Relationship Between Obesity and Low Back Pain Among Adult Patients Attending the General Out-patient Clinic of a Tertiary Hospital in Makurdi, North-Central Nigeria: A Cross-Sectional Study

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ABSTRACT

Introduction: Low back pain and obesity are growing public health concerns that are attracting global attention with affectation of quality of life of many patients. Obesity has been considered to be associated with increased risk of many non-communicable medical conditions including low back pain. There is need therefore to assess the relationship between obesity and low back pain among adult patients at the general out-patient clinic of a tertiary hospital in Makurdi.

Method: A hospital-based cross-sectional study conducted among 392 patients aged 18 years and above at the General Outpatient Clinic of Benue State University Teaching Hospital, Makurdi. The participants were selected by systematic random sampling. Their socio-demographics, relevant low back pain history, Body Mass Index and Waist-Hip-Ratio were collected via a pre-tested, interviewer-administered questionnaire. Data were analysed with the Statistical Package for Social Sciences.

Results: The proportion of those with obesity was 25.3% and low back pain was 62%. Obesity had statistically significant association with low back pain; and together with age, marital status, level of education and occupation, were the independent predictors of low back pain.

Conclusion: More than 60% of the participants had low back pain and about a quarter were obese. Obesity was an independent predictor of low back pain. Primary care physicians should increase efforts at counselling patients on obesity and other predictors of low back pain.

Keywords: Association, Benue State, Low back pain, Makurdi, Obesity.

INTRODUCTION

Low back pain (LBP) is any pain between the 12th ribs and the buttock crease.[1,2] It is a highly prevalent health problem of significant public health importance globally and one of the most common musculoskeletal problems affecting the human race leading to disability worldwide.[3] According to the Global Burden of Disease 2010 study, low back pain ranked first as the cause of global disability and sixth in terms of the overall disease burden.[4] Approximately 80% of adults experience at least one episode of back pain during their lifetime.[5] The prevalence of back pain in the general population is as high as 50% or more in both developed and developing countries.[4] In Nigeria, the 2016 national point prevalence of low back pain ranged from 14.7% to 59.7%.[6]

Several factors such as age, gender, occupation, tobacco smoking, previous history of LBP, trauma, psychological disorder and obesity have been associated with its development and maintenance.[2,5,7,8]

The World Health Organization (WHO) defines Obesity as a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health.[9] Worldwide, obesity is increasing at an alarming rate making it the leading causes of preventable morbidity and mortality worldwide.[9,10] It is mostly classified in adults based on the body mass index (BMI) of 30 kilogram per metre square (kg/m^2) or more and/or a waist-hip ratio (WHR) of greater than 0.90 and 0.85 in men and women respectively.[11,12] In 2014, more than 1.9 billion adults aged 18 years and older were overweight. Of these, over 600 million were obese, representing about 13% of the world's adult population (11% of men and 15% of women).[9] In Nigeria, the prevalence ranged from 8.1%–22.2%.[13] In Benue state, North-Central Nigeria, a prevalence of 21.9% has been reported in adults.[14]

Generally, obesity has been found to increase the risk of many medical conditions, and these conditions such as musculoskeletal disorders can manifest in the form of low back pain (LBP).[9]

A positive association between obesity and LBP has been reported in some studies but not in others.[9] A meta-analysis of both cross-sectional and cohort studies by Rahman et al, as well as a study by Binwu et al, showed that overweight and obesity are associated with an increased risk of low back pain.[10,15] However, other studies have identified a weak or no association between obesity and low back pain.[2,7]

In South East Nigeria, Onyemkpa et al showed a significant association between BMI and LBP, while Ogunbode et al in South West Nigeria, found the highest proportion of LBP in those who were overweight, but there was no significant association between LBP and BMI.[8,6]

In Benue state, North Central Nigeria, where this study was conducted, to the best of the author's knowledge, the relationship between obesity and low back pain has not been examined. This formed one of the bases for this research.

