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Association between erectile dysfunction and cardiovascular risk factors in a Nigeria tertiary hospital

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ABSTRACT

INTRODUCTION: Erectile dysfunction has adverse effects on the marital harmony and self-esteem of affected persons. It is shrouded in shame in our environment, hence affecting self-reporting of the condition. It is linked to CVDs in its etiology. The objective was to determine the relationship between erectile dysfunction (ED) and cardiovascular risk factors to recommend them as indicators for screening for ED in our environment.

METHODS: This was a cross-sectional analytical study of 243 men at a tertiary hospital in Nigeria. Participants were recruited by systematic random sampling, excluding those on aphrodisiacs. Erectile dysfunction was measured using the International Index of Erectile Function (IIEF-5), and ED was defined as a score <17. CVD risk factors were obtained from history and examination. Univariate analysis and logistic regressions were used to elicit associations between ED and cardiovascular risk factors.

RESULTS: The prevalence of ED was 47.3%. Erectile dysfunction was associated with increasing age ($\chi2=27$, $p<0.01$), harmful alcohol use ($\chi2=3.08$, $p= 0.079$), diabetes ($\chi2=8.29$, $p=0.04$), and hypertension ($\chi2=12.28$, $p =0.01$) following bivariate analysis. However, only advanced age (aOR=0.04, 95% CI: 0.00-0.54, p = 0.014) and harmful alcohol use (aOR = 0.37, 95% CI: 0.04-0.97, p=0.043) were independently associated with ED after binary logistic regression.

CONCLUSION: The prevalence of ED is high high. It is associated with age, harmful alcohol use, diabetes mellitus, and hypertension, hence the need to screen for ED, especially in the presence of these factors.

Keywords: Erectile dysfunction, cardiovascular risk factors, men, Nigeria

INTRODUCTION

The inability to achieve and maintain a penile erection for satisfactory coitus is increasingly becoming the reason for family dysfunction in Nigeria [1-2]. As couples age, the problem becomes more prevalent; whereas 15.7% of men among the young population are reported to have ED, the prevalence is 59% among those above 60 years [3]. Furthermore, it has been shown that in the absence of other confounding factors, the burden of ED increased from 0.4% among those aged less than 30 years to 11.5% among men in the 6th decade of life [4]. The crude prevalence of

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ED also varies depending on location, population under consideration, and the tool used to measure it. For instance, the prevalence in Nigeria is 57.4%, while it is 63.6% in Egypt and 80.8% in Pakistan [5]. Among the hypertensive population, the burden of ED ranges from 75% to 85.1%, as opposed to 56.9% in the normotensive population [2, 6]. Similarly, the prevalence of ED among the diabetic population ranges from 35-75% versus 26% in the general population. Furthermore, ED occurs 10-15 years earlier among diabetes patients versus the general population [7].

The correlation between ED, hypertension, and diabetes can be explained by the vascular and neurogenic pathways of erection physiology [7]. The explanation is further strengthened by the relationship between ED and other cardiovascular risk factors. For instance, smoking, obesity, and dyslipidemia have all been linked to erectile dysfunction at varying degrees [8-10]. Similarly, other chronic medical conditions of cardiovascular etiology have also been linked to erectile dysfunction. These include chronic kidney disease, heart failure, and ischemic heart disease [11-12].

Apart from the family and medical problems associated with erectile dysfunction, it has also been shown to affect the productivity of men experiencing it, leading to economic losses for their employers [13]. There is also an associated decline in mental health and quality of life after a diagnosis of ED [13].

In Nigeria, erectile dysfunction is thought to be underreported and shrouded in shame [3]. Few patients present with self-reported ED. The main reasons are shame, ignorance of where to seek help and cultural beliefs. Furthermore, few clinicians routinely screen for ED [14]. However, patients are not ashamed or ignorant of cardiovascular risk factors like alcohol, smoking, overweight, hypertension, and diabetes. Hence, we sought to establish if these factors are associated with ED in our environment and can become indicators for screening for ED.

METHODS

Study site: The study was carried out at the National Health Insurance Out-patient clinic of Federal Medical Centre Makurdi, Benue State, Nigeria.

Study population: This was an analytical cross-sectional study of 243 men

Sample size calculation: Using the Cochrane formula for cross-sectional studies with a previous prevalence of erectile dysfunction of (P) 80.8% [5] and 95% confidence, hence Z=1.96 and d=5%

$n=Z^2 P(1-P)/d^2$ = 235 men (however, 243 persons were included in the study)

Sampling technique: Men attending the clinic were recruited by systematic random sampling over a three-month period. A sample frame of approximately 1,200 men was obtained from hospital records; hence, a sampling interval of 5 was obtained (1200/235).

