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Pattern and Predictive Factors of Health-related Quality of Life of Patients with Hypertension, Diabetes and Concomitant Hypertension with Diabetes in Ilorin, Nigeria

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ABSTRACT

Background: Hypertension and diabetes are the two most important modifiable risk factors for cardiovascular disease (CVD) among Nigerian population. Because of the lifelong nature of the two diseases and the attendant long treatment regimen required, assessing the health-related quality of life (HRQoL) is an important outcome of these diseases.

Objective: This study assessed the pattern and predictive factors of HRQoL among patients with hypertension, diabetes and concomitant hypertension and diabetes using the 36-item short-form version 2.

Patients and Methods: A cross-sectional study of 1203 patients attending the outpatient clinics of the University of Ilorin Teaching Hospital, Ilorin; the patients were sampled using systematic random sampling methods. Patients were divided into those with hypertension, diabetes and both diseases. The predictors of physical and mental component summaries of HRQoL were analysed using Norm-based Scoring. The level of significance was set at $P < 0.05$ and 95% confidence interval.

Results: The patients with both diseases have lowest physical HRQoL (45.6), while the diabetic patients have the worst mental HRQoL (39.5). Negative predictors of physical HRQoL across the three groups were: drug regimen (hypertension $P < 0.001$, diabetes $P < 0.001$, both $P = 0.005$), CVD complication (hypertension $P < 0.001$, diabetes $P = 0.025$) and accompanying persons ($P < 0.001$). The positive predictors of physical HRQoL across the three groups were medication adherence (hypertension $P < 0.001$, diabetes $P < 0.001$ and both $P = 0.002$). Similarly, medication adherence was the positive predictor for mental HRQoL across the three groups of patients (hypertension $P < 0.001$, diabetes $P = 0.001$ and both $P < 0.001$).

Conclusion: This study provided evidence to show that HRQoL across the three categories of patients in Ilorin, Nigeria, is suboptimal. Drug regimen, medication adherence and support from accompanying persons were important predictive factors of HRQoL.

KEY WORDS: Diabetes, hypertension, predictors, quality of life

INTRODUCTION

Hypertension is more prevalent among people of African decent than any other racial group, while diabetes is on the increase among these populations.^[1] They are the two most important modifiable risks of cardiovascular diseases (CVDs) among Nigerian population.^[1] Both diseases are the most common chronic non-communicable diseases seen in the outpatients' clinics of developing countries.^[2] In addition, it has been established that patients with one of the diseases are at a higher risk of the other.^[1] As a result of the lifelong nature of the two diseases and the attendant long treatment regimen required, the quality of life perceived by the patients becomes important. The World Health Organization defines quality of life as 'individuals' perception of their position in

life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns'.^[3] Other different definitions of health-related quality of life (HRQoL) stemmed from the multidisciplinary use of the term.^[4-6]

A worsened quality of life could be the early indication of the target organ damage complications associated with hypertension and diabetes,^[7,8] making HRQoL an

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important outcome measurement in their management.^[9] The relationships between the patient, disease, treatment variables, symptoms and HRQoL have been described by researchers.^[10-14] A study conducted in Brazil described that complicated hypertension reduced HRQoL^[11] while another study conducted in South-West Nigeria described uncontrolled BP, increased symptom counts and complications as negative predictive factors for HRQoL.^[14] Quality of life assessment is rarely done in hypertension and diabetes management despite the important clinical information it can provide to medical practice. Therefore, there is the need to explore more subjective, patient-focused measures to support the conventional (clinical) outcomes.^[15] In addition, it can assist health practitioners and researchers in developing and implementing interventions that will improve patients' medical condition.^[15]

Many methods have been used to assess HRQoL and related concepts from early literature. Among them were the Medical Outcomes Study Short Forms,^[16,17] the Sickness Impact Profile^[18] and the Quality of Well-Being Scale.^[19] Later, there came numerous generic and disease-specific HRQoL measurements.^[11,20,21] Of these assessment tools of HRQoL, the short-form health survey (SF) tools are specifically designed to measure both the generic and specific HRQoL for small and large populations' surveillance. It is particularly used for the assessment of impact of health or social health intervention on health status.^[22] It was developed in the United States of America for use by RANDS Corporation's Health Insurance researches.^[22] Currently, it has been translated to over 120 world languages and has featured in over 10% of the generic health measures' reports worldwide.^[22] These attributes gave the SF tools general acceptability and wider usage over the other types of HRQoL assessment tools in health science. The SF-36 consists of 36 questions analysed into eight-scaled scores and two summary components.^[16,17] This study, therefore, assessed the pattern and predictive factors of HRQoL among patients with hypertension, diabetes and concomitant hypertension and diabetes at University of Ilorin Teaching Hospital (UITH), Ilorin, using the Norm-based Scoring (NBS) scoring of 36-item short-form version 2 (SF-36v2).

