Illness Perceptions and Depression in Relation to Self-care Behaviour among Type 2 diabetes Patients in a Referral Hospital in Kigali-Rwanda

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Abstract

Background: This paper describes illness perceptions, communication and depression in relation to self-care behaviour among Type 2 diabetes patients, collected from a referral hospital in Kigali, Rwanda between 14 December 2010 and 28 February 2011. **Methods:** A descriptive cross-sectional study explored the relationships between interpersonal communications assessed using the Interpersonal Processes of Communication of Care in Diverse Population questionnaire; depression assessed using the Centre for Epidemiological Studies Depression Scale; illness beliefs assessed using the Revised Illness Perceptions Questionnaire; and self-care behaviour assessed using the Summary of Diabetes Self-Care Activities questionnaire. Self-regulatory model of illness perceptions, with a focus on cognitive representation, was the conceptual framework used to guide this study. We recruited 86 participants. **Results:** Participants perceived type 2 diabetes as a cyclical and chronic condition associated with serious but controllable consequences. Time cyclical, personal control and depression were independently associated with self-care behaviour. **Conclusion:** The findings confirm that depression and illness beliefs influence self-care behaviour.

Keywords: Illness perceptions, depression, among type 2 diabetes patients

Introduction

Type 2 diabetes is a growing public health concern worldwide and accounts for more than 90% of all diabetes cases in sub-Saharan Africa. [1, 2, 3] It causes a moderate decrease in insulin production and together with insulin resistance, this leads to a high blood glucose level. [4] Poor blood glucose control in type 2 diabetes is associated with cardiovascular, renal and neurological complications. [5, 6] These complications are preventable through adherence to medical treatment and lifestyle changes. [1] The overall diabetes treatment regime includes physical activity, a balanced diet, adequate blood glucose control, as well as adherence to the medication therapy. It requires active participation in daily self-care activities, something patients find complex and demanding. Although self-care is reported to be beneficial, around 28.9% of type 2 diabetes patients do not adhere to appropriate self-care activities in sub-Saharan Africa. [4]

Among the causes reported to be associated with poor self-care activities, the literature mentions illness cognitive representation. This refers to beliefs (perceptions) that patients may have about their condition, which might lead to differences in self-care behaviour. [7] These beliefs are based on information received from different sources including the interpersonal communication with their care providers; a true picture of the condition which depends on the accuracy of the information and on cultural background. [8, 9] Basing themselves on a self-regulatory model, researchers provided evidence on the relationships between illness beliefs and the way people perform self-care activities. [7, 10] Besides the premise that effective communication might influence illness beliefs, research revealed its association with self-care behaviour. Communication provides accurate information that helps people to set up achievable self-care targets. [11, 12]

An additional factor often mentioned in the literature that affects self-care behaviour is depression. It is a frequent co-morbidity among diabetes patients.

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There is a growing body of literature documenting the relationships between depression and poor self-care behaviour. [13, 14] This, however, is not clearly explained. Literature suggests that depressive symptoms such as lack of motivation may lead patients to believe that the disease is out of control and therefore limit personal efforts needed to mitigate the diseases progress. Beyond the mechanisms, many studies identify depression as an independent contributor to poor self-care performance. [13, 14] In view of consistent evidence that psychosocial factors play a role in self-care behaviour, any move to upgrade self-care must consider patients' psychosocial background. On the other hand, evidence shows that illness perceptions may differ across cultures [15] Therefore, as most of the available literature is from western societies, differences between sub-Saharan Africa and the developed world hamper the extrapolation of the above research results to the Rwandan context. Additionally, there is no research on the role played in Rwanda by the psychosocial variables mentioned. Consequently, investigating illness beliefs among type 2 diabetes patients in Rwanda will provide new information on which to base further research. The main aim of this study was to gain insight into psychosocial mechanisms underlying self-care behaviour among type 2 diabetes in Rwandan culture.

