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An 'Unholy Triad': Coexistence of Symptoms Benign Prostatic Hyperplasia and Erectile Dysfunction in an Overweight/Obese Population

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Abstract

Obesity, benign prostatic hyperplasia (BPH) and erectile dysfunction (ED) are health care challenges with high prevalence rates globally and particularly in Nigeria. Though obesity is linked to BPH and ED, the coexistence of BPH and ED in an overweight/obese population of Nigerian males has not been studied. This study is an attempt at filling that vacuum. Two hundred and seventy four overweight/obese subjects were assessed for the presence of symptoms of BPH and ED using the International Prostate Symptom Score and the 5-item International Index for Erectile Function questionnaires respectively. The mean age of the subjects was 54 ± 11 years. Subjects with symptoms of BPH and ED were significantly ($P < 0.001$) older than 'healthy' subjects. A total of 32.2% and 80.3% of the population had symptoms of BPH and ED respectively. Both disorders increased in prevalence with age. As much as 24.1% of the population had BPH co-existing with ED in the same subject. Only 11.6% of the population were free from both symptoms. Overweight/obese subjects presenting with symptoms of BPH should also be assessed for ED, and vice-versa, as overweight/obesity, symptoms of BPH and ED are an unholy triad affecting a quarter of the studied population.

Keywords: Benign Prostatic Hyperplasia; Coexistence; Erectile Dysfunction; Obesity

Introduction

Overweight/obesity, defined by a body mass index (BMI) ≥ 25 kg/m^2, is currently one of the greatest public health challenges of the world. An estimated 2 billion people are already obese [1] and developing countries are disproportionately affected. In Nigeria for example, a recent study reported a prevalence of 20.7% for overweight/obesity in young adult Nigerians [2]. The challenge however is that obesity is associated with chronic cardiovascular and metabolic diseases, including prostatic diseases [3,4].

Though benign prostatic hyperplasia (BPH) is classically thought to be driven by age and steroid hormones, it is currently known that a significant chunk of the pathogenesis of BPH is driven by metabolic derangements. These derangements are often sequel to obesity and the systemic inflammation that comes with it [5]. Just like obesity, BPH is highly prevalent, affecting 25% of men in their 50s, 33% of men in their 60s, and 50% men in their 80s [6]. In Nigeria one in four men has symptoms of BPH [7]. Akin to BPH, erectile dysfunction (ED) is a major sexual dysfunction found in men [8]. It is also age-related and may affect obese men disproportionately. Approximately 50% of men older than 40 years have ED and it takes a toll on the quality of life of the sufferer and his partner [9]. In Nigeria, Shaeer *et al.* [10] had report-

ed a prevalence of 57.4% for mild to severe ED.

Given the rising prevalence of obesity in Nigeria and other countries, and the reports of its negative effects on men's health, and because there are no reports on the prevalence of both symptoms of BPH and ED in obese Nigerians, this study was designed to investigate the subject. It is hoped that the findings will improve the understanding of the relationships between these disorders, and therefore guide public health action for policy makers and clinicians.

Subjects and Methods

The protocol for the recruitment of the subjects and methods for this study have been exhaustively described in an earlier paper [11]. They are however represented below, albeit briefly.

Subjects

Male subjects (aged forty years and older) who gave informed consents were recruited within Umudike, Abia State, Nigeria. Those who had a BMI ≥ 25 kg/m^2 and were in a stable sexual relationship with one or more women were included in this study. Subjects were excluded from the study if they were illiterate or if they had obvious signs of morbidity other than obesity. A total of 274 subjects were ultimately recruited. The Board of the Department Of Biochemistry, Michael Okpara University of Agriculture, Umudike, approved the design and protocol for this study and they were guided by the Helsinki declaration. No honoraria were paid to the participants.

