CORRELATES OF OBESITY AND FUNCTIONAL DISABILITY AMONG SENIOR CITIZENS AT USMANU DANFODIO UNIVERSITY TEACHING HOSPITAL, SOKOTO EXPERIENCE.

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Abstract

Background: The study assessed the relationship between obesity and functional disability in elderly.
Materials and method: A descriptive sectional study was conducted at Usmanu Danfodiyo University Teaching Hospital. Systemic sampling technique was employed and structured interviewer administered questionnaire was administered among 319 participants. Data was collected on socio-demographics, functionality, assessment and anthropometrics (weight and height and BMI) of the respondents were also taken. Data was analyzed using IBM SPSS version 21 statistical software.
Results: The mean age of the respondents was 65.9 ± 6.7. There was a statistically significant relationship between obesity and ADL disability (0.001).The prevalence of obesity was 17.6% with majority having obesity class 1(11.3).
Conclusions: Obese elderly have twice the risk of having disability in self-care. Therefore, it needs to be tackled for prevention and management of disability in elderly.

Keywords: obesity, disability, senior citizens , elderly

Introduction

The rise in life expectancy brought an increased prevalence of chronic diseases such as obesity, which, besides its known impact on health, causes significant decrease in quality of life and functional independence of individuals.[1] Obesity is defined as unhealthy excess of body fat which increases the risk of medical illnesses and premature mortality.[2] It is a worldwide health problem in all stages of life and considered one of the major causes of onset and severity of chronic diseases. Although, epidemiological texts disapproved the use of body mass index (BMI) as a guide of obesity, however, it remains useful in the assessment of obesity in clinical and general trial.[3] The recent increase in the prevalence of obesity in elderly made it considered as one of the most serious public health challenges worldwide.[4]

Global prevalence of obesity among elderly revealed the highest prevalence in South-Africa (49%) with 11 % having obesity class 3.[5] This is followed by Poland (35.3%), Russia (34.5%) and Spain (31.9%).[5] An estimate of 33.6% was reported among elderly Americans, in the best-case estimate to 39.6% in the worst-case estimate.[6] United Kingdom had prevalence of 25% and 18% among women and men respectively, aged 60-74 years and 12% among those over 75 years of age.[7] A study in Egypt reported 20.3% prevalence of obesity among older adults.[8] Asia has the lowest prevalence of 25% and 5.8% in India and China respectively.[5]

Regarding functionality, the limited mobility increases progressively with increasing body mass index (BMI) above 30 kg/m^2.[1] Obese elderly over the age 70 years have a high incidence of functional limitation and the risk of institutionalization in elderly patients with BMI ≥35 kg/m^2 is significantly higher.[1] The obese elderly are also likely to have functional limitations because of decreased muscle mass and strength, increased joint dysfunction, disabilities in activities of daily living, frailty, chronic pain, and impaired quality of life.[9] Unintentional injuries such as sprains and strains occur more often.[10] Obesity in this population, particularly its visceral component, is associated with higher incidence of a syndrome called sarcopenia, characterized by progressive and generalized loss of muscle mass and strength, increasing the risk of disability, worse quality of life and therefore, reduced expectations of life.[11] In this matter, the benefits of weight loss in the elderly include the improved functional capacity and ability to do activities of daily living, and reduced musculoskeletal co-morbidities.[10] The intentional loss of weight, in turn, can cause an improvement of functional capacity, running speed, strength and balance in obese elderly.[11] On the other hand, massive weight loss in the elderly is associated with some risks that include loss of muscle mass, loss of bone mineral density, osteoporosis and increased risk of fractures.[10] The optimal weight maintenance should address improvement in obesity related co-morbidities (including functionality), an overall reduction in medication requirements, but minimizing the risks of massive weight loss.[10]

Other obesity-related disorders are increased risk of heart failure, osteoarthritis, pulmonary dysfunction including the obesity hypoventilation syndrome and obstructive sleep apnoea syndrome, certain cancer types, reduced cognitive skills, sexual dysfunction, and urinary incontinence.[6,10] Obesity may also contribute to cataract formation and the progression of age-related macular degeneration.[6]

Obesity is an important risk for frailty either through increased levels of inflammatory markers or through sarcopenia.[10] Obesity can have a beneficial effect (through the endocrine effects of insulin, leptin, and oestrogens on stimulating bone growth and inhibiting bone remodeling) that can result in preserved or higher bone mineral density, a lower risk of osteoporosis and hip fractures, and a cushioning effect of fat around the trochanter that can provide protection against hip fracture during a fall.[10] The health complications may arise directly from obesity itself or mediated by other associated factors such as chronic low-grade inflammation or even vitamin D insufficiency.[10] Although obesity is generally associated with increased risk of morbidity and mortality,[10,12] However, there are continuing debates whether obesity is so harmful in the elderly since the relative increase in mortality is less in older than in younger adults and 'ideal' body weight based on mortality is with BMI 25–29.9 kg/m2.[1]

Materials and method

It was a descriptive cross-sectional study, conducted at the General outpatient Clinic (GOPC) of Usmanu Danfodiyo University, Sokoto (UDUTH). We assessed the relationship between obesity functional disabilities in elderly patients attending the clinic. UDUTH is an institution for tertiary health care delivery, training and research. The hospital has a 700-bed capacity, serves Sokoto State and neighboring Kebbi, Niger and Zamfara States, as well as parts of Niger Republic.

