

Full-Length Research Article

Prevalence and Correlates of Erectile Dysfunction: A Comparative Study of Adult Hypertensive Patients in an Outpatient Clinic of a Tertiary Healthcare Centre, South East Nigeria

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Summary: The prevalence of erectile dysfunction (ED) among hypertensive patients has been documented in the range of 35.2% to 71% in the general population. This is a neglected problem in low-income countries (such as Nigeria), with its attendant consequences. It is an important public health problem, according to the National Institute of Health Consensus Development Conference Panel. Measures to address ED risk factors are advocated in order to reduce the burden of the disease and its financial impact on the economy. This study assessed ED and its associated risk factors among adult hypertensive patients attending a tertiary care centre, with a view to ensuring an advocacy aimed at reducing its burden in the population. It is a hospital-based cross-sectional comparative study which involved 236 adult male patients recruited via a systematic random sampling. Data was collected using a semi-structured, interviewer-administered pretested questionnaire to obtain information on the socio-demographic characteristics, past medical history, behavioural characteristics, clinical assessment and erectile dysfunction assessment using the Sexual Health Inventory for Men (SHIM). Data was analyzed with SPSS (version 23). The chi-square test, Fisher's test, and multivariate logistic regression were used for the analysis. Respondents had a mean age of 42.1±15.17 years. An overall prevalence of erectile dysfunction of 44.1%, with a higher prevalence in hypertensive (54.2%) than non-hypertensive (33.9%) respondents, was noted. There was a significant difference when ED was compared in the two groups (hypertensive and non-hypertensive) ($p<0.05$). There was a significant association between body mass index and erectile dysfunction ($P<0.05$). Blood pressure ($P=0.010$, OR=2.026, 95% CI=1.180-3.479) and BMI ($P=0.048$, OR=0.688, 95% CI= 0.372-1.271) were independent predictors of erectile dysfunction. Inasmuch as smoking and the class of anti-hypertensive medications used by the respondents had no significant association with erectile dysfunction, hypertension and obesity were independently associated with erectile dysfunction. Alcohol use was also significantly associated with erectile dysfunction, but did not independently predict erectile dysfunction.

Keywords: Hypertension, erectile dysfunction, disease, health, obesity

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INTRODUCTION

According to Agaba *et al*, (2017), erectile dysfunction has been shown to be a leading cause of marital disharmony and low quality of life. With the global upsurge in the prevalence of several chronic medical conditions such as hypertension, diabetes, coronary heart diseases, and some of their drug therapies, erectile dysfunction is likely to increase since most of them are risk factors for ED (Idung *et al*, 2012)

Psychosocial issues associated with ED can affect work and economic productivity in the men (Irekpita *et al*, 2017). Affected men are scorned by the society, labelled abnormal, and given derogatory names in their communities (Oyelade *et al*, 2016). Furthermore, the associated financial cost of managing erectile dysfunction is quite enormous in the face of poor resources especially in the developing countries like ours. Measures to address the risk factors are advocated as to reduce the burden of the disease and its financial impact

on the economy. As erectile dysfunction is not routinely screened for at this clinic, this study sought to find out the prevalence and correlates of ED among hypertensive patients in a tertiary care centre, and compared with non-hypertensive and hence, make recommendations on the preventive strategies.

