

Obesity indices as predictors of pattern of self-reported arthritis among elderly women in Southwestern Nigeria

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Abstract

Objectives: This study assessed obesity indices and pattern of arthritis among elderly women in Osun State, Southwestern Nigeria.

Methods: The cross-sectional descriptive study was carried out among 350 elderly women selected by multistage sampling technique. Research instruments used in data collection were semi-structured, interviewer-administered pre-tested questionnaires that were analyzed using the Statistical Package for Social Sciences software version 17.0.

Results: The mean age of the participants was 69.1 (± 1.4) years. A total of 232 (66.3%) of them had complaints of joint pains (*Awoka* as expressed in the local language). Pattern of arthritis showed that 172 (74.0%) had recurrent joint pains, while 35 (15.1%) had joint swelling; the knee joint was mostly affected. A total of 97 (28.0%) were overweight while 84 (24.0%) were obese. Obese women were twice more likely to have arthritis when compared to the nonobese (odds ratio: 2.4, 95% confidence interval: 1.8–9.4, $p = 0.001$).

Conclusion: There is a need to give high priority to weight reduction strategies targeted at the elderly and the entire population.

Keywords

Arthritis, body mass index, obesity, joint pains

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Introduction

The population of the elderly age group is increasing. This increasing number of people surviving into old age is a global occurrence affecting many countries around the world.¹ Many diseases are implicitly assumed to be associated with old age, as chronic medical illnesses are mostly present with increasing age. Many hospital-based studies have shown that arthritis is among the most common presentations among the elderly who are 65 years of age and older in Nigeria.^{2,3} In older age groups, the rapid increase in the prevalence suggests that arthritis, most especially osteoarthritis (OA), will have a significant impact on public health-care systems in the nearest future.⁴

Common presentations of arthritis are pain and functional impairment. Other common presenting complaints are bony and soft tissue swelling, early morning stiffness, stiffness related to inactivity and restricted range of movement.

Several research works have identified an association between obesity and certain types of arthritis. Obesity has been strongly linked to OA of the knee and to a lesser extent, the hip.^{5–7} In a study, obese respondents (body mass index

(BMI) ≥ 30.0 kg/m²) were 1.9 times more likely to report arthritis compared with normal-weight respondents (BMI < 25.0 kg/m²).⁸ Also, women with waist-to-hip ratios (WHRs) of more than 0.8 are at increased health risk because of their fat distribution. Since some of these risk factors are diet and lifestyle dependent, lifestyle modifications could be a way of reducing the effects of this arthritis. Arthritis and obesity are conditions of public health significance that are costly to the individual and the nation. This study offers baseline information for programs that target women who are overweight or obese, with the objective of decreasing the prevalence of arthritis, as well as provide insight into the

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reduction of morbidity associated with arthritis among the elderly population. The objective of this study is to assess some obesity indices (such as the BMI and WHR) as possible determinants of arthritis among elderly women in Osun State, Southwestern Nigeria.

Methods

This cross-sectional descriptive study was conducted in selected health facilities in Osogbo, the capital of Osun State in Southwestern Nigeria. The city has a teaching hospital, a general hospital, one comprehensive health center and six primary health centers. The teaching hospital's General Out-Patient Department (GOPD) runs a geriatric clinic once in a week on Tuesdays, while the general hospital runs its own geriatric clinic on Thursdays with a great majority of patients presenting with self-reported or referral long standing joint pains or "Rheumatism." The average number of female patients seen per clinic session in each of the hospitals is 40–45. The primary health-care facilities were excluded from the study because they do not run special geriatric clinics unlike the other two levels of health care (secondary and tertiary health-care facilities). Females who were 65 years of age and above were recruited for the study while male patients were excluded.

This study was carried out in the geriatric clinics of the general and teaching hospitals. Using Leslie-Kish formula for the estimation of sample size for a population greater than 10,000,⁹ and arthritis prevalence rate of 26.8% among the elderly from a previous study.¹⁰ At a standard Z value of 1.96, the precision (or margin of error) that 80% of area to the right or left of a z score on a standard normal curve was taken as a constant of 0.05. The calculated sample size of 301 was increased to 360 to account for possible attrition and nonresponse.

The number of respondents interviewed was based on equal allocation techniques among the various health facilities based on their clinic records/registers. On the geriatric clinic days, systematic sampling technique was used to select respondents. Based on the average number of female patients seen in each clinic session, a predetermined interval of 2 was used; hence, every other female patient who came to the clinic was recruited, and thus, an average of 20 patients were interviewed per clinic session of each hospital. Estimated sample size was exhausted after nine clinic sessions (9 weeks) in each selected hospital.

