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Blood Pressure Control among Hypertensive Diabetic Patients on Follow Up at Kampala International University Teaching Hospital, Bushenyi, Uganda

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ABSTRACT

Hypertension is a common comorbid condition in diabetes, affecting 20–60% of patients, depending on obesity, ethnicity, and age. Adults with diabetes have a two to threefold higher rate of cardiovascular disease (CVD) than adults without diabetes. The purpose of this study was to look at blood pressure (BP) control and predictors inhypertensive diabetic patients who were being followed up on at Kampala International UniversityTeaching Hospital (KIU – TH) in Ishaka, Bushenyi. A cross-sectional study was carried out in KIU – TH among hypertensive adult patientscomorbid with diabetes who had been taking antihypertensive drugs for at least a year. There wereboth bivariate and multivariate analyses performed. Using multivariable logistic regression analysis, the +e odds ratio and 95 percent confidence level were calculated to identify factors associated with uncontrolled BP. The level of statistical significance was set at 0.05 p value. Afterexplaining the purpose and procedures of the study, the patient provided written informed consent. This study included a total of 186 study participants. The participants' average age was 51.2 12.2 years. Blood pressure and blood glucose levels were under control in 104 (55.9%) and 106 (57.0%) of study participants, respectively. Age 60 years (AOR = 4.537, 95 percent CI = 1.142–18.024, p = 0.032), duration with hypertension 5 years (AOR = 3.534, 95 percent CI = 1.062–11.760, p = 0.040), cigarette smoking (AOR = 7.697, 95 percent CI = 2.356–25.146, p = 0.001), non-adherence (AOR = 6.584, 95 percent CI = 2.337. In the current study, BP was better controlled among hypertensive diabetic patients than in previous studies. Uncontrolled BP was predicted by older age, longer duration of hypertension, cigarette smoking, non-adherence, and uncontrolled glycaemia. thus, interventions on modifiable factors should be implemented to improve BP control in diabetic patients.

Keywords: Blood Pressure, Hypertension, Diabetic Patients

INTRODUCTION

Non-communicable diseases (NCDs) represent the leading cause of death worldwide, killing 41 million people each year—equivalent to 71% of all deaths globally. Among NCDs, the four top killers that together account for more than 80% of all premature NCD deaths include cardiovascular diseases (17·9 million deaths annually), cancers (9·0 million), respiratory diseases (3·9 million), and diabetes (1·6 million) [1-7] and loss of 54% of healthy years calculated by the disability-adjusted life years (DALYs) [8].

The WHO projected that deaths from NCDs alone in Africa were rise to above 3.9 million by 2020[9]. The rapid population growth rate at an average of 2.7% makes the challenge even more complex with the countries in this region lacking the needed capacity to maintain and promote health [10].

There has been a surge in the burden of NCDs in sub-Saharan Africa over the past two decades, driven by increasing incidence of cardiovascular risk factors such as unhealthy diets, reduced physical activity, hypertension [11-20], obesity, diabetes, dyslipidaemia, and air pollution. NCDs are set to overtake communicable, maternal, neonatal, and nutritional (CMNN) diseases combined as theleading cause of mortality in sub-Saharan Africa by 2030 [21].

Over the past 20 years, Uganda has

experienced a reduction in poverty with the concurrent rise of economic success, provoking changes in societal cultures and occupations that are more sedentary in nature. The country is now facing an epidemiological transition, as the prevalence of NCDs is rapidly increasing, accounting for 35% of the country's deaths [22-25]. According to a national survey, most individuals with a NCD in Uganda were neither aware of their status/risk factors, nor took their medication regularly [26].

Therefore, this study seeks to determine the level of Blood Pressure (BP) control and factors associated with uncontrolled BP among hypertensive diabetic patients on follow up at Kampala International University Teaching Hospital in Bushenyi, western Uganda.

Study design

A cross-sectional study was conducted for a period of three months, from January to March, 2022.

Study site

This study was conducted at Kampala International University Teaching Hospital in Ishaka- Bushenyi.

Study population

All adult patients of hypertension with diabetes who were attending the chronic diseases clinics of KIU - TH during the study period.

Inclusion criteria

All adult patients of hypertension with diabetes taking antihypertensive drugs for at least one yearin KIU - TH on follow-up during the study period and willing to participate were included in the study.

Only patients suffering from hypertension and diabetes alone that were visiting the consultant outpatient clinics for chronic care were interviewed.

Exclusion criteria

Mentally disabled, those who are unable to hear, and seriously ill patients were excluded from thisstudy.