There are differences in the prevalence of erectile dysfunction between various nations and ethnic groups. A review study by Kessler *et al.*, (2019) puts the global prevalence between 3% and 76.5% in the general population. A population-based study in Southwest Nigeria by Oyelade *et al.*, (2016) recorded a prevalence of erectile dysfunction to be 58.9%. Men with hypertension were found to have erectile dysfunction in 66.2% of cases in Qatar, 56.2% of cases in Thailand, 67% of cases in Israel, 61.3% of cases in Bangladesh, 35.2% of cases in Greece, and 71% of cases in Spain (Abuhay *et al*, 2021; Seid *et al*, 2017; Olisa *et al*, 2016; Hernandez-Cerda *et al*, 2020). Erectile dysfunction in hypertensive men was shown to be prevalent in four African countries: 65.8% in Nigeria, 50.6% in Cameroon, 43.2% in Egypt, and 94.5% in Kenya (Oyelade *et al*, 2016; El-sakka *et al*, 2012). Different demographics and clinical settings have experienced erectile dysfunction in somewhat different ways. In Nigeria, the prevalence of erectile dysfunction varies from state to state. Cross – sectional studies in south west, south-south and north central Nigeria, using IIEF – 5, reported general prevalence of erectile dysfunction of 58.9%, 41.5%, and 46.9%, respectively (Idung *et al*, 2012; Oyelade *et al*, 2016; Oladiji *et al*, 2013). Also, a study by Ejike *et al* (2015) in Umudike reported severe ED prevalence of 33.3% among the hypertensive when compared to the normotensives. From the available evidence, more than half (56.4%) of adult males in Nigeria suffer from various degrees of erectile dysfunction (Gara *et al*, 2024). This brings to the fore the burden of ED in the male population in Nigeria. There seems to be somewhat scarcity of evidence on the magnitude of this problem in the South – Eastern Nigeria and the study location in particular.

Age-related arterial stiffening brought due to smooth muscle cell death and collagen deposition, results in hypertension. This could explain why hypertension is a common comorbidity associated with ED and seems to indicate that ED and hypertension may be the same pan-vascular disorder with different systemic manifestation (Teixeira & Soares, 2020).

Many antihypertensive medications, including centrally acting alpha-adrenergic agonists, beta blockers, and diuretics, are thought to have ED as a common side effect (Mills *et al*, 2020). The effects of newer antihypertensive medications, like calcium antagonists and ACE inhibitors, appear to be neutral (Akinyede *et al.*, 2020). According to several reports, ED and obesity are related in both directions. Obesity has been linked to lower testosterone levels in men as well as endothelial dysfunction. Despite having a number of explanations, the mechanism is not entirely understood (Oyelade *et al*, 2016).

A study by Reddy (2017) showed a link between ED and a number of modifiable lifestyle variables, such as physical inactivity, smoking, and excessive alcohol consumption. In a cross-sectional community based study in Tanzania by Pallangyo *et al* (2016), smokers had 40% increased likelihood for ED compared to never smokers. A

systematic review by Cao *et al* (2013) found that ED was increased by 20% and 51% among past and current smokers, respectively. In a cross-sectional study conducted at an inpatient psychiatry ward of a tertiary care hospital in India, Mandal *et al.* (2021) came to the conclusion that sexual dysfunction, which affects desire, erection, and satisfaction with orgasm, is common and seen in nearly half of the patients with alcohol dependency. Erectile dysfunction is also highly associated with age and educational status (Ogunfowokan *et al*, 2022).

SUBJECTS AND METHODS

Study Population: The study population comprised adult male hypertensive and non-hypertensive patients attending the general outpatient clinic of the study institution.

Study Design: This is a hospital-based cross-sectional comparative study

Sample Size Determination: The formula for sample size determination for a cross-sectional comparative study with a qualitative outcome according to Charan and Biswat, (2013) was used to calculate the minimum required sample size. This is as shown below:

$$n = \frac{r+1}{r} \frac{(P^*) (1-P^*) (Z_{\beta} + Z_{\alpha/2})^2}{(P_1 - P_2)^2}$$

Where

n = Minimum sample size in each group,

P* = Average proportion with ED, Z_{β} = 0.84 (standard normal deviate at desired power of 80%),

$Z_{\alpha/2}$ = 1.96 (standard normal deviate corresponding to 95% confidence level),

$P_1 - P_2$ = Effect size or difference in proportion expected based on previous studies (Fafiolu *et al*, 2015).

P_1 = Proportion of ED in hypertensive,

P_2 = Proportion of ED in non-hypertensive,

r = Ratio of control to cases, 1 for equal case and control,

$P_1 = 0.75$ and $P_2 = 0.569$.

Substituting these values, $n = 107.478 = 107$.

Eleven (11) which is 10% of minimum sample size was added to make allowance for unexpected data losses or invalid data, hence $n = 107 + 11 = 118$

An equal number of the comparison group (non-hypertensive) was recruited and age-matched to the hypertensive group. This corresponds to 118 in each group
Sampling Technique: The sampling frame was 600, hence, sampling interval was gotten by dividing the sampling frame by the sample size.

