Original Article

PREVALENCE AND RISK FACTORS FOR OVERWEIGHT AND OBESITY AMONG SUBURBAN SEMI-NOMADIC FULANI'S OF NORTHWESTERN NIGERIA

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ABSTRACT

Background
Obesity is a major public health problem that is associated with increased cardiovascular morbidity and mortality. It is an important threat that is fast becoming an emerging epidemic globally, Nigeria inclusive. Although there are numerous studies on the prevalence of obesity in Nigeria, the semi-nomadic Fulani's have not been extensively studied. This study will, therefore, help to assist policymakers to plan effective strategies for combating the epidemic among neglected ethnic populations.

Method
The study was a community-based cross-sectional study carried out in Kumbotso Local Government Area of Kano state, from June 2015 to December 2015. Anthropometric indices (Weight, height, waist and Hip circumferences) were measured for the subjects. Body mass index and waist hip ratio was also calculated. Serum blood glucose, lipid, and blood pressure were determined.

Results
The mean ±SD age of the subjects was 38.97±15/98 years, with a range of 18 – 90 years. There were 208 (39.1%) males and 324 (60.9%) females, p <0.001. Obesity was found in 9.21% of the subjects (4.32% of males, 13.58% of females). Overweight was found in 20.86% of the subjects, 15.38% of males and 13.58% of females respectively. Factors associated with overweight include advancing age and female gender.   The odds ratio for developing obesity is higher in subjects > 50 years (2.319, 95% CI, 1.203-3.540).

Conclusion
There is a relatively high prevalence of overweight and obesity among suburban semi-nomadic Fulani's. In view of this, there is the urgent need to initiate public health measures aimed at improving healthy lifestyle measures.

Key words: Prevalence, overweight, obesity, risk factors and sub urban.

INTRODUCTION

Obesity is a major public health threat that is fast becoming an emerging epidemic globally, Nigeria inclusive. The prevalence of overweight and obesity is expected to rise over the next few decades. This increase in prevalence is related to the changing demographics of our population and the adoption of western lifestyles characterized by consumption of energy-dense foods and decreased physical activity. [1-3]

It is one of the major modifiable cardiovascular risk factors and is associated with increased risk of developing diabetes mellitus and other endocrine disorders, cardiovascular diseases; hypertension, atherosclerosis, as well as certain types of cancer. [4,5]

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In the United States, for instance, more than two-thirds (68.8%) of the adult population is considered to be either overweight or obese and a third (35.7%) of adults are obese. In men almost, a three quarter (74%) are considered to be overweight or obese. Extreme obesity has been estimated to affect about one-tenth of the population (6.3%).[6]

In Nigeria, the exact prevalence of obesity is not known but rates ranging from 8.1% to 22.2 % have been reported, while the prevalence of overweight ranged from 20.3% - 35.1%, which has been noted to have increased from an earlier study in 1970 by Johnson[8] in Lagos, which reported a prevalence of 14.9% and 26.5% males and females respectively.[7-9]

The economic consequences of obesity are enormous with a direct cost of managing people with obesity expected to rise to about $48-66 billion/year in the USA and by £1·9-2 billion/year in the UK by 2030[4]. Indirect costs relating to disability from the disease, absenteeism at places of work, premature mortality and workers' compensation related to the disease is also expected to rise exponentially globally.[6,7]

Most studies on the prevalence of overweight and obesity in Nigeria were conducted in urban populations. This study sets out to determine the prevalence of overweight and obesity among ethnic Fulani's of Northwestern Nigeria who are mostly nomads with an increased level of physical activity by virtue of their means of livelihood.[10]

Materials and method
The study was a community-based cross-sectional study carried out in Kumbotso LGA, which is one of the 44 Local Government Areas of Kano state, and one of the eight local government councils that make up Kano Metropolis from June 2015 to December 2015.

Study participants included adult males and females aged 18years and above resident within the study area who meet the inclusion criteria and consented to participate in the study.

We excluded participants who were ill, pregnant women and all persons who declined consent to participate in the study.

Sampling Method
A multi-stage sampling technique was used to select the participants. In stage one, Kumbotso was randomly selected out of the eight local governments in Kano metropolis. In the second stage, Kumbotso ward was randomly selected out of eleven wards in Kumbotso local government. Three settlements (Kamfa, Rigafada, and Bayan Dala) were selected out of the nine settlements that make up Kumbotso ward using simple random sampling technique (Balloting). House and Household listing were done in the three selected settlements.