Sample size determination

The required sample size was calculated using single population proportion formula, and the following assumptions will be used in order to calculate the required sample size.

- 43.51% Population proportion of controlled blood pressure.
- 95% confidence interval.
- Marginal error of 5% to get a sample size of 378
- 10% nonresponse rate will be considered.

Since the total number of hypertensive diabetic patients in KIU - TH was 304, the sample size was adjusted by using correction formula. The calculated sample size was n =169. Considering a 10% nonresponse rate, 186 hypertensive diabetic patients were included in the study.

Data collection tools

Data was collected using an interviewer-administered pretested questionnaire that was adopted from different available literatures, and the patient medical chart review was used to determine different variables. The questionnaire was prepared originally in English with four parts: sociodemographic characteristics, clinical characteristics, knowledge, and adherence parts. The questionnaire was translated to Runyankore which is the local language widely spoken in Bushenyi district for purposes of data collection and it was translated back to English again for consistency.

Data analysis

Data was entered into Epi info version 7, then exported into Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM/SPSS, Inc., Chicago, IL) for analysis.

Both bivariate and multivariable analyses were done. The odds ratio, along with a 95% confidencelevel, was estimated to identify factors associated with uncontrolled BP by using multiple stepwisebackward logistic regression model. The level of statistical significance was declared at p value <0.05 levels.

Ethical considerations

Ethical approval was sought from Kampala international university western campus Faculty of clinical medicine and dentistry and an introduction letter was obtained to seek for permission to collect data at the Hospital. A written and verbal consent was obtained from the respondents beforethey were recruited in the study.

RESULTS

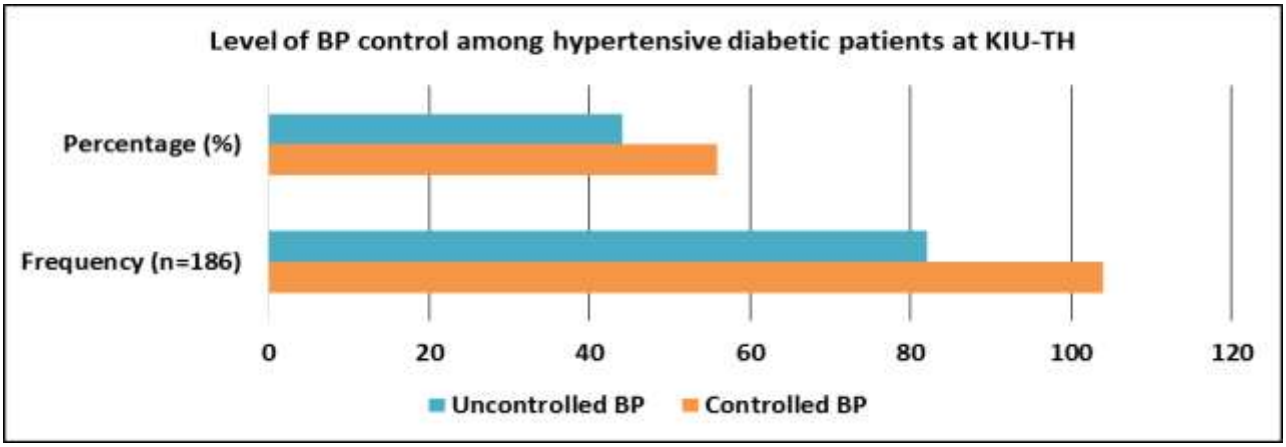
A total of 186 study participants were included in this study, from which 83

(44.6%) were males and 103 (55.4%) were females, mean age of the participants was 51.2 ±12.2 years, largest groups by age were those from 40 to 59 years old, which constituted 101 (54.3%) patients. More than half(53.8%) of the respondents were from rural resident as shown in Table 1 and Figure 2.

Table 1: Socio-demographic characteristics of hypertensive diabetic patients at KIU-TH

Characteristic	Frequency (n=186)	Percentage (%)
Sex		
Male	83	44.6
Female	103	55.4
Age		
18–39	33	17.7
40–59	101	54.3
≥ 60	52	28.0
Marital status		
Single	21	11.3
Married	126	67.7
Divorced	23	12.4
Widowed	16	8.6
Residence		
Urban	86	46.2
Rural	100	53.8
Education level		
No formal education	82	44.1
Primary school	44	23.7
Secondary school	24	12.9
College/university	36	19.4
Occupation		
Employed	143	76.9
Unemployed	43	23.1

Figure 2: Stacked area column graph showing Socio-demographic characteristics of hypertensivediabetic patients at KIU-TH.