Eligibility criteria: All sexually active men who are 18 years and above and sexually active were included in the study. Men who had taken an erection-enhancing medication in the preceding 5 days were excluded. Patients who have a psychiatric illness or are incapable of giving consent were also excluded.

Data collection: Data was collected using a semi-structured questionnaire consisting of 3 sections. Section 1 received data on bio-social demographics, including age, marital status, and educational status. Other included a history of smoking (which shall be documented as Yes or No), a history of alcohol consumption (as Yes or No), and an estimate of the units consumed per week. Section 2 contained the International Index for Erectile Function-5 questionnaire. The IIEF-5 consists of 5 questions on a 5-point Likert scale graded 1-5. Hence it generates scores that range from 5-25. Erectile dysfunction is categorized as severe (5-7), moderate (8-11), mild to moderate (12-16), mild (17-21) and no ED (22-25). However, for in this study, it was graded as ED (5-16) and no ED (17-25). Section 3 contained records of blood pressure, height, weight, and thus body mass index (BMI). These shall be measured as described below. Blood pressure (BP) was measured using a mercury sphygmomanometer (placing a finger breath above the cubital fossa) and a stethoscope. Systolic BP was the value corresponding to the first Korotkoff sound, while diastolic BP was the value at the 5th Korotkoff sound. Blood pressures were taken while the patient was sitting comfortably with both feet on the ground and back rested in the chair. This was after the patient had rested for at least 10 minutes after arriving at the clinic. Weight was measured using a Z-160 health weighing scale placed on a flat surface. The patient's weight was taken when standing on the scale with both feet after objects deemed to increase his weight,

including shoes, phones, keys, wallets, and excess clothing, were removed. Weight was measured in kilograms to the nearest 0.5 kg. Height was measured using a stadiometer. The patient was required to remove his shoes and head gears and then stand upright with his back to the scale and heels together, and arms by the side. Height was measured in centimeters to the nearest 0.5 cm. Body mass index was calculated as the ratio of weight in kilograms to height in meters square.

Data Analysis: Data was analyzed using SPSS 20. Data was categorized, and frequencies were presented as proportions. Univariate associations with ED were calculated using Chi-square or Fisher exact as was appropriate. Logistic regressions were used to determine the independent association between ED and cardiovascular risk factors.

Ethical approval was sought from the Health Research and Ethical Committee of the Federal Medical Centre Makurdi (ref No: FMH/FMC/HREC/108/Vol 1). An informed consent was received from all participants before they were enrolled in the study. Patients' confidentiality was ensured throughout the study.

The study was funded by the authors. It involved the development and printing of questionnaires and data analysis. Data collection was done by two of the authors.

RESULTS

Two hundred and forty-three men were recruited over three months. Their socio-demographics are presented in Table 1, which shows that the majority of the participants were between 45-60 years old (123; 50.6%), married (232; 95.5%), and educated up to the tertiary level (198; 81.5%). Most did not smoke (223; 91.8%). However, 44.4% (108) took alcohol, and of these, 34 (14%) took alcohol at unsafe limits. Table 2 shows the clinical history and examination findings of participants. It showed approximately half (117; 48.1%) had hypertension, and 14.8% (36) had diabetes mellitus. Overweight and obesity were present in 66.7% (162) of participants. A similar picture was seen when measured by WHR. The majority (155; 63.8%) were either non-hypertensive or had controlled blood pressure. The prevalence of ED was 47.3% (115). Following univariate analysis, age, hypertension, diabetes, harmful alcohol use, and blood pressure were demonstrated to have a significant relationship with erectile dysfunction (Table 3). While educational status, smoking, and obesity were not. Following multivariate analysis, increasing age and harmful alcohol use were shown to be associated with erectile dysfunction (Table 4).

Table 1: Socio-demographic characteristics of participants (n=243)

Socio-demographic	Frequency	Percent
Age (in years)		
18-45	103	42.4
46-60	123	50.6
≥60	17	7.0
Mean=47.74±9.66		
Marital status		
Married	232	95.5
Single	11	4.5
Educational status		
Primary	7	2.9
Secondary	38	15.6
Tertiary	198	81.5
Smoke or Tobacco use		
Yes	20	8.2
No	223	91.8
Alcohol Consumption		
Yes	108	44.4
No	135	55.6
Safe Alcohol Intake (n=108)		
Safe	74	30.5
Unsafe	34	14.0

DISCUSSION

The effect of erectile dysfunction on the family unit, the mental health, and the economic productivity of its sufferers poses a grave challenge to the health of society. Sadly, however, 47.3% of the study participants had erectile dysfunction. This value excludes those categorized by IIEF-5 as mild and mild-to-moderate who were classified as no-ED by this study. Hence, the value is expected to be lower than the burden of ED reported by similarly structured hospital-based studies in Nigeria. For instance, Adebusoye et al. reported a prevalence of 55.1%, while Oyelade and colleagues reported a prevalence of 58.9% [15-16].