Research instrument

Research instrument used was a pre-tested, semi-structured, interviewer-administered questionnaire. Study variables included personal data of respondents, pattern of self-reported arthritis and measurements of weight, height, waist and hip circumferences. Questionnaire administration and body measurements were carried out by eight trained female

health research assistants. Questionnaire were translated into the respondents' native language (Yoruba) and later translated back into English. Pre-testing was carried out by two of the researchers listed in this study, by administration of 10 questionnaire in each of the two randomly selected geriatric clinics in neighboring Ibadan town in Oyo State which was not part of the original study area. Responses from the pre-testing exercise were used in modifying the questionnaire and clearing areas of ambiguity.

Assessment of arthritis was based on clinical ground or self-reported history of "Awoka" or "Rheumatism" associated with recurrent joint pains plus or minus similar joint swelling or stiffness. Weights were taken using calibrated weighing scale and results were expressed in kilograms. Heights were taken using a calibrated stadiometer and measurements reported in meters (to the nearest e.g. 0.1 m). BMI was calculated as weight divided by the square of the height. The waist circumference was measured at a level midway between the lowest rib and the iliac crest, and the hip circumference at the level of the greater trochanters with the legs closed together. The WHR was calculated as the waist circumference divided by the hip circumference.

Ethical clearance

Ethical clearance was obtained from the Institutional Review Board of Osun State University College of Health Sciences. Further permissions were obtained from the Medical Directors of the selected health facilities. Researchers also obtained written informed consent from each of the elderly subjects who took part in the study. Respondents were assured of the confidentiality of data collected.

Data management

Questionnaire were sorted out and manually checked for errors before entering data into the computer. The Statistical Package for Social Sciences (SPSS) software version 17.0 was used for data analysis. Relevant frequency distribution tables and summary indices were generated. The Chi-square test was used to demonstrate relationships between some categorical variables. Binary logistics regression model was used for analysis of some variables of interest in relation to occurrences of arthritis, with *p*-values set at ≤ 0.05 for all inferential analysis.

Results

A total of 350 completely filled questionnaires were returned giving a response rate of 97.2%. In total, 170 (48.6%) respondents belonged to the age group of 65–74 years, 100 (28.6%) were in the age group of 75–84 years, 78 (22.3%) were 85–94 years and only 2 (0.5%) were 95 years and above. Mean age of respondents was 69.1(± 1.4) years. A total of 222 (63.4%) of the respondents were housewives who were

Table 1. Socio-demographic data of respondents (N=350).

Variable	Frequency (n)	Percentage (%)
Age		
65–74	170	48.6
75–84	100	28.6
85–94	78	22.3
≥95	2	0.5
Level of education		
No formal	102	29.1
Primary	119	34.0
Secondary	80	22.9
Tertiary	49	14.0
Occupation		
Housewives	222	63.4
Trading	82	23.4
Retiree	46	13.2
Marital status		
Single	1	0.3
Married	156	44.6
Widow	189	54.0
Divorced/separated	4	1.1
Religion		
Christianity	167	47.7
Islam	183	52.3

never engaged in any form of income earning activities, 82 (23.4%) were engaged in petty trading while 46 (13.2%) had retired from government work and were being paid pension. One (0.3%) respondent was single, 156 (44.6%) were married and living with their partners, 189 (54.0%) were widows while 4 (1.1%) had been separated from their husbands (Table 1).

A total of 232 (66.3%) of the respondents had complaints of arthritis called “Awoka or Rheumatism” as expressed in the local language. Pattern of this arthritis showed that 172 (74.0%) had recurrent joint pains, 35 (15.1%) had joint swelling while 60 (25.7%) had joint stiffness or limitation in movement. Among the respondents with arthritis, 127 (54.8%) had their knee and hip joints affected, 59 (25.5%) had their knee joints only affected, 29 (12.4%) had the hip joints only affected while 17 (7.3%) had pains in their interphalangeal, metacarpal and metatarsal joints. Medical histories which may be associated with arthritis were also assessed among respondents with arthritis symptoms. A total of 48 (20.6%) of them had previous history of trauma to affected joints, 71 (30.7%) said arthritis or rheumatism runs in their family while 205 (88.3%) attributed it to walking long distances when younger. In total, 134 (58.0%) had been to the traditional bone healers for treatment, 139 (60.0%) were hypertensive and 7 (3.1%) were diabetic (Table 2).

In Table 3, mean weight of respondents was 63.4 (±1.7) kg, mean height was 1.50 (±2.9) m, mean waist circumference was 89.9 (±14.9) cm and mean hip circumference was 102.1 (±13.4) cm. Mean BMI was 27.0 (±8.0) kg/m², mean

Table 2. Pattern of arthritis among respondents.