Methods

This study recruited participants diagnosed with type 2 diabetes from outpatients' clinic, and two medical clinics affiliated with Kigali teaching hospital in Kigali, Rwanda. Potential participants were approached in two phases. In the first phase, a social worker did so after a diabetes education session, distributed recruiting pamphlets that explained the research aim, process and expectations to potential participants. Those who agreed to participate provided with their contacts details to a nurse in charge, who made a list of candidates that met the recruitment criteria. In second phase, the nurse in charge contacted candidates and organized an interview schedule. Eligible participants were older than 18 years, diagnosed with type 2 diabetes and had been treated at Kigali teaching hospital for at least 6 months. The data collection period was December 2010 up to February 2011.

Ethical considerations

The Kigali teaching hospital research committee approved the research proposal. Data collection tools were anonymous. Participants signed a consent form before data collection.

Materials and Methods

In this study, we used the following standardized data collection tools: the Interpersonal Processes of Communication of Care in Diverse Population questionnaire; depression was assessed using the Centre for Epidemiological Studies Depression Scale; illness perceptions were assessed using the Revised Illness Perceptions Questionnaire; and self-care behaviour was assessed using the Summary of Diabetes Self-Care Activities questionnaire. Because original tools were in English, to facilitate the data collection process we used a translated version of the standardized questionnaires (English to Kinyarwanda). The principal investigator did the first translation, for the final check, translated copy along with original tools was submitted to a professional translator fluent in both languages from the Kigali Health Institute Language Centre.

Measurements

Socio-demographic and clinical characteristics

The first section of the data collection tools collected the following socio-demographic data: age, sex, marital status, education and employment status. Regarding age, participants were asked to give their date of birth (month and year). Because not all participants were able to provide details, those who were unable were asked to give their age (in years). The marital status of the participants was categorized in single, married, divorced/separated and widow/widower. Level of education was categorized in never schooled, did not completed primary school, complete primary school, did not complete secondary school, completed secondary school, and university education. With regard to employment status, participants were asked if they were unemployed, self-employed, employed or retired. Regarding clinical characteristics, participants were asked to report the diabetes duration, diabetes medication in use (insulin/pills) and co-morbidities. To measure co-morbidities, we drew up a co-morbidity checklist based on the frequent diabetes complications, along with the most frequent communicable diseases in the region. The co-morbidities were categorized into cardiovascular, connective tissues, respiratory/ pulmonary, neurological, renal, hepatitis, HIV/AIDS and malaria. Participants were asked if they had any of the diseases mentioned on the checklist of the data collection tool and requested to add any that they had which were not listed.

Illness representation

The participant's cognitive representations of diabetes were measured using the Revised Illness Perceptions Questionnaire (IPQ-R). [16] The IPQ-R questionnaire is made up of 8 subscales that cover the illness perception model. The subscales are: (a) Timeline, (b) Time cyclical, (c) Consequences, (d) personal Control, (e) Identity, (f) Causes, (g) Emotional representations and (h) Illness coherence. Apart from illness identity, other subscales are scored on a 5-point scale ranging from "strongly disagree to strongly agree". Except for the Emotional representations subscale, the study used 7 others that correspond with cognitive representation. The reliability coefficient (internal consistency) of the subscales used ranged between 0.63 and 0.94, which indicate a sufficient reliability. [17] *(a) Timeline* measured participants' perceptions on the duration of diabetes (5 items, e.g. "I expect to have this illness for the rest of my life"); *Time cyclical* measured the perceptions on diabetes cyclical changes. (4 items, e.g. "My symptoms comes and go in cycles"), and *Consequences* measured the perceived impact of diabetes on participants' life. (6 items. e.g. "My illness has major consequences on my life"). The *treatment control* measured participants' beliefs concerning treatment effectiveness in controlling diabetes (5 items: e.g. "My treatment will be effective in curing my illness"). *Personal control* measured participants believes in their own self-efficacy to control diabetes (6 items: e.g. "There is a lot which I can do to control my symptoms"). *Illness coherence* measured the extent to which illness makes sense to participants (5 items: e.g. "I have a clear picture or understanding of my condition"). *Causes* measured perceived causes of diabetes (18 items, of which 7 items that cover potentials risk factors were used e. g. "The cause of my diabetes is diet or eating habits."). *Identity* assessed whether or not experienced symptoms were due to diabetes. To make this subscale specific to diabetes the general symptoms from the original subscale were replaced by low and high blood glucose symptoms in our study (14 items, e.g. "Sweating, trembling, thirstiness").