Methods

Self-reported age at last birthday was recorded for each subject. For convenience sake, they were grouped into age ranges *viz:* 40 to 49 years, 50 to 59 years, 60 to 69 years and 70 years or older. Heights, weights, waist and hip circumferences were measured following standard protocol and from these measurements, the BMI, waist-to-hip ratio (WHpR), and waist-to-height ratio (WHtR) of the subjects were calculated using standard internationally accepted equations.

The International Prostate Symptom Score (IPSS) index which has been shown that it is valid for use in Nigeria [7] was used to diagnose the clinical symptoms of BPH. Mild symptoms of BPH were defined by a symptom score of 0 to 7 points, moderate symptoms by a score of 8 to 19 points, and severe symptoms by score of 20 to 35 points. Subjects with moderate-to-severe symptoms were regarded as having lower urinary tract symptoms suggestive of BPH.

The 5-item International Index for Erectile Function (IIEF-5) [12] was used for the diagnosis of ED. ED was defined as IIEF scores of < 22 while scores of 22–25 represented normal erectile function. The severity of ED were defined as mild, moderate and severe if the IIEF scores were 12–21, 8–11, and 5–7 respectively. For both the IPSS and the IIEF-5 questionnaires, the subjects were asked to respond to the questions conscientiously.

Statistics

Descriptive statistical analysis was carried out on the data generated and differences between means separated by one-way ANOVA. The relationships between the scores for BPH and ED (each, on the one hand) and age and measures of obesity (BMI, WHpR and WHtR) on the other hand were assessed using Pearson's correlation coefficients and linear regression analysis. A significant threshold of $P \leq 0.05$ was fixed for all analyses. Data analyses were done using IBM-SPSS for windows, version 20 (IBM Corp., Atlanta, GA). The results are presented in Tables and Figures.

Results and Discussions

The mean age of the subjects was 54 years. Those who had symptoms of BPH were significantly ($P < 0.001$) older than those who did not (63 vs 50 years). Similarly those who had ED were significantly ($P < 0.001$) older than those who did not (57 vs 42 years). BMI was statistically similar ($P > 0.05$) irrespective of BPH or ED status. Both BPH and ED are known to increase in prevalence and severity with age [6,8,13, 14]. Ezeanyika *et al.* [7] and Fatusi *et al* [15]. Had also reported an age-related increase in the prevalence of BPH symptoms and ED, respectively, in Nigeria. This finding is therefore consistent with previous reports.

WHpR did not vary significantly by ED status, but those who had symptoms of BPH had significantly ($P < 0.05$) higher values compared to those who did not have the symptoms. Conversely, WHtR did not vary significantly by BPH status, but was significantly ($P < 0.05$) higher in those who did not have ED compared to those who had ED. Expectedly the IPSS and IIEF scores varied significantly depending on the presence or absence of the respective symptom (Table 1). WHpR is known to be a good indicator of visceral adiposity as against generalised obesity, and it is the visceral adipose tissue that is linked more to increased health risk [16]. Interestingly the adipose tissue is a site for the synthesis of factors that are thought to promote prostatic enlargement and therefore link obesity to BPH [5, 17]. However, correlation and regression data presented here do not show any strong and significant relationship between BPH and ED symptoms on the one hand, and measures of obesity on the other hand. The IPSS and IIEF scores correlated positively and negatively respectively, significantly with age but not with any of the measures of obesity (Table 2). Both were similarly associated with age. IPSS was weakly but significantly associated with WHpR (positively) and WHtR (negatively) (Table 3). This absence of a strong and significant relationship may be as a result of the small sample size for this study, and the absence of morbidly obese subjects in the study (mean BMI was within the overweight range, and mean WHpR was less than 1).