In the third stage, a systematic sampling technique was used to select a proportionate number of households in the settlement after calculating a sampling interval for each settlement. Three hundred and sixty households were selected.

Finally, eligible respondents in the sampled households were requested to participate after obtaining signed informed consent (about 3 respondents per household). The first household was selected using a table of random numbers while adding the sampling interval to preceding household number identified subsequent households until the required sample size was obtained.

Ethical Consideration
Ethical approval was obtained from Aminu Kano Teaching Hospital Kano Ethical

review committee (NHREC/21/08/2008/AKTH/EC/1224, and the Kano state ministry of health (HMB/GEN/488/VOL 1).

Participants were assured of the confidentiality of their information and those who declined consent to participate in the study were excluded from the study.

Study Population
The study population consists of suburban semi-nomadic Fulani's residing in the study area who fulfil the inclusion criteria. The Fulani's are the most widely dispersed ethnic group in West Africa and the Sahel although they were originally thought to have originated from North Africa[10]. The number in excess of 20 – 25 million and they are the largest groups of nomadic pastoral community in the world.[10]

Study Procedure
Permission and cooperation for the study were obtained from the village and ward heads of the respective communities where participants were recruited.

Research assistants who speak English, as well as the local languages, were recruited and trained to assisted in data collection and anthropometric measurements.

An interviewer-administered questionnaire based on a modification of WHO STEPS Instrument was used for data collection.[11]

Anthropometric measurements were carried out on each subject as follows;

Weight in kilograms (kg) -Was measured to the nearest 0.1kg with subjects in light clothing and without shoes while standing on a calibrated bathroom scale, positioned on a flat even surface.[12]

Height in metres (m) –Was measured to the nearest 0.1cm using a height stand with subjects barefooted and without headgear while standing erect.[12]

Body mass index (BMI) – The BMI was calculated as weight in kg divided by the square of height in metres (m2) i.e. kg/m using the Quetelet formula BMI = weight (kg)/height (m)2,[12]

Waist circumference (WC) - in centimetre (cm) – The WC was measured to the nearest 0.1cm using a non-stretchable dressmaker's tape at a point mid-way between the margin of the lowest rib and the iliac crest in the horizontal level. This was done with the subject standing erect at the expiratory phase of respiration[12]

Hip circumference (HC) - in centimetre (cm) – The HC was measured to the nearest 0.1cm at the horizontal level of the maximum circumference around the gluteal region (posteriorly) and the pubic symphysis (anteriorly) with the tape parallel to the floor. This was done with the subject standing erect at the end of a normal expiration[12]

Waist to hip ratio (WHR) – The WHR was calculated as the waist circumference in centimetre (cm) divided by hip circumference in centimetre (cm). [12]

Statistical Methods
Data were analysed using SPSS version 20.0 (IBM Corporation, New York USA.) Presentation of the data was done in tables. Prevalence of overweight and obesity was expressed in percentages. The socio-demographic and lifestyle risk factors of the subjects were presented using descriptive statistics and the chi-squared test. Mean values were compared using the independent t-test.

P values <0.05 were considered statistically significant.

Results

A total of five hundred and thirty subjects completed the study (532). The mean ±SD age of the subjects was 38.97±15/98 years, with a range of 18 – 90 years. There were 208 (39.1%) males and 324 (60.9%) females. p <0.001. The mean ±SD age of the females and males was 43.4±18.7 and 39.7±16.2 respectively, with the latter being younger. The majority of the subjects were in their second and third decade of life.

The socio-demographic characteristics of the study population are as shown in Table 1.

Anthropometric Indices

Table 2 shows the mean anthropometric indices of the study population by gender. The mean values of BMI and WC, were higher among females compared with males, while the reverse was the case with the WHR, which was noted to be higher among males although the difference was not statistically significant

Prevalence of overweight and obesity

The prevalence rates of overweight and obesity among the study population based on BMI is shown in Table 3. The prevalence of overweight was 15.38% in males and 24.38% in females, while obesity was found in 4.32% of males and 13.58% of females, respectively.

About a third of the females was either overweight or obese, while about a quarter of the males was either overweight or obese. Class 1 obesity is the commonest pattern in both genders. None of the male subjects was morbidly obese (class 3 obesity).