This study established that present study found that BP was controlled in 55.9% of hypertensive diabetic patients on follow up at KIU – TH. The study further established out of all antidiabetic therapy, oral hypoglycemic agents alone 103 (55.4%) were the most prescribed agents while 72 (38.7%) patients were on insulin

alone and only 11 (5.9%) were taking both. majority of the studyparticipants had poor knowledge about hyper-tension 120 (64.5%) and were non - adherent to their treatment 128 (68.8%), blood glucose was controlled in 106 (57.0%) study participants. It was also observed that most of the patients (73.1%) had no comorbidity. majority of the participants, 120 (64.5%), were on a single antihypertensive agent as shown in Table 2 and Figures 3 and 4.

Figure 3: Bar graph showing BP control among hypertensive diabetic patients at KIU – TH

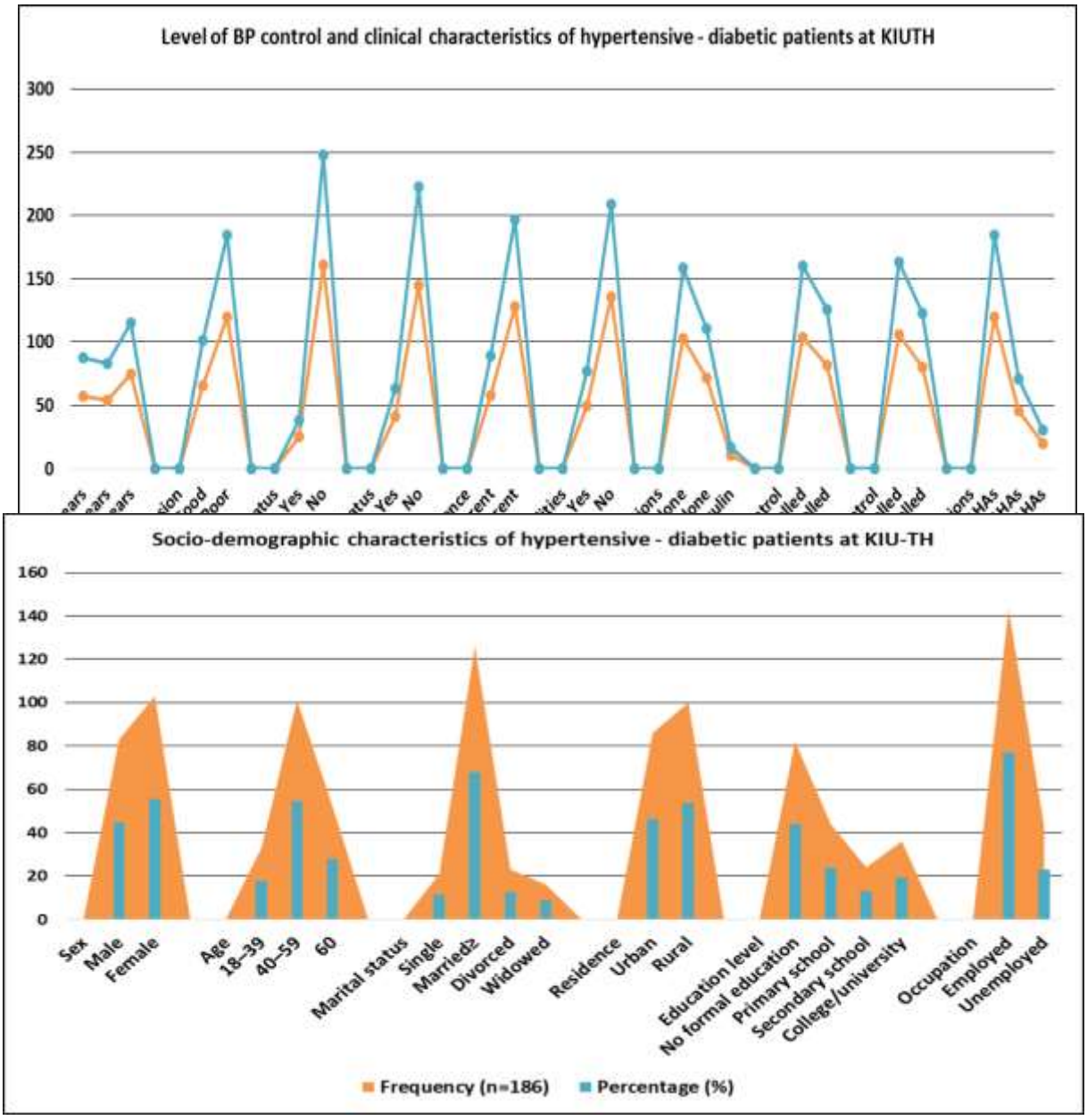


Figure 4: Line graph showing characteristics and level of BP control among hypertensive diabeticpatients on follow up at KIU–TH