PATIENTS AND METHODS

STUDY POPULATION AND DESIGNS

This cross-sectional study was carried out among hypertensive patients attending outpatient clinics of UITH, Ilorin, Nigeria. The hospital is situated in the north-central zone of Nigeria. Patients were recruited from the General Outpatient Department (GOPD) and Medical Outpatient Department (MOPD) clinics. According to the hospital records of 2013, on the average, a total of 162 hypertensive patients were seen per week in both the GOPD and MOPD clinics.

SAMPLE SIZE AND SAMPLING TECHNIQUES

A total of 1203 patients were recruited into the study using systematic random sampling with a sampling interval of three in both clinics. The sample size was determined using Fisher's formula.^[23] The study was carried out between September 2014 and August 2015. Both old and newly diagnosed

adult patients with hypertension, diabetes and patients with concomitant hypertension and diabetes were recruited into the study. Ethical approval was obtained from the Ethical Review Committee (ERC) of UITH, Ilorin, on July 24, 2014 with approval no: ERC PAN/2014/07/1332.

DATA COLLECTION AND TOOLS

Data were collected from informed and consenting patients attending general and medical outpatient's clinics of the hospital. Data were collected by eight trained research assistants who were health workers. Data collection instruments were questionnaire and patients' Clinical Report Form (CRF). The questionnaire contained information on socio-demography, disease history and experience and clinical outcome measurements. Data on HRQoL were collected with a validated SF-36v2 questionnaire. The SF-36v2 was translated into Yoruba language and back translated to English language to ensure that translation was reliable. The weight and height measurements were measured with the OMRON® weighing scale and SECA® portable stadiometer, respectively. The body mass index (BMI) was calculated from the weight (kg) divided by height (m²). Blood pressure (BP) was measured with OMRON® BP measuring machines. The measurement equipment was standardised and calibrated according to the manufacturers' specification. Standard Operating Procedures were developed for the weighing scale, height meter and BP monitor.

DATA ANALYSIS AND SCORING

Data scoring of the SF-36v2 Health Survey is a generic measurement of HRQoL. A license from QualityMetric™ through OPTUM® was obtained for this study. A Health Outcomes Scoring Software version 5.0 (11000 Optum Circle, Eden Prairie, MN 55344) was provided by the corporation which was used for the NBS of the HRQoL. The NBS provides a basis for direct comparisons between scores from the SF-36® Health Survey and SF-36v2™ Health Survey.^[24] The questionnaire contains 36 items integrated into multi-item scales measuring the eight generic health concepts called scales and two composite summary scores. These eight scales were: physical functioning (PF), role physical (RP), bodily pains (Bp), general health (GH), vitality (VT), social functioning (SF), role emotional (RE) and mental health (MH). The composite summaries were the physical component score (PCS) and Mental Component Score (MCS). The two composite summaries were results of correlation analysis of the eight scales. The original SF-36 (in English language) was validated with higher Cronbach's alpha scores of over 0.78 in all the 8 domains.^[25] For this study, both face validity and reliability (using Cronbach's alpha) were conducted on the SF-36v2 questionnaire. Table 1 shows the reliability coefficients and inter-item correlations of the 8 scales of the SF-36v2 used for the study. Therefore, with the exception of SF and MH, all the other 6 scales attained a satisfactory Cronbach's alpha score of ≥ 0.70 as recommended by the developer of the tool.^[17] To determine the pattern of the HRQoL of the patients, the QualityMetric™ has standardised the scoring to 2009 US population norm (Norm-based Score). This was standardised to have a population mean

($\pm$ standard deviation) of 50 ($\pm$ 10). The results were interpreted by comparing patients' score to this reference population standard.^[17]