Interpersonal communication

To measure the communication between participants and care providers, we used the Interpersonal Processes of Communication of Care in Diverse Populations questionnaire (IPC). [15] The original instrument is made up of 40 items assessing patients' communication experience with their care providers. Items are scored on a 7-point scale ranging from "always" to "refuse". The internal consistency coefficient of the subscale used ranged between 0.67 and 0.80, indicating sufficient reliability. [18] The questionnaire covers both communication and interpersonal interactions. In this study, we used items that cover the explanation of the condition (2 items, e.g. "How often did your care provider at this clinic give you enough information about diabetes". Communication explanation of self-management (7 items, e.g. "How often did the care provider tell you how to pay attention to your diseases' symptoms and when to call for help?").

Depression

To measure depressive symptoms among participants we used the Centre for Epidemiological Studies Depression Scale (CES-D20), which is a self-reported depression tool. [19] Twenty items (e.g. "I was bothered by things that usually don't bother me") were used to measure depressive symptoms at 4 points, ranging from "rarely or none of the time" to "most of or all of the time". The internal consistency coefficient of the scale used was 0.76 indicating a sufficient reliability (analysis of original scale reported reliability coefficient between 0.76 and 0.92). [16, 20]

Self-care behaviour

To measure self-care behaviour among participants, we used the self-care behaviour questionnaire classically named "Summary of Diabetes Self-Care Activities (SDSCA)", which is a self-report instrument that measure four areas of diabetes self-care [21] The 4 areas measured in this study were diet, exercise, blood sugar monitoring and foot care. The tool uses an 8-point scale (0-7) which represents the number of days of the week. Participants reported the frequency with which they performed self-care behaviour during the last 7 days. In this study the internal consistency coefficient was 0.85, which correspond to a sufficient reliability because previous reliability analysis reported the coefficient between 0.42-0.78. [22]

Statistical analyses

For data coding and processing, we used the Statistical Package for the Social Science (SPSS.18). To describe the study sample characteristics, frequency and mean summary statistics were performed. To address main research question, we conducted correlation analysis and multiple linear regression analysis. The significance of the slopes in the regression analyses were tested with a two-sided test, using an alpha level of 0.05. A

preliminary analysis checking for required assumptions was conducted. For the mediation analysis, the study used Baron and Kenny as well as BOOTSTRAP methods.

Results and Discussion

Participants' characteristics

The data on socio-demographic and clinical characteristics of the participants are in Tables 1 and 2. It is noticeable that the majority were females, Christians, self-employed and under insulin therapy. Fewer than 20% did not have medical insurance. The majority of the participants had a low level of education (below secondary school). The age range of participants was 32-80 years. Cardiovascular conditions were the most reported co-morbidity (17%).

Table 1 Baseline socio-demographic characteristics of the participants (n = 86)

Gender	(%)
Male	34.9
Female	65.1
Education: (%)	
Never schooled	17.4
Did not complete primary school	4.7
Completed primary school	9.3
Did not complete secondary school	33.7
Completed secondary school	23.3
University education	11.6
Religion: (%)	
Christian	65.1
Muslim	30.2
Others	4.7
Employment status: (%)	
Unemployed	25.6
Self-employed	40.7
Employed	29.1
Retired	4.7
Insurance status: (%)	
Insured	80.2
Not insured	19.8
Age, Y : (Mean, SD)	51.96 (12.02)

Table 2 Clinical characteristics of the participants (N=86)