Therefore, sampling interval = $600/118 = 5$.

Sampling Method: A systematic sampling method was used to select the study participants. One in every 5th registered male hypertensive patient was selected at presentation until the desired sample size was achieved. The first subject was randomly selected by a balloting method; this was done for the first five hypertensive patients by using a yes or no method. One “yes” and four “no” were written separately on five small pieces of paper and folded. Whichever number picked the “yes” became the first subject, and from this number, every subsequent fifth subject was picked. This was repeated daily until the minimum sample size was attained. However, in the event

of any chosen patient not meeting the selection criteria or declining to participate, the next patient will be selected.

The non-hypertensive subject (the comparison group) was selected by convenience sampling, matched to the hypertensive subjects by age until the desired sample size was achieved. A signature marker was placed on the top right corner of the respondents' consultation card to prevent any participant from being selected more than once during their follow-up visits.

Selection Criteria: Included in this study were all consenting male patients age 18 years and above who were married or cohabiting (living together and having sexual relationship without being married) with female partner, registered male hypertensive regardless of duration of hypertension, and registered non-hypertensive male patients attending the out-patient clinics for other medical conditions which on their own are not known to contribute to ED. Excluded from this study were male patients with medical or surgical conditions (separate or co-morbid with hypertension), which on their own can cause erectile dysfunction e.g. diabetes, cerebro-vascular accidents, Spinal injuries, Parkinson's disease and with dementia, critically ill patients who cannot stand erect for weight and height measurement and patients with marked edema

Data Collection Tools: Tools used in this study were: a semi-structured, interviewer-administered and pretested questionnaire, Sexual Health Inventory for Men (SHIM), a dedicated weight and height stadiometer (Seca gmbh and co kg. 22089 Hamburg, Germany), mercury sphygmomanometer and a stethoscope (3M Littmann brand, made in USA)

Pretesting of Research Questionnaire: The questionnaires were pretested among 12 registered hypertensive and 12 registered non hypertensive adult male patients attending the outpatient clinic of a mission hospital which had a similar setting with author's study centre to ascertain the relevance and understanding of questions contained in it and its potential to capture the required information for the study adequately. The questionnaire took about 10 minutes to administer, inclusive of the erectile dysfunction screening tool. Some of the questions were modified thereafter.

Data Collection Procedure: All new patients visiting the study clinic were first seen at the records department where they were registered, assigned a hospital number and issued a folder. Patients who were not seen for first time took their cards to the registry, where their case files were retrieved. Research assistants were recruited, the researcher and the assistants recruited eligible study participants each day, with the nature and aim of the research adequately explained to the participants. Participants who met the criteria for recruitment in the study were selected by the researcher after written informed consents were obtained from them. To ensure privacy, a separate consulting room was used to interview the participants. Structured interview of participants was done using researcher administered pre-tested questionnaire based on the modified WHO–Stepwise instrument approach to surveillance of chronic non-communicable disease risk factors (NCDs-STEPwise approach, 2022). It consists of different sections such as:

socio-demographic characteristics, past medical history, behavioural characteristics, clinical assessment, biochemical assessment of FBS and Erectile dysfunction assessment using Sexual Health Inventory for Men (SHIM) (Alwaal *et al*, 2022). This instrument has been shown to be useful in quantity and quality of research in male sexual function and has been validated for the assessment of erectile function (Cappelleri & Rosen, 2005). In the SHIM, erectile dysfunction was classified as severe with SHIM score 1 – 7; moderate 8 – 11, mild to moderate 12 – 16; mild 17 – 21 and no erectile dysfunction 22-25. In this study the same classification was maintained. During bivariate and logistic analysis two categories was used namely: (22 – 25) = No ED, and (1-21) =ED. The task of the research assistants was to accurately measure and record the weight and height of the participants under supervision of the researcher. Measurement of blood pressure of participants was done by the researcher as the participants were brought into the consulting room, one by one and interviewed privately.

Anthropometric data: A dedicated stadiometer with an attached weighing scale (Seca GmbH and Co. KG, 22089 Hamburg, Germany) was used to measure height (ht) and weight (wt) of each subject to the nearest 0.1 meter (m) and 0.1 kilogram (kg), respectively, using standard protocols. The body mass index (BMI) of each subject was calculated by using weight (kg)/height (m²).