Clinical and laboratory variables

The values of anthropometric indices were higher in obese subjects than in non-obese subjects, however there is no statistically significant difference in the systolic and diastolic blood pressures of the subjects as shown in table 4.

There was no difference in the mean values of blood glucose of the obese and non-obese subjects. However, there is a statistically significant difference in the mean values of the lipid profile of the obese and non-obese subjects. This is depicted in table 5.

Risk factors for overweight and Obesity

The risk factors for developing overweight and obesity as established from this study obtained from multi variate analysis include advancing age (>50 years) and female gender.

This is shown in table 6.

Discussion

There is the paucity of knowledge on the prevalence of overweight and obesity among the semi-nomadic Fulani ethnic group. To the best of our knowledge, this is the population-based study examining the overweight and obesity among the semi nomadic Fulani's of Northern Nigeria.

In this study, the prevalence of overweight and obesity is lower than reported from previous studies. Gezawa et al[9] reported prevalence rates of overweight and obesity of, 27.1% and 17.1%, respectively in a study among 1650 urban dwellers, while Puepet et al[13] reported obesity prevalence rates of, 19.4% and 23.5% among males and females respectively, in a study of 825 adults in Jos metropolis. An earlier study by Bakari et al reported a prevalence of 13.1% and 18.5% respectively for overweight and obesity in a suburban Northern Nigerian population consisting of 317 subjects. The finding in our study is also lower than the 6.0% reported by Iloh1[4] et al in a study of 2156 adult Nigerians seeking medical care at a mission General Hospital in Imo state, Southeastern Nigeria. The prevalence of overweight and

obesity found in this study is however similar to the 21% and 4% respectively, reported from a study among a rural community of Benue State North-central Nigeria by Adediran[16] et al in 2011. The lower rates of overweight and obesity reported in this study may be related to the study population, with urban dwellers having higher rates compared with rural residents and the increased level of physical activity among the nomads, however much lower rates of overweight and obesity have been reported from Northern Cameroon by Kufe et al (6.1and 2.2% respectively).[18] Diet and lifestyle may also contribute to the lower rates of obesity and overweight in the study population.

More women than men were found to be overweight and obese in our study which is consistent with reports from previous studies.[9,13] The higher prevalence of obesity among females in this study may be due to lower levels of physical activity among women compared with the men who travel long distances to rear their animals and add to their engagement in farming activities.

Conclusion and Recommendation
This study depicts the effects of culture and environment in modulating the development, cause and progression of the disease.

The strength of this study includes the fact that it is a community-based study of an ethnic group hitherto not extensively studied with respect to the prevalence of obesity. The use of the standardized WHO questionnaire enabled us to compare this study with studies done elsewhere.

More studies are therefore needed to be done in order to develop intervention programs and strategies that will help in the long run to curb the rising tide of non-communicable disease in the suburban population.

Limitations of the study
Because it is a cross-sectional study, it is limited by the fact that the temporal profile of the disease occurrence cannot be determined.

Inability to take diet history and food intake pattern of the participants.

Conflicts of Interest
We declare that there is no potential conflict of interest.

Acknowledgments

Authors Contribution
All the authors contributed equally to the study.

Tables
Table 1. Socio demographic characteristic of the study population by Age and Gender

Variable		Male		Female		Total	
Age (Years)		N	%	N	%	N	%
	<30	74	35.58	89	27.47	163	30.64
	30-39	66	31.73	80	24.69	146	27.44
	40-49	27	12.98	61	18.83	88	16.54
	50-59	20	9.62	43	13.27	63	11.84
	60-69	13	6.25	20	6.17	33	6.20
	70	8	3.85	31	9.57	39	7.33
	Total	208	100.00	324	100.00	532	100.00
Educational Status							
Able to read or write							
Yes		143	68.75	93	28.70	236	44.36
No		65	31.25	231	71.30	296	55.64

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Total	208	100.00	324	100.00	532	100.00
Level of Formal Education						
Quranic Education	77	53.85	48	51.61	125	52.97
Primary Education	55	38.46	41	44.09	96	40.68
Secondary Education	11	7.69	4	4.30	15	6.36
Total	143	100.00	93	100.00	236	100.00
Marital Status						
Single	47	22.60	25	7.72	72	13.53
Married	159	76.44	256	79.01	415	78.01
Separated	0	0.00	41	12.65	41	7.71
Widowed	2	0.96	2	0.62	4	0.75
Total	208	100.00	324	100.00	532	100.00