Data were analysed using IBM® SPSS, version 22 (SPSS Inc. Chicago. IL, USA). The data were disaggregated into three groups of hypertensive patients, diabetic patients and patients with both diseases. Descriptive analysis including calculations of means, 95% confidence intervals (CIs) of means for numerical variables and frequencies of categorical variables was presented. Predictive factors of the two components of HRQoL were analysed. This involved using multivariate linear regression to model the predictive factors from Simple Linear Regression (SLR). Therefore, principles of fit, parsimony and plausibility were considered while including variables in Multiple Linear Regression (MLR) modelling using backward method [Table 2]. Interactions, multi-collinearity (using variance inflation factor and tolerance) and other model assumptions were checked and fulfilled before modelling. The level of significance was set at $P < 0.05$ and 95% CI.

RESULTS

PATTERN OF PATIENTS CHARACTERISTICS

Over 80% (965) of the patients studied were hypertensive, 4.9% (59) were diabetic while patients with concomitant hypertension and diabetes were 14.9% (179). The pattern of patients' socio-demographic characteristics, clinic follow-up experience, treatment and clinical profile are presented in Tables 3 and 4. Patients of 40 years and above predominate among the hypertensives (92.7%), diabetics (89.8%) and patients with both diseases (97.8%) in the study sample. On the average, those patients with concomitant diseases have been living with the diseases for 8.9 years whereas the hypertensive and diabetic patients have average morbidity duration of 4.8 and 4.4 years, respectively [Table 3]. Drug side effect of 15%, 18.6% and 12.8% was reported among hypertensive, diabetic and patients with both diseases, respectively. A single daily regimen of drug intake was observed among 79.2%, 37.3% and 49.2% of hypertensive, diabetic and patients with both the diseases, respectively [Table 4]. The BP control was highest with the patients with diabetes (96.6%) while patients with hypertension and concomitant diseases had 77.5% and 81%, respectively [Table 4]. The highest adherence pattern was observed among the patients with concomitant diseases (49.1%).

Table 1: Scale reliability and homogeneity estimates

Scale	<i>n</i>	Cronbach α	Inter-item correlation
PF	10	0.888	0.442
RP	4	0.973	0.900
Bp	2	0.740	0.587
GH	5	0.701	0.319
VT	4	0.779	0.468
SF	2	0.674	0.509
RE	3	0.944	0.848
MH	5	0.650	0.271

n: Number of items, PF: Physical functioning, RP: Role physical, BP: Bodily pain, GH: General health, VT: Vitality, SF: Social functioning, RE: Role emotional, MH: Mental health

SCALES AND COMPONENT SUMMARIES OF HEALTH-RELATED QUALITY OF LIFE

In all the 8 scales of HRQoL measured, the RP (11.9, 12.4 and 11.4, respectively) and RE (14.8, 15.4 and 14.2, respectively) had scores that fell short of the population average of 50 ± 10 in all the three groups of patients [Figure 1]. Similarly, the component summary scores revealed below population average for hypertension (PCS 46.1; MCS 40.3), diabetes (PCS 47.2; MCS 39.5) and patients with both diseases (PCS 45.6; MCS 40.6) [Figure 1].

PREDICTIVE FACTORS OF HEALTH-RELATED QUALITY OF LIFE AMONG THE THREE DISEASE CATEGORIES

On SLR, the predictive factors for HRQoL of patients with hypertension are shown in Table 2. After modelling with MLR, only out-of-pocket (OoP) payment (adjusted β , 1.56) and medication adherence (adjusted β , 3.00) positively predicted physical HRQoL of hypertension ($P < 0.001$) while age (adjusted β , -0.10), no education (adjusted β , -1.13), waiting time (adjusted β , -0.30), drug frequency (adjusted β , -1.59), CVD complication (adjusted β , -4.25) and accompanying person (adjusted β , -2.07) negatively predicted physical HRQoL of hypertension ($P < 0.05$). However, only medication adherence (adjusted β , 6.17) positively predicted mental HRQoL of hypertension while payment by relative (adjusted β , -1.55), waiting time (adjusted β , -0.54) and drug combination (adjusted β , -0.69) negatively predicted mental HRQoL ($P < 0.05$) [Table 5].