Measurement of Blood pressure: The blood pressure was measured in sitting position with the arm placed on the table at the level of the heart, after about 5 minutes of rest using adequate cuff-size mercury sphygmomanometer (Dekamet Accoson, made in England MKS) and a 3m Littmann Stethoscope according to standard protocol. Two measurements were taken 5 minutes apart and the average, calculated to the nearest 1mmHg was reported as the blood pressure. Blood pressure criteria was based on Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure JNC7 (Dennison-Himmelfarb *et al*, 2014) Diagnostic Criteria

Erectile Dysfunction: This was assessed using Sexual Health Inventory for Men (SHIM) to determine the presence and severity of ED. In the SHIM, erectile dysfunction was defined as SHIM score of less than 22. It was classified as severe with SHIM score 1 – 7; moderate 8 – 11, mild to moderate 12 – 16; mild 17 – 21 and no erectile dysfunction 22-25 (Alwaal *et al*, 2020) In this study the same classification was maintained. SHIM score of less than 22 is diagnostic of ED.

Hypertension: Hypertension was defined as blood pressure ≥ 140 mmHg systolic (SBP) and or ≥ 90 mmHg diastolic (DBP), history of being a known hypertensive and/or current use of antihypertensive medication(s). For easy analysis, subjects were grouped into normotensive (non-hypertensives), SBP < 140mmHg and DBP < 90mmHg; and hypertensive, SBP ≥ 140 mmHg and/or DBP ≥ 90 mmHg. Measurement in one occasion was used to make diagnosis in newly diagnosed, since this is an epidemiological study.

Alcohol Consumption: was assessed on whether subject had ever consumed alcohol or not.

Tobacco Use: was assessed based on whether subjects had ever smoked cigarette or not.

Statistical Analysis:

The data collected was analysed using the Statistical Package for Social Sciences (SPSS) version 23. Accuracy of data entered was censured by double-check entry approach. Summary statistics (mean and standard deviation) was calculated for continuous variables (age, height, weight, BMI, SBP and DBP) while frequency and percentages were calculated for categorical variables (residence, marital status, occupation, level of education, religion, ethnicity etc). To assess more information, some continuous variables (age, BMI, BP) were categorised. Relationships among categorical variables were determined using Chi-Square test with Fisher's test being adopted where Chi-square test assumption is not met. Logistic regression was deployed to ascertain risk factors that are independently associated with the dependent variable (Erectile dysfunction). Means among the study groups for continuous variables were compared using independent t-test. All statistical tests were conducted at 5% level of significance.

Ethical Consideration: Ethical approval was sought and obtained from the Research and Ethical Committee of the study institution. This study complied with the Helsinki Declaration of 1975 on human experimentation as revised in 2000. Written informed consent was obtained from the participants before questionnaires were administered and confidentiality was maintained throughout the study.

RESULTS

This was a hospital-based cross-sectional comparative study of 236 male respondents (118 hypertensive and 118 normotensive), with a mean age of 42.1 ± 15.7 years.

Socio-demographic distributions of the study participants: As shown in Table 1, the overall mean age of participants was 42.1 years, with no significant difference in the mean ages of hypertensive and non-hypertensive participants ($p=0.801$). None of the demographics except education was significantly different when both groups were compared (0.049).

Prevalence of erectile dysfunction among the study group (hypertensive and non-hypertensive): There was a significant difference when ED among hypertensives was compared with ED among non-hypertensives ($p<0.05$), either in the degree of dysfunction or in the overall level of dysfunction. See Table 2. Only BMI had a statistically significant association with erectile dysfunction ($p<0.05$). See Table 3.

Association between ED and class of antihypertensive medication: None of the class of antihypertensive used had a significant association with ED. See Table 4.

Binary logistic regression model of ED on blood pressure and anthropometric: Blood pressure and BMI were independently associated with erectile dysfunction. See Table 5.