This study was set out to determine the prevalence of obesity and LBP as well as assess the relationship between obesity and

low back pain in the study population. Understanding the roles obesity play in low back pain will help prevent its development and complications. This will invariably lead to improved well being and quality of life of patients and the society at large.

MATERIALS AND METHODS

This was a hospital-based cross-sectional analytical study conducted between December 2018 and April 2019 involving 392 patients aged 18 years and above who attended the General Outpatient Clinic of the Benue State University Teaching Hospital, Makurdi, for any reason, and were selected by systematic random sampling technique.

The minimum sample size (n) of 383 for the study was calculated using the Leslie and Kish formula for single proportion.[16]

n $=\frac{Z^2 pq}{d^2}$ with 46.8% estimated proportion of low back pain based on another study in Ibadan, Nigeria.[8]

However, since the entire population was less than 10,000, the required sample size was corrected to 356 using the formula below.[16]

nf $= \frac{n}{1+\frac{n}{N}}$ which was rounded off to the final sample size of 392 considering a 10% non-response rate. Adult patients aged 18years and above who gave consent to participate were recruited, while those who were too ill to participate, pregnant women, patients with ascites or oedema and those with spine deformity were excluded from the study. History of low back pain (any pain between the lowest (12th) ribs and the buttock crease) was obtained via face to face interview. Standard weighing scale "ZT-120 *health scale* was used for weight measurement in

kilogramme (kg), Stadiometer mounted on "ZT 120 *health scale* was used for height measurement in centimetre (cm), while a stretch-resistant tape measure was used to measure waist and hip circumferences in centimetre (cm).

Ethical clearance was obtained from the Ethical and Research Committee of BSUTH, Makurdi.

Data were collected using pretested semi-structured interviewer administered questionnaire, and analysed with the Statistical Package for Social Sciences (SPSS) version17 software.

Associations between categorical variables (e.g obesity versus LBP) were tested using the Chi-square and Fisher's exact test, while that of continuous variables (e.g mean WHR or BMI of two group) were tested using the t-test. Significant relationship between LBP and its risk factors were explored using logistic regression analysis. All analysis was done at a 5% level of significance, while the p-value of significance was set at 0.05.

RESULTS

The age range of the respondents was 18-81years. The mean age of the respondents was 41.6±1.33years. There was higher number of females (58.4%). More than 60% of the respondents were married. Slightly more than two-third of the respondents had tertiary education (n = 268, 68.4%). Civil servants had the highest proportion (38.0%). Tiv was the most predominant tribe (73.0%). The vast majority of the respondents were Christians (n = 386, 98.5%). Participants who earned above N100, 000 naira had the highest frequency (35.7%).

Table 1: **Socio-demographic characteristics of the respondents (n=392)**

Variable	Frequency	Percent
Age (in years)		
18-30	97	24.7
31-40	105	26.8
41-50	91	23.2
51-60	64	16.3
61-70	26	6.6
71-80	8	2.1
>80	1	0.3
Mean(SD) = 41.6 (1.33)		

Table no. 1 continued….		
Gender		
Male	163	41.6
Female	229	58.4
Marital status		
Single	96	24.5
Married	265	67.6
Separated	4	1.0
Divorced	3	0.8
Widowed	24	6.1
Highest Educational Level		
No formal education	14	3.6
Primary	28	7.1
Secondary	82	20.9
Tertiary	268	68.4
Occupation		
Professional	5	1.3
Civil servant	149	38.0
Retired	27	6.9
Farmer	53	13.5
Unemployed	27	6.9
Business executive	22	5.6
Student	59	15.0
Others×	50	12.8
Ethnicity		
Tiv	286	73.0
Idoma	46	11.7
Igede	16	4.1
Igbo	16	4.1
Hausa	2	0.5
Yoruba	7	1.8
Others××	19	4.8
Religion		
Christianity	386	98.5
Islam	6	1.5
Average family income per month in Naira (₦)		
Less than 18,000	26	6.6
18,000-58,999	127	32.4
59,000-99,999	99	25.3
100,000 and above	140	35.7
Others includes artisans **Others include Igala, Etulo etc.		