Table 2. Mean Anthropometric indices of the study population by Gender

Anthropometric Index	Gender	N	Mean	*p* Value
BMI	Male	208	22.56	0.001*
	Female	324	24.35	
WC	Male	208	81.41	0.001*
	Female	324	84.78	
HC	Male	208	91.84	0.003*
	Female	324	96.54	
WHR	Male	208	0.89	0.117
	Female	324	0.88	

BMI= Body Mass Index; WC = Waist circumference; HC= Hip Circumference; WHR= Waist Hip Ratio; *$p < 0.05$

Table 3. Distribution of the study population by BMI

BMI category		Male n =208		Female n= 324		Total N= 532		*P* Value
		N	%	N	%	N	%	
Underweight		15	7.21	35	10.80	50	9.40	0.001*
Normal		152	73.08	166	51.23	318	59.77	0.001*
Overweight		32	15.38	79	24.38	111	20.86	0.001*
Obesity	Class 1	6	2.88	30	9.26	36	6.77	0.001*
	Class 2	3	1.44	10	3.09	13	2.44	0.001*
	Class 3	0	0.00	4	1.23	4	0.75	0.001*
Total		208	100.00	324	100.00	532	100.00	

BMI= Body Mass Index; *$p < 0.05$

Table 4: Mean values of anthropometric indices and Clinical Parameters of the study subjects

Mean Parameter		Obesity Present	Obesity Absent	*P* Value
Height	Total	1.59	1.62	0.003*
	Male	1.68	1.68	0.887
	Female	1.57	1.58	0.224
Weight	Total	86.42	59.40	0.001*
	Male	94.00	62.50	0.001*
	Female	84.06	57.17	0.001*
BMI	Total	34.08	22.94	0.001*
	Male	33.06	22.09	0.001*
	Female	34.29	22.79	0.001*
WC	Total	104.50	81.14	0.001*
	Male	104.56	80.36	0.001*
	Female	104.49	81.68	0.001*

HC	Total	112.38	92.75	0.001*
	Male	108.33	91.10	0.001*
	Female	113.20	93.92	0.001*
WHR	Total	0.93	0.87	0.001*
	Male	0.97	0.88	0.001*
	Female	0.92	0.87	0.001*
BPS	Total	137.70	131.86	0.001*
	Male	129.56	127.17	0.644
	Female	139.36	135.19	0.394
BPD	Total	89.87	82.57	0.062
	Male	86.22	79.14	0.062
	Female	90.16	85.01	0.043*

BMI= Body Mass Index; WC = Waist circumference; HC= Hip Circumference; WHR= Waist to Hip Ratio; BP= Blood Pressure; BPS= Systolic Blood Pressure; BPD= Diastolic Blood Pressure;* *p*< 0.05

Table 5: Mean values of biochemical parameters among obese and non-obese subjects

Mean Parameter		Obesity Present	Obesity Absent	*P* Value
FPG	Total	4.29	4.39	0.469
	Male	4.35	4.56	0.589
	Female	4.29	4.31	0.549
CPG	Total	5.27	5.81	0.857
	Male	5.22	5.85	0.501
	Female	5.87	5.78	0.172
TChol	Total	4.75	3.67	0.640
	Male	4.40	3.50	0.001*
	Female	4.82	3.50	0.020
HDL	Total	1.10	0.95	0.001*
	Male	1.19	0.94	0.001*
	Female	1.09	0.96	0.030*
LDL	Total	2.71	2.05	0.150
	Male	2.20	1.17	0.001*
	Female	2.80	2.15	0.001*
Trig	Total	1.53	1.21	0.015*
	Male	1.83	1.17	0.001*
	Female	1.47	1.24	0.010*

T Chol = Total Cholesterol; HDL = High Density Lipoprotein Trig = Triglyceride; HDL = High Density Lipoprotein; LDL = Low Density Lipoprotein; FPG= Fasting Plasma glucose; CPG= Casual Plasma Glucose;* *p*< 0.05

Table 6. Odds ratio for Obesity

Parameter	Odds Ratio	95 % CI	pValue
Males	0.621	0.351-1.317	
Females	2.273	1.176-2.729	0.01*
≥ 50 Years	2.319	1.203-3.540	0.01*
Hypertension	0.928	0.569-1.182	0.23

* *p*< 0.05

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