Sample size was estimated from the record average number of elderly patients seen in the clinic per annum and prevalence of disability from a previous study. They were substituted in the formula used for cross-sectional study to achieve the sample size of 319. All patients ≥ 60 years attending the clinic and consented to participate in the study were enrolled and we excluded those who were acutely ill and those with hearing or mental impairment. Eligible participants were selected using systematic random sampling. In this study, 60 years was used as the definition of elderly as it is the retirement age in Nigeria which also coincides with the United Nation (UN) definition of elderly person.[13,14]

Data was collected with a structured, pretested, interviewer administered questionnaire for information on the socio-demographics. Functionality was assessed with Katz and Lawton tools and BMI was calculated from anthropometrics.

Variables

Weight measurement

Weight was measured using a standard pendulum weighing scale made by GZ Company, England, calibrated in kilogram with attached stadiometer calibrated in meters after being pretested and corrected for zero error. The subjects were minimally clothed (without shoes, veils, caps, heavy wears, and their pockets were emptied). Weight was measured to the nearest 0.1 kg.

Height

In measuring height, the subjects were made to stand erect looking straight on a leveled surface with heels together and toes apart, at full inspiration. Stadiometer was adjusted to the top level of the head and height was read to the nearest 0.1 cm.

Body mass index (BMI) calculation

Body mass index was calculated as weight in kg divided by height in meter square (kg/m^2). According to WHO, BMI of < 18.5 kg/m^2 signifies underweight, 18.5- 24.9 kg/m^2 (normal weight), overweight was defined as BMI 25.0 - 29.9 kg/m^{2}and obesity as BMI ≥ 30.0 kg/m^2. BMI of 30.0-34.9 kg/m^2 (class I obesity), 35.0-39.9 kg/m^2 (class II obesity), ≥40.0 kg/m^2 (class III obesity).[2] However, BMI ≥30.0 kg/m^2 was used in this study to define obesity.

Functionality

Functional status was assessed using scales for evaluation of activities of daily living (ADL) and Instrumental activities of daily living (IADL). The evaluated ADL are eating, transfer to and out of bed, continence, dressing and bathing.[15] Instrumental activities of daily living are cooking, cleaning, phoning, shopping, and coping with transport, finances, and use of medication.[17] In these functional status assessment protocols, subjects were given 1 point if they were totally independent and 0 if assistance was sought in performing any component of ADL, according to the Katz index of independence in activities of daily living. They were also scored 1 or 0 based on their highest level of function according to the Lawtons-brody's instrumental activities of daily living.[16]

Data was collected, checked, cleaned and entered into the computer. Analysis of the data was made using the statistical package for social sciences (SPSS version 21). Quantitative and qualitative data were presented using charts and tables for frequencies and percentages of the variables. The level of significance was set at p- value < 0.05. Chi–square test was used to compare differences between proportions. Binary logistic regression analysis was used to examine relationships between the variables.

Results

4.1 RELATIONSHIP BETWEEN OBESITY AND SOCIO-DEMOGRAPHIC PARAMETERS OF THE RESPONDENTS

Table 1 showed the relationship between obesity and socio-demographic parameters. Education was the only socio-demographic variable with a statistical significant association with obesity (p=0.002).

Table 1: Showing the socio-demographic parameters of the respondents.

Variable	Non obese (%)	Obese (%)	χ^2	P value
Age (years)				
60-74	230 (87.5)	53 (94.6)	2.384	0.088
≥75	33(12.5	3 (5.4)		
Sex				
Male	143 (54.4)	24 (42.9)	2.454	0.117
Female	120(45.6)	32 (57.1)		
Marital status				
Married	192 (73.0)	45 (80.4)	1.307	0.253
Unmarried	71 (27.0)	11 (19.6)		
Family size				
≤5	60 (22.8)	14 (25.0)	0.124	0.725
≥5	203 (77.2)	42 (75.0)		

Family support				
With immediate family	257 (97.7)	56(100.0)	1.302	0.311
With other relatives	6 (2.3)	0 (0.0)		
Living condition				
With immediate family	258 (98.1)	56 (100.0)	1.092	0.298
With other relatives	5 (1.9)	0 (0.0)		
Occupation				
Unemployed	69 (26.2)	17 (30.4)	0.0398	0.528
Employed	194 (73.8)	39 (69.6)		
Education				
Informal	217 (82.5)	36 (64,3)	9.398	0.003
Formal	46 (17.5)	20 (35.7)		
Income				
<1800	175 (66.5)	37 (66.1)	0.005	0.531
≥1800	88 (33.5)	19 (33.9)		

Chi-square test

4.2.2 Prevalence of obesity among the respondents

Figure 1 showing the prevalence of obesity among the respondents. Only 17.6% of the respondents had obesity. The remaining 82.4% were either normal, over or under weight.