Table 1:
Socio-demographic distributions of the study participants

Variable	Overall n (%) (n=236)	Hypertensive n (%) (n=118)	Non-Hypertensive n (%) (n=118)	Chi-square	p-value
Age (Years)	Young Adults (18-35)	97(41.1)	48(40.7)	0.213	0.899
	Middle-Aged Adults (36-55)	80(33.9)	39(33.1)		
	Older Adults (>55)	59(25.0)	31(26.3)		
	*Age: Mean(SD)	42.1(15.2)	42.3(15.1)	t=0.253	0.801
Residence	Rural	112(47.5)	55(46.6)	0.068	0.794
	Urban	124(52.5)	63(53.4)		
Marital Status	Married	205(86.9)	102(86.4)	0.037	0.847
	Cohabiting	31(13.1)	16(13.6)		
Occupation	Unemployed	52(22.0)	22(18.6)	1.579	0.209
	Employed	184(78.0)	96(81.4)		
Education	No Formal Education	31(13.1)	13(11.0)	7.801	0.049
	Primary	46(19.5)	29(24.6)		
	Secondary	58(24.6)	22(18.6)		
	Tertiary	101(42.8)	54(45.8)		
Religion	Christian	170(72.0)	89(75.4)	2.153	0.341
	Islam	19(8.1)	10(8.5)		
	Others	47(19.9)	19(16.1)		
Ethnicity	Igbo	171(72.5)	89(75.4)	1.040	0.308
	Others	65(27.5)	29(24.6)		

n=frequency, %=percent, $p<0.05$ indicates significant, * =Mean(SD), SD = standard deviation, t=independent t-test.

Table 2:

Prevalence of erectile dysfunction among the study group (hypertensive and non-hypertensive)

Variable	Overall n (%) (n=236)	Hypertensive n (%) (n=118)	Non-Hypertensive n (%) (n=118)	Chi-square	p-value
Degree of Erectile Dysfunction					
Severe ED	5(2.1)	4(3.4)	1(0.8)	17.898*	0.001
Moderate ED	45(19.1)	22(18.6)	23(19.5)		
Mild to Moderate ED	42(17.8)	32(27.1)	10(8.5)		
Mild	12(5.1)	6(5.1)	6(5.1)		
No ED	132(55.9)	54(45.8)	78(66.1)		
Erectile Dysfunction					
ED	104(44.1)	64(54.2)	40(33.9)	9.902	0.002
No ED	132(55.9)	54(45.8)	78(66.1)		

n=frequency, %=percent, ED=Erectile Dysfunction, *Fisher's exact, $p < 0.05$ indicates significant.

Association between erectile dysfunction and modifiable risk factors (smoking, alcohol intake and BMI) among the study groups

Table 3:

Association between erectile dysfunction and modifiable risk factors (smoking, alcohol intake and BMI) among the study groups.

Variable		ED (n=104)	No ED (n=132)	Chi-square	p-value
Ever smoked Cigarette	Yes	41(39.4)	51(38.6)	0.115	0.602
	No	63(60.6)	81(61.4)		
Alcohol Intake	Yes	88(84.6)	113(85.6)	0.057	0.803
	No	16(15.4)	19(14.4)		
BMI	Underweight	1(1.0)	6(4.5)	7.412	0.040
	Normal	46(44.2)	61(46.2)		
	Overweight	19(18.3)	34(25.8)		
	Obese	38(36.5)	31(23.5)		

*=fisher's exact test, n= frequency, %=percent, ED=erectile dysfunction, BMI= body mass index

Table 4:

Association between ED and class of antihypertensive medication

Variable	Overall n(%) (n=118)	Erectile Dysfunction n (%) (n=64)	No Erectile Dysfunction n (%) (n=54)	Chi-square	p-value
Class of Antihypertensive Medications					
Diuretic	17(14.4)	11(17.2)	6(11.1)	1.287*	0.972
Calcium Channel Blockers	32(27.1)	17(26.6)	15(27.8)		
Centrally Acting Drugs	24(20.3)	12(18.8)	12(22.2)		
Angiotensin Converting Enzyme	22(18.6)	11(17.2)	11(20.4)		
Angiotensin Receptor Blocker	17(14.4)	10(15.6)	7(13.0)		
B-blocker	2(1.7)	1(1.6)	1(1.9)		
Others	4(3.4)	2(3.1)	2(3.7)		

n= frequency, %=percent, $p < 0.005$ indicate significance, *=fisher's exact**Table 5:**