Similarly, Table 2 shows the predictive factors for HRQoL of patients with diabetes on SLR. After modelling with MLR, drug combination (adjusted β , -2.28), CVD complication (adjusted β , -4.07) and accompanying person (adjusted β , -7.61) negatively predicted physical HRQoL of diabetic patients ($P < 0.05$) [Table 5]. However, only medication adherence (adjusted β , 7.97) fitted into the model as the only (positive) predictor of mental HRQoL for diabetes ($P = 0.001$) [Table 5].

The predictive factors for HRQoL of patients with the concomitant diseases are shown in Table 2 (on SLR). On modelling with MLR [Table 5], the physical HRQoL of

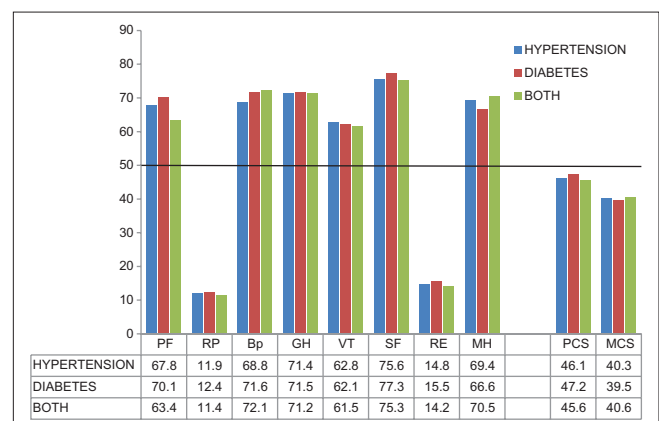


Figure 1: Scales and component summaries' mean scores of the 3 disease groups in comparison to reference population average (50.00)

Table 2: Prediction of health-related quality of life among patients with hypertension, diabetes and both diseases using simple linear regression

Predictive factors	Hypertension			Diabetes			Both hypertension and diabetes		
	β	95% CI	P	β	95% CI	P	β	95% CI	P
Physical HRQoL									
Age	-0.15	-0.18--0.11	<0.001*	-0.15	-0.31-0.00	0.051	-0.16	-0.26--0.06	0.002*
Higher education	2.04	1.02-3.05	<0.001*	5.48	0.73-10.24	0.025*	0.76	-1.81-3.33	0.559
No education	-1.91	-2.82--1.00	<0.001*	-6.06	-10.31--1.80	0.006*	-0.34	-2.55-1.85	0.559
Out-of-pocket payment	1.96	1.08-2.84	<0.001*	-0.78	-4.93-3.36	0.707	0.15	-2.00-2.30	0.892
Payment by relative	-1.76	-2.67--0.85	<0.001*	-1.87	-6.31-2.58	0.404	-0.94	-3.10--1.21	0.389
Travel time	-0.02	-0.04--0.01	<0.001*	-0.02	-0.07-0.03	0.433	-0.03	-0.07-0.01	0.120
Waiting time	-0.62	-0.10--0.39	<0.001*	-0.39	-1.83-1.05	0.591	-0.63	-1.17--0.08	0.024*
Drug combination	-0.63	-1.14--0.13	0.015*	-2.63	-4.86--0.40	0.022*	0.27	-1.20-1.75	0.714
Drug frequency	-1.80	-2.76--0.83	<0.001*	-0.02	-3.39-3.34	0.989	-0.71	-2.65-1.23	0.470
Drug side effect	-2.74	-3.97--1.51	<0.001*	-1.92	-7.18-3.35	0.469	-5.26	-8.37--2.15	0.001*
CVD complication	-4.93	-5.83--4.03	<0.001*	-6.16	-10.06--2.27	0.002*	-4.65	-6.91--2.39	<0.001*
Accompany person	-3.12	-4.13--2.11	<0.001*	-8.53	-12.82--4.25	<0.001*	-6.50	-8.76--4.24	<0.001*
Symptom count	-1.54	-2.30--0.79	<0.001*	-1.66	-4.82-1.49	0.296	-2.35	-4.27--0.42	0.017*
Medication adherence	3.29	2.42-4.16	<0.001*	3.33	-0.88-7.54	0.119	3.52	1.44-5.60	0.001*
Mental HRQoL									
Higher education	-0.19	-1.38-0.99	0.753	-2.13	-7.78-3.53	0.455	3.38	0.58-6.19	0.018*
Out-of-pocket payment	1.09	0.07-2.12	0.037*	1.44	-3.29-6.17	0.546	2.70	0.35-5.05	0.025*
Payment by relative	-1.23	-2.29--0.16	0.024*	-5.12	-10.05--0.18	0.042*	-3.05	-5.40--0.70	0.011*
Waiting time	-0.67	-0.99--0.34	<0.001*	-0.99	-2.63-0.64	0.230	-0.71	-1.32--0.12	0.021*
Morbidity duration	-0.09	-0.17--0.01	0.040*	-0.02	-0.38-0.34	0.899	0.06	-0.12-0.23	0.509
Drug combination	-0.61	-1.20--0.02	0.044*	-1.39	-4.04-1.26	0.296	0.80	-0.83-2.43	0.332
CVD complication	-2.18	-3.26--1.08	<0.001*	-3.86	-8.58-0.86	0.107	-3.14	-5.71--0.56	0.017*
Medication adherence	6.26	5.30-7.22	<0.001*	8.06	3.63-12.49	0.001*	4.95	2.70-7.21	<0.001*