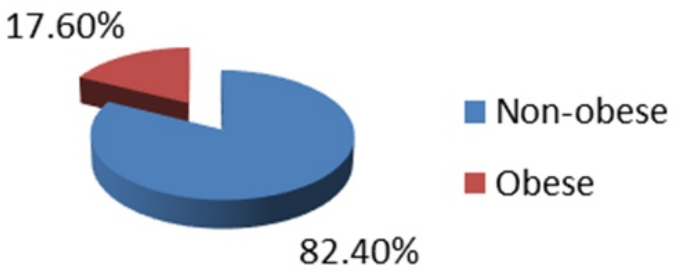

Figure 1 Prevalence of obesity among the respondents

Weight Proportion and Prevalence of Obesity Among The Respondents

Weight proportion among the respondents

Figure 2: Showing the weight of the respondents according to their BMI. About half of the respondents (49.5%) have normal weight, (23.5%) were overweight; 11.3% and 4.7% have obesity class 1 and 2 respectively. Only 1.6 % of the respondents were morbidly obese and 9.4% were underweight.

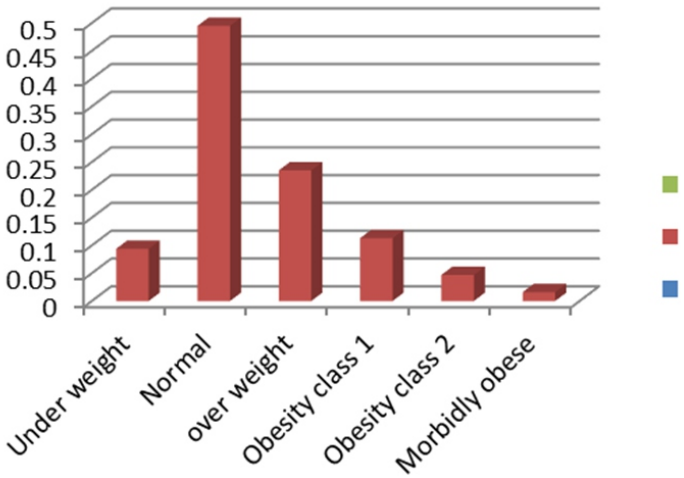

Figure 2 weight proportion among the respondents

RELATIONSHIP BETWEEN OBESITY AND FUNCTIONAL DISABILITY

Relationship between obesity and functional disability in ADL

Table 2 showed the relationship between obesity and functional ability in ADL. More than two third (76.4%) of the non-obese and 60.7% of the obese respondents were functionally independent in performing ADL. In addition, 39.3% of the obese and 23.6%of the non-obese respondents have disability in ADL. There was a statistically significant relationship between obesity and functional disability in elderly (P value 0.015).

Table 2: Relationship between obesity and functional ability in ADL

Variables	Independent Frequency (%)	Dependent Frequency (%)	χ^2	P value
BMI				
Non obese	201 (76.4)	62 (23.6)	5.875	0.015
Obese	34 (60.7)	22 (39.3)		

X^2– Chi square"

4.3.2 RELATIONSHIP BETWEEN OBESITY AND FUNCTIONALABILITY IN IADL

Table 3 showed the relationship between obesity and functional ability in IADL. Among the respondents, 40.3% of the obese and 35.7% of the non-obese elderly have good IADL functions. However, 64.3% of the obese and 59.7% of the non-obese have functional disability in IADL. Although, the study found no statistically significant relationship between obesity and functional ability in instrumental activities in daily living (P=0.523).

Table 3: Relationship between obesity and functional disability in IADL

Variables	Independent Frequency (%)	Dependent Frequency (%)	χ^2	P value
BMI				
Non obese	106 (40.3)	157 (59.7)	0.407	0.523
Obese	20 (35.7)	36 (64.3)		

X^2– Chi square test:

Discussion

The study has shown 17.6 % prevalence of obesity among the respondents with 11.3% of them having obesity class 1. The remaining 4.7% and 1.3% had obesity class 2 and 3 respectively. These values were much lower than 37% and 30% reported from USA in 2011and Europe in 2015 respectively.[17,18]. Similarly, it was lower than the figures reported from Russia, Portland, Spain, Egypt and South-Africa.[5] However, the parameters used in assessing obesity and the modal ages of the respondents as old-old and oldest old were dominant in the previous studies. Conversely, the finding was much higher than 2.5 % and 5.8 % reported from India and China respectively.[5] These may not be unconnected with the lifestyles and economic development of the countries studies, as lowest prevalence of obese elderly had been reported in Asia with high prevalence of underweight elderly in india.[5,19] However, these may be related to over population, unemployment and poverty

among Indians.