Table 2: Characteristics of participants (n=243)

Variables	Frequency	Percent
Hypertension		
Yes	117	48.1
No	126	51.9
Diabetes		
Yes	36	14.8
No	207	85.2
BMI		
Normal	81	33.3
Overweight	112	46.1
Obesity	50	20.6
Mean±SD=26.92±4.30		
WHR		
Normal	73	30.0
Obesity	170	70.0
Mean=0.93±0.06		
Blood pressure status		
Controlled	155	63.8
Uncontrolled	88	36.2

SD: Standard deviation

However, when the diagnostic classification used in this study was applied by Oladiji et al., they obtained a similar prevalence of ED of 46.9% [17]. On the contrary, Idung et al. demonstrated a lower burden in their study in Uyo, where they reported a prevalence of 41.5% [18]. The reason for this difference could not be ascertained.

Cardiovascular risk factors are thought to be associated with erectile dysfunction. More so, erection is linked to a healthy vascular response to psych-neural stimuli. The factors so thought of include increasing age, smoking, and harmful alcohol use. Others include diabetes, obesity, and hypertension. Their association with erectile dysfunction was hence tested in this study.

This study found that increasing age was a predictor of erectile dysfunction, and the relationship between age and ED persisted when other factors were adjusted for. This finding could result from the fact that increasing age is associated with vascular changes and chronic medical conditions that could affect the integrity of penile erection. This finding was also concurrent with reports by other studies in Nigeria and beyond [16, 18-20].

Hence, advanced age should be an indicator to screen for ED in a patient presenting to a primary caregiver. Similarly, unsafe alcohol consumption (defined as consumption of more than 14 units of alcohol per week) was found to be independently associated with erectile dysfunction. Hence, a social history of unsafe use of alcohol should prompt a physician to screen for ED, too. This finding was also confirmed by reports by Olugbenga-Bello et al. and Arackal et al. in Nigerian and Indian populations, respectively [20-21]. This could be due to the central nervous system's suppressive properties of alcohol, hence suppressing the neurogenic pathway of erection. Furthermore, harmful alcohol intake is demonstrated to suppress testosterone levels [22].

The other cardiovascular risk factors linked to erectile dysfunction in this study were diabetes mellitus and hypertension. Although the relation between ED and these factors (hypertension and diabetes) was lost when other factors were adjusted for, it does not erode the importance of screening for erectile dysfunction in patients with these diseases. The binary relationship between Hypertension, diabetes, and erectile dysfunction could not be unconnected to endothelial injury associated with hypertension and diabetes [23]. Hence, other studies have also demonstrated the relationship between erectile dysfunction and these chronic medical conditions [16, 18, 20]

Other cardiovascular risk factors, including obesity (estimated by body mass index and waist-hip ratio) and smoking, were not found to be associated with erectile dysfunction in this study. Though the reports on the relationship between ED and obesity are not consistent, the findings of this study are congruent with the findings by Abu et al. and Ezeude et al. [3, 24]. On the contrary, Skrypnik et al. reported a 1.5-3-fold increase in ED among overweight and obese men [9]. The differences in populations and methods used for these studies could have accounted for these differences. Similar inconsistency is observed in the reports on the relationship between smoking and ED. While Oyelade et al. found no relationship between ED and smoking (which is consistent with this study), Abu et al. reported a significant association between smoking and ED [3, 16].

Limitations: It is, however, worthy of note that this is a cross-sectional study where data on both dependent (ED) and independent variables (cardiovascular risk factors) were obtained

Table 3: Association between participants' characteristics and erectile dysfunction

