process of implementing a strategic plan for home monitoring for certain chronic diseases such as diabetes mellitus. Thus, the hypothesis that the perception of threats caused by the onset of the disease, the expected results and the sense of personal effectiveness are only partially validated.

5. CONCLUSION

At the end of this study, which aimed at identifying the factors that explain compliance to self-care in patients with type II diabetes.

The main determinants of compliance to self-care by diabetics to meet the time required by caregivers to take diabetes mellitus medications in order of importance are the perception of threats caused by the onset of the disease and expected outcomes. On the other hand, the sense of personal effectiveness is not significantly related to the compliance to self-care.

CONSENT

As per international standard, patient’s informed written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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