Table 2. Relevant low back pain history of the respondents

Variables	Frequency	Percent
History of low back pain		
Yes	243	62.0
No	149	38.0
Duration of pain (n = 243)		
<6 weeks	46	18.9
6 weeks – 3 months	138	56.8
> 3 months	59	24.3

More than half of the respondents had a history of low back pain (62.0%). One hundred and thirty eight of those with low back pain (56.8%) experienced between 6 weeks and 3 months of low back pain.

Table 3. Body mass index and Waist/hip ratio of the respondents

Variables	Frequency	Percent
Body mass index (BMI)		
Underweight (<18.5)	0	0
Normal (18.5-24.9)	151	38.5
Overweight (25-29.9)	142	36.2
Obese (≥30)	99	25.3
Mean (SD) = 27.29 (0.79)		
Waist/hip ratio (WHR)		
Normal	141	36.0
Obese	251	64.0
Mean (SD) =0.91 (0.48)		

There was no participant that was underweight (BMI<18.5). In terms of Body Mass Index, about a quarter of the respondents (25.3%) were obese.

Table 4. Comparison of means of BMI and WHR of low back pain vs no low back pain

Parameter	Low back pain	Number	Mean	p Value
BMI (kg/m^2)	YES	243	28.23±6.05	<0.001
	NO	149	25.76±5.13	
WHR	YES	243	0.91±0.10	0.831
	NO	149	0.92±0.67	

The mean BMI of respondents with low back pain was higher than those without low back pain (28.23 vs 25.76).

Table 5. Relationship between low back pain and BMI/WHR.

Variables	No low back pain n = (%)	Low back pain n = (%)	Chi-square	Df	p Value
Body mass index (BMI)					
Normal (18.5-24.9)	73 (45.3)	78 (48.3)	17.317	2	< 0.001
Overweight (25-29.9)	54 (38.0)	88 (62.0)			
Obese (≥30)	22 (22.2)	77 (77.8)			
Waist/hip ratio (WHR)					
Normal (141)	73 (51.8)	68 (48.2)	17.702	1	< 0.001
Obese (251)	76 (30.3)	175 (69.7)			

Obese respondents by both BMI and WHR had higher prevalence of low back pain (77.8%, n = 99, 69.7 %, n = 251).

Table 6. Logistic regression model of independent variables predicting low back pain

Variables	Adjusted odds ratio (aOR)	95% Confidence Interval (C.I.)	p Value
Age (in years)			
18-30	1		
31-40	2.708	1.527 – 4.804	<0.001
41-50	6.005	3.184 – 11.327	<0.001
51-60	10.969	4.946 – 24.326	<0.001
61-70	11.172	3.550 – 35.154	<0.001
71-80	6.094	1.164 – 31.900	0.032
>80	403458991.3	403458991.3– 403458991.3	<0.001
Gender			
Male	1		
Female	1.048	0.693 – 1.5984	0.826
Marital status			
Single	1		
Married	6.240	3.717 – 10.474	<0.001
Separated	7.667	0.764 – 76.967	0.083
		5211966231.5– 5211966231.5	
Divorced	5211966231.5	6.183 – 127.808	<0.001
Widowed	28.111		<0.001
Highest Educational Level			
No formal education	5.090	1.118 – 23.181	0.035
Primary	5.090	1.719 – 15.069	0.003
Secondary	2.630	1.505 – 4.596	0.001
Tertiary	1		
Occupation			
Professional	0.375	0.057 – 2.458	0.307
Civil servant	1.221	0.623 – 2.393	0.561
Retired	1.969	0.672 – 5.771	0.217
Farmer	5.400	1.821 – 16.015	0.002
Unemployed	0.522	0.202 – 1.351	0.180
Business executive	0.813	0.291 – 2.270	0.692
Student	0.144	0.061 – 0.339	<0.001
Others	1		
Ethnicity			
Tiv	1		
Idoma	1.104	0.575 – 2.120	0.766
Igede	0.589	0.215 – 1.615	0.304
Igbo	0.757	0.274 – 2.092	0.592
Hausa	102557088.3	102557088.3– 102557088.3	<0.001
		0.172 – 3.576	
Yoruba	0.785	0.258 – 1.662	0.755
Others	0.654		0.372
Religion			
Christianity	0.322	0.037 – 2.780	0.303
Islam	1		
Body mass index (BMI)			
Normal (18.5-24.9)	1		
Overweight (25-29.9)	1.525	0.958 – 2.429	0.076
Obese (≥30)	3.276	1.850 – 5.800	<0.001
Waist/hip ratio (WHR)			
Normal	1		
Obese	2.472	1.614 – 3.785	<0.001