Diabetes medication in use: (%)	
Insulin	51.2
Pills(oral)	48.8
Co-morbidities: Frequency (%)	
None	61.6
Pulmonary /Respiratory	9.3
Cardiovascular	17.4
Connective tissues	4.7
Neurological	1.2
HIV/AIDS	2.3
Malaria	3.5
Diabetes duration (months): (Mean, SD)	54.52 (60.63)

Mean score on cognitive representation, communication, depression and self-care behaviour

Table 3 depicts participants' mean score on different scales. The results on Illness representation show a mean score on illness identity, it is above the average (>7, range, 5-14). The results suggest that participants experienced diabetes symptoms and attributed them to the real disease. The mean score on the 5-point scale shows a relatively high score (>3, range 1-5) on respectively Timeline, Time cyclical, Illness coherence and Consequence. The results suggest that participants held a belief that diabetes is a chronic disease, associated it with serious consequences and believed that they had a good level of illness coherence (understanding of diabetes). From the same table the mean score on treatment control and personal control suggests that participants believed in the effectiveness of diabetes medication and in a personal contribution in controlling diabetes and its consequences. The mean score on risk factors suggest that participants held beliefs that diet or eating habits along with ageing and heredity are among diabetes risk factors. The score on personal behaviour is low suggesting that to some extent participants do not see personal behaviour as a predisposing factor to type 2 diabetes.

Table 3 Illness representation: (n = 86)

Title	**Mean**	**SD**	**Range**
Illness identity	9.31	2.62	5–14
Timeline acute/chronic	3.26	0.69	2–5
Time cyclical	3.77	1.06	1–5
Illness coherence	3.20	0.97	1–5
Consequences	4.08	0.71	3–5
Personal control	3.58	0.81	2–5
Treatment control	3.79	0.57	2–5
II. Risk factor attribution: (n = 86)			
Risk factor	*Mean*	*SD*	*Range*
Hereditary it runs in my family	3.25	1.39	1–5
Diet or eating habit	4.09	0.87	1–5
My own behaviour	2.93	1.33	1–5
Ageing	3.97	0.93	1–5
III. Interpersonal communication and self-care behaviour (N = 86)			
	Mean	SD	Range
Communication	15.75	6.38	7.00 – 43.00
Depression (*CES-D20)*	11.69	3.22	4.00 – 19.00
Self-care behaviour	17.58	7.95	4.00 – 32.00

Relationships between potential predictors and self-care behaviour

Table 4 documents Pearson correlations between psychosocial predictors and the self-care behaviour. From 10 potential predictors of self-care behaviour among type 2 diabetes participants, only significant correlations are observed on a number of illness perception subscales and depressive symptoms. There are positive significant correlations between four illness representations subscales, i.e., Illness identity, Timeline, Illness coherence, personal control and Self-care behaviour. The study identified significant negative correlation between Time cyclical, Depressive symptoms and Self-care behaviour. The positive correlations suggests that people who experience and recognize diabetes symptoms and held beliefs that diabetes is a chronic condition controllable by personal commitment are more involved in self-care behaviour. The negative associations indicate that people who are depressed and perceive cyclical changes of type 2 diabetes are less involved in self-care behaviour.

Table 4 Relationships between illness representation and self-care behaviour (n=86)

	1	2	3	4	5	6	7	8	9	10
1. Self-care behaviour	_									
2. Identity	0.26*	_								
3. Timeline	0.27*	0.18	_							
4. Time cyclical	-0.40**	-0.08	-0.07	_						
5. Coherence	0.38**	0.11	0.12	-0.55**	_					
6. Treatment control	0.15	0.20	0.05	-0.42**	0.32**	_				
7. Personal control	0.41**	0.25*	0.15	-0.35**	0.41**	0.52**	_			
8. Risk attribution	0.09	0.01	0.21	-0.13	-0.11	0.01	0.29**	_		
9. Depression	-0.53**	-0.08	-0.13	0.20	-0.20	-0.04	-0.27*	-0.11	_	
10. Communication	-0.07	-0.147	-0.10	0.08	0.13	-0.01	-0.07	-0.02	-0.01	_
11. Under. T2D- care	0.10	0.12	0.05	-0.22*	0.15	0.14	0.07	0.01	-0.18	-0.09