Variable	Frequency (n)	Percentage (%)
Arthritis (n=350)		
Yes	232	66.3
No	118	33.7
Arthritis pattern (n=232 with multiple responses)		
Joint pains	172	74.0
Joint swellings	35	15.1
Joint stiffness	60	25.7
Parts of joint affected (n=232)		
Knee only	59	25.5
Hip only	29	12.4
Knee and hip joints	127	54.8
Others (phalangeal, tarsal joints)	17	7.3
Medical history (n=232 with multiple responses)		
Past history of trauma to affected joints	48	20.6
Positive family history of arthritis	71	30.7
Had normally walk long distance when younger	205	88.3
Had been to traditional healers for cure	134	58.0
Hypertensive	139	60.0
Diabetic	7	3.1

WHR was 0.9 (±0.09) and mean height-to-hip (HTH) ratio was 1.5 (±0.2). Figure 1 shows that 97 (28.0%) were overweight, 84 (24.0%) were obese while 169 (48.0%) were normal using BMI as indicator. A statistically significant association exists between having joint pains and age, having past history of trauma and BMI ($p < 0.05$).

Table 4 showed that a significant association was found between high BMI (overweight or obesity) and having arthritis, and between WHR > 0.8 and having arthritis ($p < 0.05$). A statistically significant association also exists between having arthritis and BMI, having WHR > 0.8 and having walked long distance frequently when young ($p < 0.05$). Meanwhile, none was found between HTH ratio and having arthritis ($p > 0.05$). On further analysis, obese women were two times more likely to have arthritis compared to the nonobese (odds ratio (OR): 2.4, 95% confidence interval (CI): 1.8–9.4, $p = 0.001$). Women with WHR > 0.8 are 1.5 times more likely to have arthritis compared to those with WHR < 0.8, although this observation was not statistically significant ($p = 0.065$). Those women who frequently walk long distances when young were about five times more likely to have arthritis compared to those who do not, and this observation was found to be statistically significant ($p = 0.002$).

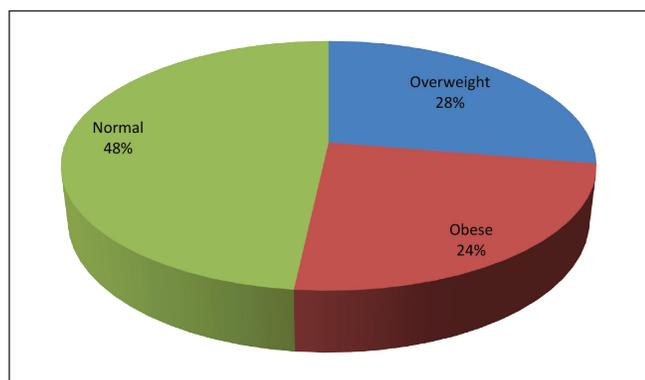
Discussion

Male clients were excluded because of established association of occurrence, distribution and severity of arthritis more with the female gender.¹¹ In this study, arthritis of the hip and

Table 3. Summary indices of anthropometric measurements of respondents.

Variables	Mean	SD
Weight (kg)	63.4	1.7
Height (m)	1.50	2.9
Waist circumference (cm)	89.9	14.9
Hip circumference (cm)	102.1	13.4
BMI (kg/m ²)	27.0	8.0
Waist-to-hip ratio	0.9	0.1
Height-to-hip ratio	1.5	0.2

SD: standard deviation; BMI: body mass index.

**Figure 1.** Classification of respondents' body weight using the body mass index.

knee is common among elderly women with about two-thirds of respondents having it. Almost three-quarters among the respondents with arthritis had joint pains limiting their movements mostly in the hips and knees, a quarter had joint stiffness and few (15.1%) had joint swelling. This is higher when compared to an American study in which only about one-quarter of respondents had self-reported arthritis.⁸ A higher figure of arthritis reported in this study could be as a result of higher morbidity reported among Nigerian elderly compared to the western world and other parts of the world. The population projection showed that there will be one billion elderly persons (≥ 65 years) in the world by 2020, and 71% of whom will live in low-income countries.¹²

Aging is a condition that is associated with disease and deteriorating health, as the elderly suffer from multiple pathologies.¹³ In a community-based study in Southwestern Nigeria,¹⁴ 59.4% of the elderly population studied had poor health. The main health problems were hypertension (29.0%), visual impairment (12.1%), cataracts (8.1%), OA (6.7%) and neurological problems (5.2%).³ OA is a common disease and a leading cause of disability affecting a number of populations above 60 years. Many hospital-based studies showed that arthritis is very common in Nigeria,² and in other parts of the world.^{4,5}

Table 4. Association between arthritis and selected obesity indices.