Table 2: Clinical characteristics and level of BP control among hypertensive diabetic patients onfollow up at KIU – TH

Variable	Frequency (n=186)	Percentage (%)
Duration with hypertension		
2 years	57	30.6
2–4 years	54	29.0
5 years	75	40.3
Knowledge of hypertension		
Good	66	35.5
Poor	120	64.5
Cigarette smoking status		
Yes	25	13.4
No	161	86.6
Alcohol drinking status		
Yes	41	22.0
No	145	78.0
Adherence		
Adherent	58	31.2
Nonadherent	128	68.8
Presence of comorbidities		
Yes	50	26.9
No	136	73.1
Antidiabetic medications		
OHAs alone	103	55.4
Insulin alone	72	38.7
Both OHAs and insulin	11	5.9
BP control		
Controlled	104	55.9
Uncontrolled	82	44.1
Glycemic control		
Controlled	106	57.0
Uncontrolled	80	43.0
Antihypertensive medications		
Single AHAs	120	64.5
Two AHAs	46	24.7
AHAs	20	10.8

In bivariate logistic regression analysis, smoking, non - adherence and uncontrolled glycaemia were associated with uncontrolled BP. Variables with $p < 0.25$ (age, marital status, knowledge of hypertension, duration with hypertension, cigarette smoking, presence of comorbidities, adherence, antidiabetic medications, antihypertensive medications, and glycemic control) were entered into the multiple stepwise backward logistic regression model to

identify independent predictors of uncontrolled BP. In the multivariable analysis, age ≥60 years (AOR= 4.537, 95% CI=1.142–18.024, p =0.032), duration with hypertension ≥5 years (AOR= 3.534, 95% CI= 1.062–11.760, p =0.040), cigarette smoking (AOR=7.697, 95% CI= 2.356–25.146, p = 0.001), non - adherence (AOR = 6.584, 95% CI = 2.337–18.553, p < 0.001), and uncontrolled glycaemia(AOR= 21.630, 95% CI = 8.057–58.070, p < 0.001) had shown statistical significance in predicting uncontrolled BP as shown in Table 3.

Table 3: Bivariable and multivariable analysis of factors associated with uncontrolled BP amonghypertensive diabetic patients on follow-up at KIU-TH, 2018 (n = 186)

		Blood pressure		COR (95% CI)	AOR (95% CI)
		Controlled	Uncontrolled	p-value	p- value
Sex	Male	44	39	1.323 (0.719-2.434)	-
				p = 0.369	
	Female	60	43	1.00	-
Age in years	18-39	19	14	1.00	1.00
	40-59	63	38	0.926 (0.393-2.186)	0.727 (0.232-2.284)
				p = 0.861	p = 0.585
	≥ 60	22	30	1.971 (0.785-4.952)	4.537 (1.142-18.024)
				p = 0.149	p = 0.032
Marital status	Single	13	8	1.00	-
	Married	73	53	1.163 (0.420-3.219)	-
				p = 0.772	
	Divorced	12	11	1.607 (0.454-5.688)	-
				p = 0.462	
	Widowed	6	10	2.500 (0.640-9.766)	-
				p = 0.188	
Residence	Urban	50	36	1.00	
	Rural	54	47	1.229 (0.667-2.266)	-
				p = 0.508	
Education	No formaleducation	46	37	1.178 (0.507-2.739)	-
				p = 0.703	
	Primary school	24	20	1.299 (0.508-3.319)	-
				p = 0.585	
	Secondary school	13	11	1.136 (0.376-3.434)	-
				p = 0.821	
	College/university	21	15	1.00	
Employment	Employed	77	66	1.00	
	Unemployed	27	16	0.698 (0.330-1.477)	-
				p = 0.347	
Knowledge	Good	44	22	1.00	
	Poor	60	60	1.792 (0.923-3.478)	-
				p = 0.085	
Duration	<2 years	33	24	1.00	1.00

2-4 years	29	25	1.176 (0.534–2.591)	2.906 (0.786–10.738)
			p = 0.687	p = 0.110
≥5 years	42	33	1.150 (0.552–2.394)	3.534 (1.062–11.760)
			p = 0.209	p = 0.040

Table 3 Continued.....