*Significant. HRQoL: Health-related quality of life, CVD: Cardiovascular disease, CI: Confidence interval, β : Coefficient of regression

patients with concomitant hypertension and diabetes was positively predicted by medication adherence (adjusted β , 3.04, $P = 0.002$) while travel time (adjusted β , -0.05), drug side effect (adjusted β , -4.06) and accompanying person (adjusted β , -6.73) negatively predicted physical HRQoL ($P < 0.05$). The mental HRQoL was positively predicted ($P < 0.05$) by higher education (adjusted β , 2.75) and medication adherence (adjusted β , 4.82), whereas payment by relative (adjusted β , -2.63) and waiting time (adjusted β , -0.66) negatively predicted ($P < 0.05$) mental HRQoL of patients with concomitant hypertension and diabetes.

DISCUSSION

Although four out of five patients studied have hypertension, the proportion of those who had concomitant hypertension and diabetes was more than those with only diabetes. As established by other study, the coexistence of hypertension and diabetes is a common clinical condition seen in outpatient clinics in developing countries.^[2] In addition, the coexistence of the two diseases has been well established to increase risks of complication in the patients.^[1] Majority of the patients in this study were above 40 years across the three categories of patients. The higher age group observed in this study implied that the prevalence of hypertension and diabetes increases with an increase in age as documented by other studies.^[26,27] All the three categories of patients had a median waiting time of 2 h.

This long waiting time indicated a poor quality of follow-up care. This may be due to overwhelmed system. Another reason could be lack of queuing system and ineffective triaging strategies in the outpatients' clinics. In addition, a patient with concomitant disease has the longest disease duration. This long duration corroborated chronicity of hypertension and diabetes.

The BP control is moderately high among the patients' category. Hypertensive patients recorded lowest BP control of the three categories. The BP control rate observed among hypertensive patients in this study is higher than the Nigerian studies which reported 32.9%, 20.1%, 34.5% and 53.3%, respectively.^[28-30] It is, however, lower than the studies reported in South-South and South-West Nigeria.^[31,32] Uncontrolled BP has been linked to increased mortality and disability in Nigerian studies.^[33,34] The combined obesity (overweight and obesity) prevalence is high among the three patients' categories. They are lower than 80.7% reported by a study in South-South Nigeria^[31] but higher than 23.2% reported in South-West Nigeria^[35] and 52% reported by another study in South-South Nigeria.^[36] Obesity is an independent risk for both hypertension and diabetes,^[37] and its persistent increase among these groups of patient implied higher risks of CVDs.^[38,39] The medication adherence is less than average across the three patients' categories. Medication non-adherence compromises safety and treatment effectiveness resulting in increased mortality and morbidity among patients with chronic diseases.^[40]