Surprisingly, the prevalence of obesity found in this study was similar to that reported in the south-Eastern part of Nigeria and it was much lower than the 64% reported from South-west Nigeria.[20,21,22.] Unfortunately, the study populations were different, as general adult population ≥ 18 years were used in the previous studies.

The age group 60-74 years were found to have the highest prevalence (94.6%), with lower prevalence among those over 75 years of age (5.4%), in conformity with a study from Mansoura city, Egypt.[23] Thus, explained the disproportional relationship between obesity and age-related loss of muscle mass and osteoporosis.[3,24,25]

There was no statistical relationship between obesity and gender in this study, contrary to the studies in Ghana and Egypt that reported higher prevalence of obesity among females.[26,27] However, a study reported more tendency to store fat during postprandial period in women, even when they eat a low-calorie diet.[11] Yet, another author attributed it with differences in physical activity and changes in the energy density of diet.[10]

The study showed a statistically significant relationship between obesity and level of education (P=0.002). Elderly with formal education were two times more obese that those without formal education. It was noted that the uneducated elderly in the study are more engaged in manual labour and farming activities that the educated group. In addition, complications of chronic illnesses are commoner among the uneducated people due to poor health seeking behaviours. [28,29] Thus, the study was in variance with the study in Singapore which reported low level of education as a risk factor for obesity.[30] Similarly, it was also in disagreement with another literature which reported no statistical relationship between obesity and level of education.[3] Differences in diet, lifestyle and economic state among the countries could be responsible for the differences.

There was no statistical relationship between marital status, family size, family support income and obesity in this study. Thus conforms with studies in Asia that reported no significant relationship between obesity and marital status.[3,31,32] Furthermore, Akarolo et el in his study among the general adult population , in South-east, Nigeria, reported having a more professional job and belonging to middle or high socio-economic status were significantly associated with increased risk of obesity.[22] There was a paucity of local and regional studies as more emphasis was placed on the relationship between obesity and chronic diseases.

The study found a statistically significant relationship and a strong association (OR= 2.402, P= 0.010, CI=1.221-4.417) between obesity and basic activities of daily living (ADL). The obese elderly in the study have twice risk of ADL disability than the non-obese, in keeping with the literature which reported a strong association between optimal physical function, BMI values (20.0-24.9 kg/m^2) and low risk of morbidity.[29] These may not be unconnected with the direct association between urinary incontinence (an important component of ADL) in elderly and increased BMI.[33] In obese individuals, it is often thought that, the urinary incontinence is due to the effects of excessive weight exerting strain and stretch, thus eventual weakening the neuromuscular structures.[9] However, there is more evidence that urinary incontinence in obese individuals is due to raised intra-abdominal and intravesical pressure as a result of increased weight of the abdominal wall.[9]

Similarly, studies in west Bengel, and South Brazil have reported highest percentage of ADL disability among obese elderly.[13,19] Thus, explained the impact of obesity on mobility due to increased mechanical strength on the joints and its antecedent increase in low back pain and osteoarthritis.[11] Hence, obese individual may have difficulty in performing basic task, such as climbing steps, walking and toileting.[2] Another study stated that geriatric impairments were generally more strongly associated with ADL disability than chronic diseases, with differences in strength of association increasing as the number of impairments and diseases increases.[34] Thus this study highlighted another adverse effect of obesity in elderly apart from chronic medical conditions.

Regarding IADL disability, the study found 64.3% prevalence among the obese participants. However, there statistical relationship was insignificant (P=0.523). These was in harmony with studies from Brazil, which reported increased risk of IADL disability in old adults with high BMI.[3,35] Yet, the author did not state any statistical relationship between higher BMI and IADL Observations between anthropometric parameters and IADL were limited, however, Bahat et al, in Istanbul found a significant and positive correlation between BMI and IADL in elderly.[36] The higher prevalence of IADL may be explained by the age related decrease in muscle mass and strength which are more marked among obese and it is necessary in performing IADL.[11] In addition, another study emphasizes the need for more cognitive and physical integrity in IADL activities.[37]

In conclusion, the prevalence of Obesity among elderly was 17.6%, with majority having obesity class 1. Obesity was commoner among the young old (60-64 years). Obese elderly have twice risk of disability in self-care which impacts their general wellbeing hence more burden to the healthcare system.

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