			Blood pressure	COR (95% CI)	AOR (95% CI)
	Controlled		Uncontrolled	p-value	p- value
Cigarette smoking	Yes	10	15	2.405 (1.025-5.642)	7.697 (2.356-25.146)
				p = 0.044	p = 0.001
	No	94	67	1.00	1.00
Alcohol drinking	Yes	22	19	1.166 (0.565-2.404)	-
				p = 0.678	
	No	82	63	1.00	-
Comorbidities	Yes	25	25	1.442 (0.737-2.822)	-
				p = 0.225	
	No	79	57	1.00	
Adherence	Adherent	45	14	1.00	1.00
	Non adherent	59	68	3.509 (1.631-7.550)	6.584 (2.337-18.553)
				p = 0.001	p 0.001
Diabetic Drugs	OHAs alone	60	43	1.00	
	Insulin alone	40	32	1.180 (0.622-2.238)	
				p = 0.612	
	Both OHAs and insulin	4	7	2.662 (0.757–9.368)	-
				p = 0.127	-
Hypertensive drugs	Single AHAs	74	46		-
	Two AHAs	20	26		-
	AHAS	10	10		-
Glycemic control	Controlled	77	29		-
	Uncontrolled	27	53		-

DISCUSSION

The current study discovered that 55.9 percent of hypertensive diabetic patients had their blood pressure under control. This finding's BP control is consistent with studies from South Africa (57percent) and Chile (59.7 percent) [27].

BP control is better than in previous studies in Ethiopia (19.4%), South Africa (42%), India (36.66%), Palestine (23.9%), Malaysia (23.5%), and the United States (49 percent) [28].

In the study, the most commonly

prescribed drugs were ACEI, followed by diuretics in 54.8 percent and 48.9 percent of patients, respectively. These findings were similar to those of studies conducted in Ethiopia, India, Palestine, and Chile [29]. The guidelines that also recommend hypertension treatment should include drug classes that have been shown to reduce cardiovascular events in diabetic patients: ACEIs, ARBs, thiazide-like diuretics, or dihydropyridine CCBs. In most cases, multiple drug therapy is required to achieve blood pressure goals. In contrast to the guidelines, the majority of study participants (64.5 percent) were taking a single antihypertensive medication. This is evidence of physicians' poor practice in adhering to guidelines, which needs to be improved.

Patients over the age of 60 were more likely to have uncontrolled blood pressure. This finding is supported by research from Ethiopia, South Africa, Zimbabwe, and Malaysia [30-40].

According to studies, the cause of uncontrolled BP in older people is a combination of biological factors such as autonomic imbalance and vessel stiffening, as well as behavioral factors such as older people's decreased physical activity practice [40-49].

This study showed that patients with a longer duration of hypertension had a significant association with uncontrolled BP. Similar findings were reported from Ethiopia and China [31-40].

In the present study, cigarette smoking was significantly associated with uncontrolled BP. +is finding is consistent with studies from Zimbabwe, Spain and the USA. Studies reported that cigarette smoking is not only a cause for uncontrolled hypertension, but it is also a risk of developing cardiovascular complications. Smoking induces endothelial dysfunction, vasoconstriction, insulin resistance, and dyslipidemia. Thus, patients with hypertension comorbid with diabetes had to avoid cigarette smoking to achieve an optimal BP [40-49].

In this study, non-adherence was significantly associated with uncontrolled BP and non - adherent patients were around 6.584 times more likely to have uncontrolled BP than patients adherent to medications. A similar finding was reported from the study done in Ethiopia and South Africa [33, 36]. The reason for non - adherence could be the cost of the medications; patients
might stop taking their medication when their symptoms were under control; a distance of the hospital from their home; unavailability of medications in the health facilities; side effects.

CONCLUSION

In the current study, BP was better controlled among hypertensive diabetic patients than in previous studies. Uncontrolled BP was predicted by older age, longer duration of hypertension, cigarette smoking, non-adherence, and uncontrolled glycaemia. Thus, interventions on modifiable factors should be implemented to improve BP control in diabetic patients. This could be accomplished by pharmacists, whose responsibility it is to provide continuing medical education in the field of current pharmacotherapy, and stricter blood pressure control is required to reduce severe complications of diabetes and hypertension.

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