Table 3: Pattern of patients' socio-demography and clinic follow-up experience

Characteristic	Hypertension, <i>n</i> =965 (80.2%) Frequency (%)	Diabetes, <i>n</i> =59 (4.9%) Frequency (%)	Both, <i>n</i> =179 (14.9%) Frequency (%)
Age (years)			
<40	70 (7.3)	6 (10.2)	4 (2.2)
≥40	895 (92.7)	53 (89.8)	175 (97.8)
Mean±SD	56.9±12.0	54.4±12.9	60.7±10.4
Gender			
Male	257 (26.6)	18 (30.5)	44 (24.6)
Female	708 (73.4)	41 (69.5)	135 (75.4)
Education status			
No education	361 (37.4)	17 (28.8)	71 (39.7)
Primary education	210 (21.8)	16 (27.2)	39 (21.8)
Secondary education	152 (15.8)	13 (22.0)	29 (16.2)
Tertiary education	242 (25.0)	13 (22.0)	40 (22.3)
Mode of payment for clinic			
Self	496 (51.4)	33 (55.9)	82 (45.8)
Health insurance	90 (9.3)	6 (10.2)	15 (8.4)
Employer	20 (2.1)	2 (3.4)	4 (2.2)
Relative	359 (37.2)	18 (30.5)	78 (43.6)
Disease duration (years)			
Median (IQR)	4.8 (7.9)	4.4 (8.2)	8.9 (9.5)
Travel time (min)			
Median (IQR)	45:00 (30:00)	45 (30:00)	45 (30:00)
Waiting time (h)			
Median (IQR)	2:00 (2:44)	2:00 (3:00)	2:00 (2:75)
Accompany person to the clinic			
Yes	244 (25.3)	14 (23.7)	46 (25.7)
No	721 (74.7)	45 (76.3)	133 (74.3)

SD: Standard deviation, IQR: Interquartile range

Table 4: Pattern of patients' treatment and clinical profile

Characteristic	Hypertension, <i>n</i> =965 (80.2%) Frequency (%)	Diabetes, <i>n</i> =59 (4.9%) Frequency (%)	Both, <i>n</i> =179 (14.9%) Frequency (%)
Drug side effect			
Yes	145 (15.0)	11 (18.6)	23 (12.8)
No	820 (85.0)	48 (81.4)	156 (87.7)
Drug combination			
1	89 (9.2)	7 (11.9)	2 (1.2)
2	347 (36.0)	32 (54.2)	19 (10.6)
≥3	529 (54.8)	20 (33.9)	158 (88.2)
Drug frequency			
Once	765 (79.2)	22 (37.3)	88 (49.2)
Twice	182 (18.9)	32 (54.2)	86 (48.0)
Thrice	18 (1.9)	5 (8.5)	5 (2.8)
CVD complication			
Present	305 (31.6)	23 (39.0)	52 (29.1)
Absent	660 (68.4)	36 (61.0)	127 (70.9)
Symptom count			
None	835 (86.5)	50 (84.7)	161 (89.9)
≥one symptom	130 (13.5)	9 (15.3)	18 (10.1)
BP control			
Control	748 (77.5)	57 (96.6)	145 (81.0)
Not control	217 (22.5)	2 (3.4)	34 (19.0)
Mean systolic BP±SD (mmHg)	133.2±19.9	123.8±17.0	133.7±18.8

Contd...

Table 4: Contd...

Characteristic	Hypertension, <i>n</i> =965 (80.2%) Frequency (%)	Diabetes, <i>n</i> =59 (4.9%) Frequency (%)	Both, <i>n</i> =179 (14.9%) Frequency (%)
Mean diastolic BP±SD (mmHg)	85.8±12.2	80.0±8.9	82.9±11.7
	<i>n</i> =941	<i>n</i> =58	<i>n</i> =175
BMI			
Underweight (<18 kg/m ²)	16 (1.7)	2 (3.4)	2 (1.1)
Normal (18-24.9 kg/m ²)	295 (31.3)	18 (31.0)	47 (26.9)
Overweight (25-29.9 kg/m ²)	302 (32.1)	25 (43.2)	66 (37.7)
Obese (>30 kg/m ²)	328 (34.9)	13 (22.4)	60 (34.3)
Mean±SD	28.4±6.22	26.9±4.8	28.3±5.6
Fasting blood sugar	6.4±2.6	8.9±4.9	6.9±3.1
Medication adherence			
Low	257 (26.6)	17 (28.8)	44 (24.6)
Medium	296 (30.7)	21 (35.6)	47 (26.3)
High	412 (42.7)	21 (35.6)	88 (49.1)