*$p < 0.05$, ** $p < 0.01$, two tailed significance, $N = 86$,

Linear Regression analysis

The results of a multiple linear regression are presented in Table 5. To build a regression model, we used predictors that correlated significantly with the outcome variable (self-care behaviour). For each series of linear regression models, the study controlled for demographic characteristics (age, gender) and diabetes duration in the first block. In the second block, we added depression to the model, lastly illness representations subscales identified through inter-correlation analysis (identity, timeline, illness coherence and personal control). Table (5a) illustrates R^2 changes and the total variance explained (41%). To identify variables that independently contributed to the model, we conducted a backward analysis, removing the variables with the highest *p* value. As the table (5b) shows depression, Time cyclical and Personal control independently contributed to the model.

Table 5 (a) Regression model (N=86)

	Variables	Beta	*p-Value*	□ R^2
Step 1	Demographics			0.11
	Age	-0.237	0.06	
	Gender	0.252	0.02	
	Diabetes duration	0.252	0.01	
Step 2	Depression	-0.486	0.00	0.20
Step 3	Illness perceptions			0.16
	Identity	0.127	0.15	
	Timeline	0.151	0.09	
	Time cyclical	-0.181	0.08	
	Illness coherence	0.104	0.32	
	Personal control	0.151	0.12	

Outcome variable: self-care behaviour, N=86, total variance explained : 0.41

Table 5 (b) Regression model (N=86)

	Variables	Beta	*p-Value*	□ R^2
Step 1	Demographics			0.11
	Age	-0.237	-0.066	
	Gender	0.252	0.19	
	Diabetes duration	0.315	0.417	
Step 2	Depression	-0.486	0.000	0.20
Step 3	Illness perceptions			0.14
	Timeline	0.166	0.064	
	Time cyclical	-0.225	0.019	
	Personal control	0.204	0.031	

Outcome variable: self-care behaviour, N=86, total variance explained : 0.40

Mediation analysis

The results from a series of linear regression analysis, taking into account depression and illness perceptions, found that depression was independently contributing to the regression model. We were interested to see whether illness perceptions (personal control) mediate the relationships between depression and self-care behaviour (Figure 1), given that depressed people might see diabetes as an uncontrollable condition. [23] We used Baron and Kenny methods to explore the direct effect followed by BOOTSTRAP methods for indirect effect. Conflicting results were found on personal control. Referring to Table 6, direct effect provided significant results but indirect effect and significance using normal distribution were not significant at 95% ($p > 0.05$). Therefore, we could not confirm a mediation effect.

Figure 1

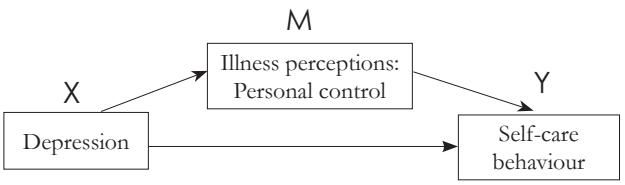

Table 6 Variable in simple mediation (N=86)

Y	Self-care behaviour		
X	Depression		
M	Personal control		
Direct effect			
	Coefficients	SE	P
b(YX)	-1.31	0.2278	<.0001
b(MX)	-0.31	0.1214	0.012
b(YM.X)	0.62	0.1944	0.002
b(YX.M)	-1.12	0.2246	<0.001

Indirect effect and significance using normal distribution				
	Value	SE	CI	P
Effect	0.19	0.09	-0.39 0.02	0.053

Bootstrap results for indirect effect					
	Data	Mean	SE	CI (95%)	CI (99%)
Effect	-0.19	-0.19	0.09	-0.40 0.04	-0.46 0.03
Number of Boostrap : 5000, N=86					