Those aged 31years and above were more likely to have low back pain. Women were more slightly likely to have low back pain when compared to males. Being married had a higher likelihood of having low back pain with reference to being single. Respondents without tertiary education had a higher likelihood of having low back pain. Farmers were five times likely to have low back pain than those in other occupation (aOR = 5.400, CI = 1.821-16.015, p = 0.002). With reference to respondents with normal BMI/WHR, those with obesity were more likely to have low back pain and it was statistically significant (p<0.001).

DISCUSSION
The age range of the respondents was 18-81 years, and the mean age was 41.46±1.33 years. The mean age of the respondents could be attributed to the study location which is a state capital inhabited mostly by civil servants who fall within this mean age. The mean age was a bit lower when compared to the observation by Omoke et al.[13] The difference could have resulted from the different study designs. Majority of the respondents were in the 31-40 year age group (26.8%). This type of peak age incidence was also seen in Enugu, Nigeria.[17] The dominance of this age group in these studies may be descriptive of the demographics of a developing country like Nigeria with a young or growing population. In this study, the male to female ratio was 1:1.4. This conforms to findings in Enugu, Nigeria with more females than males in a ratio of 1.5:1.[17] The female preponderance could be due to their better health-seeking behaviour compared to males.

The prevalence of low back pain among the respondents in this study was 62.0% which was within the global prevalence of 30% - 80% by Morris and colleague.[18] It also aligns with the national prevalence of 14.7% to 59.7% documented by Bello and colleagues in Nigeria.[7] The prevalence of obesity in the present study was 25.3%. This figure is higher than the national prevalence of 8.1%-22.2% reported by Chukwuonye and colleagues in a systematic review of articles on obesity from online databases.[13] The systematic design of the national study could have accounted for the difference. Other local studies have also reported lower prevalence of obesity compared to the prevalence found in the present study.[5,19-22] These are mainly studies done in rural areas with less sedentary lifestyle. Higher prevalence rates have been reported in developed nations compared to this study.[23,24] These higher findings may be as a result of increased consumption of high calorie diets and sedentary lifestyle in these countries.

Obesity had statistically significant association with low back pain in this study. Obese respondents had the highest prevalence of low back pain, and were more likely to have low back pain than those with normal BMI/WHR. This is in consonance with several local and international studies.[25-32] These findings could be because increase in body weight leads to increased wear and tear on disc and joints, leading to pain. It could also be as a result of the metabolic effect of obesity on joints. However, this differs with results from Tunisia and Kosovo which reported no such association.[2,3] Different study designs and socio-demographics could have accounted for this observation.

CONCLUSION
This study found a high prevalence of obesity and low back pain of 25.3% and 62% respectively in Makurdi, Benue state. Obesity as well as the respondents' age, marital status, level of education and occupation (farming) showed statistically significant association with LBP. Findings from this study should serve as basis for future longitudinal studies to ascertain the temporal relationship between obesity and low back pain.

Recommendation: Primary care physicians and indeed all clinicians should increase effort at counselling and creating awareness of the general population on the identified factors of low back pain, especially the modifiable factors like obesity.

Limitations: This was a hospital-based study; thus, the findings might not be a complete representation of what may be obtainable in the general population. Also, this study, like other cross-sectional studies where exposures and outcomes are measured at the same time, has inherent weakness or difficulty in ascertaining temporal relationship. The subjective rather than objective assessment of low back pain in this study is another limitation.

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