	Age	BMI	WHpR	WHtR	IPSS	IIEF-score
Yes BPH (N=91)	62.5±9.2	27.4±1.9	0.89±0.05	0.53±0.05	13.6±5.8	13.5±4.0
No BPH (N=183)	49.5±9.3	27.3±1.8	0.88±0.05	0.53±0.05	4.0±1.9	18.8±3.9
P	< 0.001	0.815	0.033	0.566	< 0.001	< 0.001
Yes ED (N=220)	56.7±10.3	27.3±1.8	0.88±0.05	0.53±0.05	8.2±6.0	15.5±3.9
No ED (N=54)	42.0±4.9	27.7±1.8	0.89±0.05	0.55±0.05	3.2±2.5	23.3±1.0
P	< 0.001	0.150	0.152	0.011	< 0.001	< 0.001
All (N=274)	53.8±11.1	27.3±1.8	0.88±0.05	0.53±0.05	7.2±5.8	17.0±4.7

Table 1. Some relevant characteristics of the subjects stratified based on their prostate symptom scores and erectile function status.

		Age	BMI	WHpR	WHtR
IPSS	r	.592	-.004	.114	-.014
	P	.000	.952	.059	.813
IIEF-score	r	-.740	.016	.036	.096
	P	.000	.798	.554	.113

Table 2. Correlations between measures of obesity and age on the one hand, and both IPSS and IIEF-scores on the other hand.

Dependent Var.	Independent Var.	β	t	*P*
IPSS	Age	0.584	12.041	< 0.001
(Adjusted R^2 = 0.360)	BMI	0.015	0.282	0.778
	WHpR	0.184	2.785	0.006
	WHtR	-0.144	-1.986	0.048
IIEF-score	Age	-0.739	-18.181	<0.001
(Adjusted R^2 = 0.550)	BMI	-0.030	-0.652	0.515
	WHpR	0.000	0.006	0.995
	WHtR	0.107	1.766	0.079

Table 3. Regressions of measures of obesity and age on the one hand, and both IPSS and IIEF-scores on the other hand.

BPH symptoms were found in 32.2% of the population, and increased in prevalence with age from 8% (in 40 to 49 year olds) to 77% (in 70+ year olds) (Figure 1). Again, the increase in the prevalence of BPH with age is consistent with earlier reports [6, 14]. However the prevalence of BPH symptoms reported here is considerably higher than reports from elsewhere. This is largely because of the high prevalence among the older population. To illustrate this, while Carter and Coffey [6] had reported BPH in 25% of men in their 50s, 33% of men in their 60s, and 50% men in their 80s, the prevalence in this population for the respective age brackets are 15.9%, 44.1% and 77.0%. Though methodological differences affect the comparison of data from different studies, it is clear that the disease burden in men older than 60 years who are overweight/obese is extraordinarily high.

Similar to the case with BPH, ED increased in prevalence from 40.8% (in 40 to 49 year olds) to 100% (in 70+ year olds), though the prevalence irrespective of age was 80.3% (Figure 1). Earlier reports gave a 57.4% prevalence of mild, moderate, or severe ED [10] and 43.8% (8.0% severe ED and 35.8% moderate ED) [15] in Nigeria. The observed increase in prevalence with age is consistent with previous studies in Nigeria and elsewhere. For example, Shaeer *et al.* [10] reported a 2-folds increase in the prevalence of ED from the 35-39 years age range to the 60-70 years age range, and Fatusi *et al.* [15] reported an increase in prevalence from 38.5% in the 31-40 years age range to 63.9% in the 61-70 years age range. Similar age-related increases in prevalence were reported for Egypt and Pakistan [10]. Findings from the Massachusetts Male Aging study show that 39% of 40 years old men had ED as against 67% of their 70 years old counterparts [8]. Similar findings have been reported in Spain [18]. It is also important to note that the prevalence of ED in this study was disproportionately higher in older men and this is apparently responsible for skewing the overall prevalence in this study. Again, the prevalence of mild ED reported in this study is considerable higher than the prevalence of moderate or severe ED. This too affected the overall prevalence figure presented here. It is nonetheless obvious that ED is highly prevalent in this obese population, especially among the older subset.