CVD: Cardiovascular disease, BP: Blood pressure, SD: Standard deviation, BMI: Body mass index

The two component summaries of HRQoL (physical and mental) for the three categories of patients were less than the reference population average (US 2009). However, with the exception of RP and RE, the other 6 scales scores of HRQoL were above average for all the three categories of the patients. Comparing the component summary with other studies in the study area was challenging because only few studies so far reported HRQoL using SF-36v2 NBS among hypertensive or diabetic patients in Nigeria.^[13] However, for the scales comparison, a study in South-West Nigeria (which analysed with 0–100 transformed score) reported less than average score of 33.53 (±29.65) in PF and the highest score of 79.85 (±14.57) in VT.^[13] Similarly, a study in Germany among patients with hypertension and concomitant hypertension with diabetes and osteoarthritis reported below-average scores in the two summary scores, PF, VT and RP.^[41] Another study among diabetic patients in Greece also reported below-average score for GH^[42] while an Indian study among hypertensive reported low scores in VT, RE, BP and MH.^[43] These findings buttress the diverse findings from HRQoL studies around the world. The general inference from our study is that the two components summaries of HRQoL of patient living with hypertension, diabetes and concomitant hypertension and diabetes in Nigeria are suboptimal.

Hypertension recorded highest predictors in this study. Increasing age, illiteracy and payment by relative were negative socio-demographic predictors of physical HRQoL while higher education attainment and OoP were positive socio-demographic predictors of hypertension. The mental HRQoL (sociodemographic) predictors were OoP expenditure (positively) and payment by relative (negatively). The access to care predictors for physical HRQoL was travel time and waiting time while the predictors for the mental HRQoL were waiting time. Drug regimen-related (negative) predictors for physical HRQoL were higher drug combination, high drug frequency and drug side effect. Accompany person and higher symptom count also predicted physical component negatively. CVD complications negatively predicted both

physical and mental components of HRQoL. Drug adherence is the only potent positive clinical factor predictor of both physical and mental HRQoL.

The major predictors of HRQoL of diabetic patients were illiteracy, higher education, increased drug combination, CVD complications and accompany person for physical component. The mental component was predicted by payment by relative and medication adherence. The HRQoL of patients with concomitant hypertension and diabetes was predicted by age, increased drug combination, drug side effect, accompany person, CVD complication, symptom counts and medication adherence for physical component. The mental component was predicted by higher education, OoP payment, payment by relative, waiting time, CVD complication and medication adherence.

After the modelling, the main predictors of patients with hypertension alone were age, illiteracy, mode of payment, waiting time, drug regimen-related, CVD complications and medication adherence. The major predictors for diabetic patients in this study were drug regimen-related factors, CVD complication, accompany person and medication adherence. Finally, those patients having concomitant hypertension and diabetes had main predictors of their HRQoL as a mode of payment, access to care, education level, drug regimen and medication adherence. Inferentially, by disaggregating the analysis into disease categories, this study established that drug regimen and medication adherence are predictive factors common across all the three categories of patients.

Comparing our findings with other studies, the Greece study reported age and educational levels as potent predictors of scales of HRQoL^[42] which is similar to the findings among the hypertensive patients in this study. The German study reported that concomitant hypertension and diabetes are not a predictor of HRQoL^[41] which is contrary to our study since our study found many predictors of HRQoL associated with concomitant hypertension and diabetes. On the other hand, the study in South Western Nigeria reported that educational

Table 5: Predictive factors of health-related quality of life among patients with hypertension, diabetes and both diseases (modelling with multiple linear regression)