Binary logistic regression model of ED on blood pressure and anthropometric

Variable		β	Adjusted OR	p-value	95% CI for Adjusted OR	
					Lower	Upper
Blood Pressure	Hypertensive	0.906	2.026	0.010	1.180	3.479
	Non-Hypertensive(ref)		1			
BMI	Underweight	-1.539	0.215	0.170	0.024	1.930
	Normal	-0.374	0.688	0.048	0.372	0.700
	Overweight	-0.638	0.528	0.097	0.249	1.121
	Obese(ref)		1			

 $p < 0.05$ indicates significance, OR=odds ratio, CI=confidence interval, ref= reference category, β =regression coefficient, BMI=body mass index

DISCUSSION

This study was designed to determine the prevalence of erectile dysfunction and associated risk factors among hypertensive patients.

The mean age of the respondents was 42.1 ± 15.17 years. This finding is consistent with studies by Oyelade *et al.* (2016) and Fafiolu *et al.* (2015) which recorded mean ages

of 46.7 ± 13.7 years and 49.74 ± 16.6 years respectively. In contrast, research by Almigbal & Schattner (2018) in Saudi Arabia had higher mean ages, indicating older responders. The variance in the respondents' mean ages may be the result of variances in the affected men's consciousness and awareness on the importance of seeking treatment for erectile dysfunction as soon as possible in different regions.

Prevalence and correlates of erectile dysfunction in hypertensive patients

This study also revealed that the proportion of married non-hypertensive and hypertensive respondents was approximately the same. This is possibly due to the relatively low mean age of the respondents in the study. This finding was not in agreement with a similar study by Fafiolu *et al.* (2015), which had higher proportion of married hypertensive respondents compared to non-hypertensive respondents. This might be due to the relatively higher mean age of their respondents, when compared to the current study, as hypertension has been linearly correlated with age. Participation was significantly higher among the highly educated than the poorly educated. This could be attributed to the conduct of this survey in a capital city where highly educated civil servants make up the majority of the population. This finding was in agreement with report by Idung *et al.* (2012), in Uyo. However, the finding in this work, was not in keeping with a similar study by Abuhay *et al.* (2021), which reported less participation among the highly educated. This variation could be due to differences in methods and study location.

The overall prevalence of erectile dysfunction was 44.1%, with a statistically significantly higher prevalence among hypertensive than non-hypertensive respondents. The findings in this study were similar to those of Doumas *et al.* (2006), who reported erectile dysfunction to be more common among hypertensive compared with non-hypertensive respondents. Again, Fafiolu *et al.* (2015), reported a similar but much higher statistically significance in the prevalence of ED among the hypertensive than the normotensives. Although there were variations in the prevalence of ED among respondents in the above studies, all surveys showed a higher prevalence of ED in the hypertensive than in the normal population just like the present study. Our finding could be due to increased modernisation and the awareness on the availability of treatment options for ED, and reduced stigmatisation. It could also be due to the vascular endothelial dysfunction caused by hypertension, leading to reduction in the production of nitric oxide (NO) required for vascular relaxation; as well as atherosclerotic changes associated with hypertension (Shrifdharani & Brant, 2016).

There was no significant association found between smoking and erectile dysfunction among the respondents. Our finding is consistent with other studies which found no relationship between erectile dysfunction and smoking (Oyelade *et al.*, 2016; Fafiolu *et al.*, 2015). However, findings in this study is not in keeping with another study which documented 40% increased likelihood of erectile dysfunction in those who ever smoked compared to non-smokers (Pallangyo *et al.*, 2016). Theirs was a community-based study with a larger sample size, thus reflecting the true influence of smoking in the society. Similarly, a systematic review by Cao *et al.* (2013), revealed an increase in erectile dysfunction by 20 % and 51 % among past and current smokers respectively. Our finding could be attributed to the relatively smaller sample size of this study compared to the other studies where significant association was found. It could also be due to the level of education attained by majority of the respondents to be able to know the harmful effects of smoking.