Bi-variate analysis for arthritis and some selected variables				
Variable		Presence of arthritis		Remarks
		Yes (%)	No (%)	
BMI	Underweight/normal weight	114 (33.4)	54 (15.8)	$df=2$, $\chi^2=13.81$, $p=0.001^a$
	Overweight	70 (20.5)	24 (7.0)	
	Obese	71 (20.8)	9 (2.5)	
WHR	<0.8	25 (7.2)	14 (4.0)	$df=1$, $\chi^2=1.98$, $p=0.028$
	≥ 0.8	230 (66.3)	78 (22.5)	
Height-to-hip ratio	<0.6			$df=1$, $\chi^2=1.609$, $p=0.205$
	≥ 0.6	207 (75.3)		
Age	65–74	144 (44.2)	61 (18.4)	$df=3$, $\chi^2=2.52$, $p=0.471$
	75–84	73 (22.4)	21 (6.4)	
	85 and above	20 (6.5)	8 (2.1)	
Occupation	Trading	183 (72.3)	70 (27.7)	$df=1$, $\chi^2=1.89$, $p=0.168$
	Housewife/dependant	4 (80.0)	1 (20.0)	
Frequently walked long distance when younger	Yes	229	83	$df=1$, $\chi^2=9.39$, $p=0.002^a$
	No	5	9	

Binary logistic regression model for arthritis and some selected variables

	Odds ratio	95% confidence interval		p-value
		Lower	Upper	
Overweight/obese (reference = normal weight)	2.4	0.30	0.81	0.001
WHR (reference <0.8)	0.6	0.29	1.22	0.085
Frequently walk long distance when young (reference = no)	4.9	1.61	5.24	0.002

BMI: body mass index; WHR: waist-to-hip ratio.

^aStatistically significant.

About one-quarter of the respondents in this study were overweight and another one-quarter were obese. These figures are high when compared to a similar study with an overall prevalence of overweight and obesity of 13.5% (95% CI: 9.7%–18.1%) and 4.7% (2.6%–8.0%), respectively.¹⁴ A higher prevalence figure may not be unconnected with changing lifestyles including high calorie intake, and lack of regular physical exercise at that age. This also supports a finding of self-reported hypertension and diabetes among respondents. Research has linked obesity to OA of the knee and the hip in cross-sectional and prospective studies.^{6,7} These findings call for weight reduction strategies and health education programs targeted at the elderly and women just completing their reproductive years of life.

In this study, obese women as indicated by BMI were two (2.4) times more likely to have arthritis compared to the non-obese. This finding agrees with another study in which obese respondents were 1.9 times more likely to report arthritis

compared with normal-weight respondents. The prevalence of arthritis increased significantly with age; other factors are mostly modifiable lifestyle factors, such as obesity and lack of physical activity. The increasing number of older people and the changes in lifestyle throughout the world, even in developing countries like ours mean that the burden on people and society will increase dramatically.¹⁵ The average BMI (27.0), WHR (0.9) and HTH (1.5) ratios in this study were higher than recommended, and this further reflects obesity status among studied respondents. The WHR has been used over time as a measure of the health of a person, and the risk of developing serious health conditions.

Women with WHR of more than 0.8 are at increased health risk of obesity and other predisposing diseases because of their fat distribution.^{16,17} Therefore, weight control may help delay the onset of arthritis. Given that body weight is modifiable gives us the opportunity to reduce the burden of arthritis. Our study results also support findings that programs that target women who are overweight or obese may have the greatest potential for decreasing the prevalence of arthritis.⁸

Study limitation includes the fact that the study does not further confirm diagnosis of arthritis through relatively costly investigations such as radiographic and hematological studies. In addition, since this study was based on patients' self report, we cannot entirely rule out some mis-diagnosis because, there are related conditions that are similar in presentation to arthritis and which may be confused with it. The traditional presentation being described as "Awoka" in the native or language is almost always synonymous with the presentation of arthritis. However, confounding diagnosis such as lumbar spondylosis or lower limb tendinitis cannot be ruled out as co-morbidities and hence study limitations. It is important to note that OA is part of the metabolic syndrome, with co-morbidities such as hypertension, diabetes and obesity. In addition, the cross-sectional nature of this study does not make provision for follow up of subjects over some years in order to ascertain other risk factors that could predispose to arthritis among the elderly population.

Conclusion

An appreciable proportion of elderly women studied are overweight and obese. This has been associated with a common presentation of self-reported arthritis as discovered among studied respondents. While the weight bearing joints were mostly affected, presentations were essentially in the form of recurrent joint pains, swelling and stiffness. There is a need to give high priority to weight reduction strategies targeted at the elderly women. Since these patterns among the elderly women could have emanated from events during childhood and middle age years, it is also important for stakeholders to lay emphasis on lifestyle modifications and weight reduction strategies among younger women and the entire population.

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Author contribution

The first author conceived the idea of the research and was involved throughout the research process. The second author was involved in methodology, data collection, analysis and write up while the third and fourth authors were involved in writing of results, discussions and wrap up.

Declaration of conflicting interests

The authors declare that there is no conflict of interest.

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