Discussion

The aim of the study was to explore the personal model of illness beliefs among type 2 diabetes patients and relate patients' beliefs to self-care activities. From a descriptive analysis of illness representation on type 2 diabetes, the study showed that participants held beliefs in type 2 diabetes time variability and perceived it as a chronic but controllable condition. These perceptions were in line with the medical perspective of type 2 diabetes where it is described as a chronic disease associated with serious consequences that are preventable using a number of preventive measures. [3, 11] The results from correlation analysis suggest a different relationship between illness belief and self-care behaviour. Participants who held beliefs in Illness identity, Timeline, Illness coherence and Personal control seem to be actively involved in self-care activities. However, those who held beliefs in diabetes time variability had low motivation to perform self-care activities. As literature suggests, we expected a positive association between communication and self-care behaviour. The results from this study did not confirm such findings. On the other hand, based on other studies we expected a negative association between depression and self-care behaviour. This study showed such independent association. In addition to depression, the results from regression analysis identified Personal control and Time cyclical to be independently contributing to self-care behaviour.

The results from this study could be a function of our particular sample, since we recruited participants who attended a regular diabetes education session, which could have changed their illness beliefs. With regard to expected associations, which, however, were not found between communication and self-care behaviours, a small sample size and methodological difference might be a valid explanation of that inconsistency. Concerning the mechanism underlying the relationship between depression and self-care behaviour, we conducted a mediation analysis based on premise that depression leads people to believe that diabetes is out of their control; a feeling that could hinder dedication to self-care activities. The results did not conclusively confirm that personal control mediates the relationship between depression and self-care behaviour, and such results would suggest that the relationship is beyond illness representation. Some authors believe that the relationships between depression and self-care operate through decreased compliance to the diabetes treatment regime and see non-adherence to self-care as a function of certain behaviour that results from clinical manifestation of depression. [16] In the same line, the results would suggest that clinical manifestation of depression that includes low appetite and low physical energy along with lack of motivation might have considerably affected patient involvement in following a healthy diet and physical exercise. The same reason would apply concerning blood glucose control; lack of motivation could have affected the frequency with which participants controlled their blood glucose level. However, the same explanation does not exclude generic mechanisms proposed in the literature [24] which mean that it might be a partial explanation.

Study limitations

The data collection for the purpose of this study used self-report questionnaires. The above methods are subject to social desirability bias, which refers to the individual tendency to report on the positive side of life and deny the shadowed side. [25] Consequently, it is possible that participants reported what is officially known about diabetes instead of their own beliefs. With regard to self-care, it is possible that participants have reported what they were supposed to do according to diabetes protocol instead of what they had really been doing. This could have affected our results in terms of overestimation of the truth. To measure self-care behaviour, we used a questionnaire asking about what happened in the last 7 days. Such measurement tools are open to "recall bias" which occurs when participants fail to recall an event or to match an activity to specific time. [23] Consequently, it is possible that some participants were not able to remember and report accurately what they had done. Therefore, some results of this study were possibly underestimated or overestimated. Additionally, we used an interview guide translated from English to Kinyarwanda. It is known that the most demanding aspect in cross-cultural translation is to adjust the instrument in a complete and appropriate cultural form while keeping the sense of original items. [25] Alongside linguistic problems, there is always a challenge of accurately matching cultural differences of the second language. It is therefore possible that some items of translated version had some semantic difference to the original tools that may have influenced the instrument validity. With regard to generalisability, the study recruited a relatively small sample (86 participants) from a big city. In the African context, people from cities are more

exposed to different sources of information on diabetes such as media (television, radio and newspapers), in addition to the information provided by the health care system. Because such facilities are not available at the same level across the country, extrapolation of such results to the total diabetes population in remote areas is limited. Another limitation is related to the study design. Because a cross-sectional design assesses an event at one point in time and cannot assess the change over time, the study cannot claim to describe cause-effect relationships.

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Authors' contribution

EN conceptualized the study and wrote the proposal participated in data analysis and interpretation, CB revised the proposal and participated in data collection, CU, MT, JMV, AY and EN participated in drafting manuscript. All the authors accepted the manuscript.

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