Variable	Erectile Dysfunction		Test statistic	df	p-value
	Yes	No	χ^2		
	N (%)	N (%)			
Age (in years)			χ^2=27.00	2	<0.01*
18-45	29(28.2)	74(71.8)			
46-60	74(60.2)	49(39.8)			
≥60	12(70.6)	5(29.4)			
Marital status			χ^2=1.85		0.223
Married	112(48.3)	120(51.7)			
Single	3(27.3)	8(72.7)			
Educational status			Fisher's exact=3.18		0.215#
Primary	3(42.9)	4(57.1)			
Secondary	23(60.5)	15(39.5)			
Tertiary	89(44.9)	109(55.1)			
Smoke / Tobacco use			χ^2=0.06	1	0.803
Yes	10(50.0)	10(50.0)			
No	105(47.1)	118(52.9)			
Alcohol Consumption			χ^2=1.13	1	0.288
Yes	47(43.5)	61(56.5)			
No	68(50.4)	67(49.6)			
Safe Alcohol Intake (n=108)			χ^2=3.08	1	0.079
Safe	28(37.8)	46(62.2)			
Unsafe	19(55.9)	15(44.1)			
Hypertension			χ^2=12.28	1	<0.01*
Yes	69(59.0)	48(41.0)			
No	46(36.5)	80(63.5)			
Diabetes			χ^2=8.29	1	0.004*
Yes	25(69.4)	11(30.6)			
No	90(43.5)	117(56.5)			
BMI			χ^2=1.44	2	0.486
Normal	35(43.2)	46(56.8)			
Overweight	53(47.3)	59(52.7)			
Obesity	27(54.0)	23(46.0)			
WHR			χ^2=0.51	1	0.475
Normal	32(43.8)	41(56.2)			
Obesity	83(48.8)	87(51.2)			
Blood pressure status			χ^2=7.66	1	0.006*
Controlled	63(40.6)	92(59.4)			
Uncontrolled	52(59.1)	36(40.9)			

**Statistically Significant; #Fisher's exact reported; BMI: Body mass index; WHR:*

simultaneously; hence, the strength of causality as reported here is decreased. The study was among insured patients and excluded men without such social privileges. This reduces the capacity to generalize these results to the general population. In conclusion, The burden of erectile dysfunction is high in this environment and may likely be undiagnosed because of the social stigma associated with it in the environment. However, the presence of cardiovascular risk factors (advanced age, harmful alcohol use, diabetes, and hypertension) should increase the index of suspicion for ED, hence requiring screening for erectile dysfunction.

Table 4: Cardiovascular risk factors associated with erectile dysfunction

Variables	aOR	95% CI	p-value
Age (in years)			
18-45	0.04	0.00 – 0.54	0.014*
46-60	0.35	0.03 – 3.69	0.385
≥60 (RC)	1		
Safe Alcohol Intake (n=108)			
Safe	0.37	0.14 – 0.97	0.043*
Unsafe (RC)	1		
Hypertension			
Yes	0.98	0.33 – 2.93	0.982
No (RC)	1		
Diabetes			
Yes	1.98	0.44 – 9.00	0.368
No (RC)	1		
Blood pressure status			
Controlled	0.73	0.25 – 2.13	0.733
Uncontrolled	1		
(RC)			

**Statistically significant; RC= Reference category. The age category and unsafe alcohol intake were significantly associated with erectile dysfunction; CI=Confidence interval*

REFERENCES

1. NIH Consensus Conference. Impotence. NIH Consensus Development Panel on Impotence. JAMA 1993, 270, 83-90.
2. Ademola, C.O.; Alabi, K.M.; Odeigah, L.O.; Olafimihan, K.; Obalowu, I.A.; Bamidele, T.O. Erectile Dysfunction is Associated with Family Dysfunction Among Adult Hypertensive Patients in Family Medicine Clinic University of Ilorin Teaching Hospital Ilorin Kwara State, Nigeria. Niger J Fam Pract 2021, 12, 7-14
3. Abu, S.; Atim, T.; Ripiye, N. Prevalence of Erectile Dysfunction and Awareness of Its Treatment in Abuja, Nigeria. IJTD 2019, 37, 1-10.
4. Mulhall, J.P; Luo, X.; Zou, K.H.; Stecher, V.; Galaznik, A. Relationship between Age and Erectile Dysfunction Diagnosis or Treatment Using Real-world Observational Data in The USA. Int J Clin Pract 2016, 70, 1012-1018.
5. Shaeer, K.Z.; Osegbe, D.N.; Siddiqui, S.H.; Razzaque, A.; Glasser, D.B.; Jaguste, V. Prevalence of Erectile Dysfunction and Its Correlates among Men Attending Primary Care Clinics in Three Countries: Pakistan, Egypt, And Nigeria. Int J Impot Res 2003, 15, S8-14.
6. Fafiolu, A.S.; Adebayo, A.M.; Akande, T.O.; Akinboboye, O.O. Erectile Dysfunction among Male Hypertensives in a Tertiary Health Facility in South-West Nigeria. Glob J Health Sci 2014, 7, 154-160.
7. Neelima, V.C.; Steven, V.E. Diabetes and Erectile Dysfunction. Clin Diabetes 2001, 19, 45–47.
8. Kovac, J,R.; Labbate, C.; Ramasamy, R.; Tang, D.; Lipshultz, L.I. Effects of Cigarette Smoking on Erectile Dysfunction. Andrologia 2015, 47, 1087-1092.
9. Skrypnik, D.; Bogdański, P.; Musialik, K. [Obesity--Significant Risk Factor for Erectile Dysfunction in Men]. Pol Merkur Lekarski 2014, 36, 137-1341.
10. Vrentzos, G.E.; Paraskevas, K.I.; Mikhailidis, D.P. Dyslipidemia as a Risk Factor for Erectile Dysfunction. Curr Med Chem 2007, 14, 1765-1770.
11. Papadopoulou, E.; Varouktsi, A.; Lazaridis, A.; Boutari, C.; Doumas, M. Erectile Dysfunction in Chronic Kidney Disease: From Pathophysiology to Management. World J Nephrol 2015, 4, 379-387.
12. Ibrahim, A.; Ali, M.; Kiernan, T.J.; Stack, A.G. Erectile Dysfunction and Ischaemic Heart Disease. Eur Cardiol 2018, 13, 98-103
13. Elterman, D.S.; Bhattacharyya, S.K.; Mafilios, M.; Woodward, E.; Nitschelm, K.; Burnett, A.L. The Quality of Life and Economic Burden of Erectile Dysfunction. Res Rep Urol. 2021, 13, 79-86.
14. Irekpita, E.; Awe, O.; Salami, T.; Imomoh, P.; Oseni, T. Clinical, Cultural and Psychosocial Impediments to Self-Reporting of Erectile Dysfunction by Men in Edo State, Nigeria. Afr J Urol