There was no significant correlation between erectile dysfunction and alcohol use. A similar finding was observed by Abuhay *et al.* (2021), Fafiolu *et al.* (2015), and Oyelade *et al.* (2016), who reported little or no influence of alcohol

intake on erectile dysfunction in their studies. They could have been similar behaviour among the respondents in these studies. Contrary to our finding, another study found a significant association between regular alcohol consumption and erectile dysfunction among the respondents (Li *et al.*, 2021). Their study was community-based, and might have included male smokers who do visit the hospital for care and never had any knowledge on the risks associated with alcoholism. Also not in keeping with this study is another study by Mandal *et al.* (2021) in India, which reported that sexual dysfunction was associated with chronic alcohol intake. Their study was conducted among a cohort of alcohol dependent respondents. Our study was conducted in tertiary hospital where most attendees might have been enlightened on the dangers of alcohol consumption. Alcohol has been shown to cause erectile dysfunction, especially when taken in large quantity and over a long period of time (Huang, 2015).

This study found that body mass index was independently associated with erectile dysfunction (Table 3). The odds of having ED were about 31% lower in those who had normal BMI compared to those who were obese (Table 5). This finding was comparable with other studies which found a significant association between body mass index and erectile dysfunction among hypertensive respondents (Fafiolu *et al.*, 2015; Irekpita *et al.*, 2015). Furthermore, Liu *et al.* (2023), found a positive correlation between obesity and risk of moderate/severe ED. The consistent results throughout these studies corroborate the impact of obesity on erectile dysfunction, as described in the pathway of erectile dysfunction with obesity. A reported shared pathway of erectile dysfunction and obesity has been documented to include oxidative stress, inflammation and resultant insulin and leptin resistance (Cannarella *et al.*, 2021).

There was no significant association between ED and the class of antihypertensive medications used by respondents. This Finding was supported by a randomised controlled trial by Foy *et al.* (2019) in the USA, which found that antihypertensive medications were not associated with erectile dysfunction despite using a larger sample size. The findings in this study differed from the studies by Fafiolu *et al.* (2015) and Doumas *et al.* (2006), who reported a significant association between ED and the use of antihypertensive medications. Doumas and colleagues reported that patients on older drugs (b-blockers, diuretics) presented with erectile dysfunction more frequent than patients on newer drugs (calcium antagonists, ACE inhibitors, angiotensin II receptor blockers). This discrepancy could be explained by the fact that more participants in these studies were taking thiazide diuretics and beta-blockers in comparison to those in the current study. In their research, Abuhay and colleagues (2021), found that respondents on combination antihypertensive therapy exhibited erectile dysfunction more frequently than respondents on monotherapy; and the difference was statistically significant. This was attributed to the additive side effects of combination drugs. In our study, fewer hypertensive respondents were taking the anti-hypertensive drugs known to be associated with erectile dysfunction (such as thiazide diuretics and β -blockers). This could explain this study finding.

The association between erectile dysfunction and systolic/diastolic blood pressure was statistically significant. The probability of having ED was about 2 times higher in those who had hypertension compared to the respondents who had no hypertension. This supports the fact that high blood pressure has damaging effects on the lining of the blood vessels by causing hardening and narrowing of the arteries, thus limiting blood flow into the penile blood vessels (Brandes, 2014). Similar to the present study, Ejike *et al* (2015), in a study on erectile dysfunction and hypertension among adult males in Umudike, Nigeria, found that SBP and DBP were significantly higher in subjects with moderate to severe erectile dysfunction compared to those with normal erectile function. This study is similar with our study in terms of study population and were carried out in the same region, with respondents from relatively homogenous population. Conversely, a study by Foy *et al* (2019), did not report any significant association between blood pressure and erectile dysfunction. This was possibly due to the fact that older participants (>50 years old) were recruited in their study, compared to those who participated in the current study. At that age, the effect of ageing on erectile function may blunt the effect of hypertension.

In conclusion, this study demonstrated a prevalence of erectile dysfunction of 44.1%, which was more significant among the hypertensive. In as much as smoking and the class of anti-hypertensive medications used by the respondents had no significant association with erectile dysfunction, hypertension and obesity were independently associated with erectile dysfunction. Alcohol use was also significantly associated with erectile dysfunction, but did not independently predict erectile dysfunction.

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