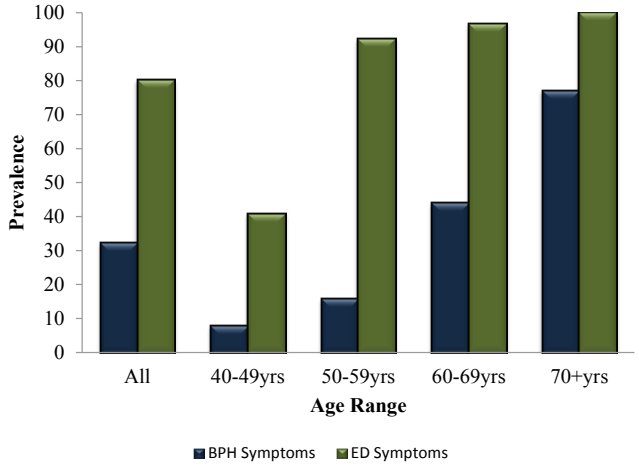

Figure 1. Prevalence of symptoms of BPH and erectile dysfunction in an overweight/obese population of adults.

Approximately one quarter of the population had BPH co-existing with ED in the same subject. As much as 56% of the subjects had only ED without concurrent BPH, while 8% of the population had just BPH symptoms without ED. Only 12% of the population were free from both symptoms of BPH and ED (Figure 2). Seftel *et al.* [19] after a systematic review of epidemiological data concluded that (a little) "less than one-third of middle-aged and older men in the general population have coexisting LUTS and ED, most men seeking treatment for either LUTS or ED have both conditions". Rosen *et al* [20]. Using the same instruments as was used for this study reported an association between BPH symptoms and ED. That association was also found in this study (data not shown). The coexistence of BPH and ED reported in this population is therefore not an isolated report, though it is the first in an obese population of Nigerians.

This study is limited by the small sample size and its inability to recruit morbidly obese subjects. However, given our pecu-

liar clime and the challenges of resources that researchers face in our environment, this is an important first step in investigating male sex related disorders that co-occur, especially in overweight/obese subjects. The findings presented here cannot fairly be extrapolated for all of Nigeria, as the subjects are representative of the Nigerian adult male population.

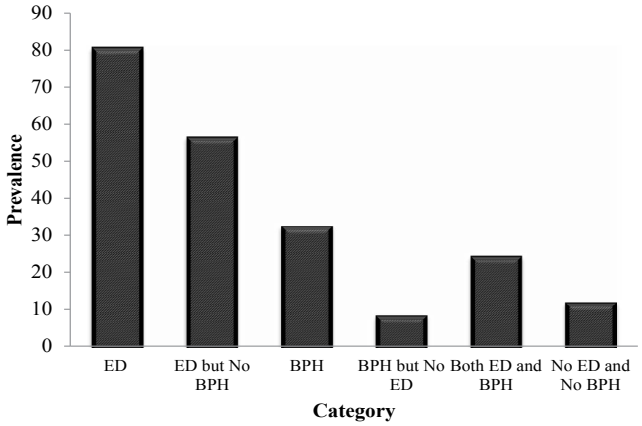

Figure 2. Distribution of symptoms of erectile dysfunction and BPH in the population.

In conclusion, this study investigated the coexistence of symptoms of BPH and ED in an overweight/obese population of adult Nigerians. BPH symptoms were found in 32.2% of the population while ED was found in 80.3%. Only 11.6% of the population had neither BPH nor ED, whereas both disorders coexisted in 24.1% of the population. Obese men who present with lower urinary tract symptoms suggestive of BPH should be screened for both disorders. Prostate health and erectile dysfunction should also be linked to public health messages targeting obese adult men. These recommendations are borne out of the finding that overweight/obesity, symptoms of BPH and ED are an unholy triad affecting a third of the studied population.

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Declaration

The author has no real or potential conflicts of interest to declare.

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