2017, 23, 160-165
15. Adebusoye, L.A.; Olapade-olaopa, .O.E.; Ladipo, M.M.; Owoaje, ET. Prevalence and Correlates of Erectile Dysfunction among Primary Care Clinic Attendees in Nigeria. Glob J Health Sci 2012, 4, 107-117
16. Oyelade, B.O.; Jemilohun, A.C.; Aderibigbe, S.A. Prevalence of Erectile Dysfunction and Possible Risk Factors among Men of South-Western Nigeria: A Population Based Study. Pan Afr Med J 2016, 24 124. doi:10.11604/pamj.2016.24.124.8660
17. Oladiji, F.; Kayode, O.O.; Parakoyi, D.B. Influence of Socio-Demographic Characteristics on Prevalence of Erectile Dysfunction in Nigeria. Int J Impot Res 2013, 25, 18-23.
18. Idung, A.U.; Abasiubong, F.; Ukott, I.A.; Udoh, S.B.; Unadike, B.C. Prevalence and Risk Factors of Erectile Dysfunction in Niger Delta Region, Nigeria. Afr. Health Sci 2012, 12, 160 – 165
19. Moreira, E.D.; Jr.; Lbo, C.F.; Diament, A.; Nicolosi, A.; Glasser, D.B. Incidence of Erectile Dysfunction In Men 40 To 69 Years Old: Results from A Population-Based Cohort Study in Brazil. Urology 2003, 61, 431-436.
20. Olugbenga-Bello, A.I.; Adeoye, O.A.; Adeomi, A.A.; Olajide, A.O. Prevalence of Erectile Dysfunction (Ed) and Its Risk Factors among Adult Men in a Nigerian Community. Niger Postgrad Med J 2013, 20, 130-135
21. Arackal, B.S.; Benegal, V. Prevalence of Sexual Dysfunction in Male Subjects with Alcohol Dependence. Indian J Psychiatry 2007, 49, 109-112.
22. Sarkola, T.; Eriksson, C.J. Testosterone Increases in Men after a Low Dose of Alcohol. Alcohol Clin Exp Res 2003, 27, 682-685.
23. Yang, C.C.; Liao, P.H.; Cheng, Y.H.; Chien, C.Y.; Cheng. K.H.; Chien, C.T. Diabetes Associated with Hypertension Exacerbated Oxidative Stress-Mediated Inflammation, Apoptosis and Autophagy Leading to Erectile Dysfunction in Rats. J Chin Med Assoc 2022, 85, 346-357
24. Ezeude, C.; Ezeude, A.; Young, E.; Oguejiofor, O.; Bakari, A. Correlates of Erectile Dysfunction in Nigerian Men with Type 2 Diabetes Mellitus: Experience from a Tertiary Health Center. Journal of Diabetes Mellitus 2020, 10, 182-201. doi: 10.4236/jdm.2020.103015.