Predictive factors	Adjusted β	95% CI	R ²	P
Physical HRQoL				
hypertension				
Constant	54.92	52.62-57.22	0.260	<0.001*
Age	-0.10	-1.14--0.07		<0.001*
No education	-1.13	-2.01--0.24		0.013*
Out-of-pocket payment	1.56	0.73-2.38		<0.001*
Waiting time	-0.30	-0.55--0.05		0.021*
Drug frequency	-1.59	-2.47--0.71		<0.001*
CVD complication	-4.25	-5.13--3.37		<0.001*
Accompanying person	-2.07	-3.03--1.12		<0.001*
Medication adherence	3.00	-2.18--3.82		<0.001*
Diabetes				
Constant	55.96	51.06-60.85	0.371	<0.001*
Drug combination	-2.28	-4.20--0.35		<0.001*
CVD complication	-4.07	-7.62--0.52		0.025*
Accompanying person	-7.61	-11.62--3.61		<0.001*
Both hypertension and DM				
Constant	49.34	46.96-51.73	0.283	<0.001*
Travel time	-0.05	-0.09--0.02		0.002*
Drug side effect	-4.06	-6.86--1.26		0.005*
Accompanying person	-6.73	-8.86--4.60		<0.001*
Medication adherence	3.04	1-15-4.92		0.002*
Mental HRQoL				
hypertension				
Constant	41.42	39.66-43.17	0.166	<0.001*
Payment by relative	-1.55	-2.54--0.55		0.002*
Waiting time	-0.54	-0.84--0.24		<0.001*
Drug combination	-0.69	-1.24--0.14		0.014*
Medication adherence	6.17	5.20-7.15		<0.001*
Diabetes				
Constant	36.76	34.06-39.46	0.185	<0.001*
Medication adherence	7.97	3.49-12.46		0.001*
Both hypertension and DM				
Constant	40.63	37.99-43.27	0.179	<0.001*
Higher education	2.75	0.03-5.46		0.047*
Payment by relative	-2.63	-4.91--0.33		0.025*
Waiting time	-0.66	-1.22--0.10		0.021*
Medication adherence	4.82	2.62-7.03		<0.001*

*Significant. Initial interactions between 'accompany person' and 'tertiary education' - Accompany person dropped. No multi-collinearity: VIF <10 and tolerance >0.10. All model assumptions met: Linearity, normality and homoscedasticity (equality of residual variance). β : Coefficient of regression, CI: Confidence interval, VIF: Variance inflation factor, DM: Diabetes mellitus, HRQoL: Health-related quality of life, CVD: Cardiovascular disease

status positively predicted mental HRQoL but did not predict physical HRQoL^[13] contrary to findings from our study. Furthermore, in contrary to our study (which found a negative prediction of symptom counts on only physical component of HRQoL), the Nigerian study found that

increasing symptom counts positively predicted both physical and mental components of HRQoL.^[13] Clinically, symptoms are the feelings and discomfort felt by patients which will invariably affect patients' sense of well-being and quality of life.^[44]

Although age, occupation and BP control were modelled by the Nigerian study, these were similarly found as non-predictors of physical HRQoL.^[13] Other factors such as drug combinations, OoP expenditure, satisfaction with care and accompanying person to clinics were not explored by these other studies. Nonetheless, in conformity with the finding of this study, multiple drug regimens among patients with chronic diseases have been linked to poor quality of life by other studies.^[45] The implication of this finding is that patients who are older, on multiple drugs regimen, with higher symptoms and not adherent to medication are more likely to have poor HRQoL outcome. In addition, other studies have corroborated that multi-drug regimen and poor medication adherence are related to deterioration in a patient's quality of life.^[45,46]

CONCLUSION

The patients living with hypertension, diabetes and concomitant hypertension and diabetes in Ilorin, Nigeria, have both physical and mental components of HRQoL below the reference population.^[17] The major predictive factors were drug regimen-related, age, literacy level, mode of payment, family supports, adherence to medication and disease symptoms. These factors can be grouped into socio-demographic, access to care, drug regimen and clinical outcomes. Neither BP control nor BMI predicted the quality of life of patients in this study. Disaggregating the predictive factors into three categories of patients established that though there were diverse factors predicting each category of patients, the drug regimen and medication adherence were potent predictors cutting across the three categories of patients. It is, therefore, recommended that multi-drug reduction options and medication adherence interventions should be explored in Nigeria. Other interventions at bridging access to care challenges and harnessing family supports for the hypertensive and diabetic patients are needed in the country.

LIMITATION OF THE STUDY

Some researchers have suggested that other environmental factors such as policy, governance, cultural practices and socio-economy may also have an impact on quality of life of patients. Because of the cross-sectional design of this study, the predictive factors reported do not confirm causality effects. The use of NBS with US population (2009) as the standard reference during analysis is also a limitation of this study.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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