Determinants of Meal Skipping and Nutritional Status of Postmenopausal Women in A Rural Community in South-Eastern, Nigeria

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ABSTRACT

Background: *Regular meal consumption among postmenopausal women is fundamental to maintaining good health.*

Objective: *This study evaluated determinants of meal skipping and nutritional status of postmenopausal women in a rural community in south-eastern, Nigeria.*

Methods: *This cross-sectional study engaged 332 participants. A structured and validated interviewer-administered questionnaire was used to obtain information on the sociodemographic characteristics and meal skipping habits of the participants. Anthropometric measurements of height, weight, waist and hip circumferences were obtained from the participants. Blood pressure, fasting blood glucose and lipid profile of the participants were determined. Statistical Product and Service Solution (SPSS) for windows version 21 was used for data analysis. Multinomial logistic regression was used to determine factors associated with skipping meals. p value of < 0.05 was considered significant.*

Results: *Most (48.5%) of the respondents were aged ≥ 62 years. Meals were skipped by 42.8%. Obesity (15.7%), overweight (37.0%), abdominal overweight/obesity (38.0%), hypertension (13.0%), pre-diabetes (36.7%), diabetes mellitus (1.8%), low HDLc (66.7%) and borderline high triglyceride (9.1%) and total cholesterol (24.2%) were prevalent among the participants. Participants who were unemployed (COR = 1.710), had no formal education (COR = 1.338), earned ₦28, 000 – ₦57, 000 monthly (COR =2.071), aged 50-55 years (COR = 2.261) and were in their early postmenopausal status (COR = 2.991) had higher odds of skipping meals. Monthly income, age and postmenopausal status were significantly (p < 0.05) associated with meal skipping.*

Conclusion: *Sociodemographic factors and postmenopausal status were associated with meal skipping among the group. Further studies are needed to evaluate the causal relationship between meal skipping, sociodemographic variables and postmenopausal status*

Keywords: Postmenopausal; meal skipping; south-eastern Nigeria; determinants; hypertension.

INTRODUCTION

Menopause is defined as a physiological event in which there is at least twelve consecutive months of amenorrhoea caused by depletion of ovarian function in the absence of pregnancy, lactation or any disease condition due to the decline of oestrogen [1,2]. It marks the conclusion of reproductive capacity of women [3] and is the culmination of some 50 years of reproductive

aging—a process that unfolds as a continuum from birth through ovarian senescence to the menopausal transition and postmenopause [4]. Menopause has become an important subject of study because of the global increase in life expectancy resulting from better nutrition and improved health care delivery [5]. In Nigeria, the average age of menopause is reported as 49 years slightly lower than the typical age of menopause experienced in North America, Australia and Western-Europe [6]. The percentage of menopausal women aged 48 – 49 years in Nigeria is documented as 51.4% [7]. Postmenopause is thus defined as the stage beginning 12 months after the last menstrual cycle [8]. According to Hill [9] the number of postmenopausal women in the world is projected to rise from 467 million in 1990 to 1.2 billion by 2030 with great majority of this growth occurring in the developing world. The postmenopausal period is associated with most morbidity and mortality therefore the importance of regular meal consumption cannot be over-emphasized during this period.

Among postmenopausal women, concern about meal skipping exists because of its long-term side effects which alter the risk of various health conditions including obesity, diabetes mellitus, atherosclerosis and other cardio-metabolic diseases. Meal skipping is the omission or lack of consumption of one or more of the traditional main meals (breakfast, lunch or dinner) throughout the day [10]. Studies on meal skipping are rare, however, most studies are centred majorly on breakfast skipping which is a more studied and widespread behaviour than lunch and dinner skipping [11, 12, 13, 14]. Several epidemiological studies, and short-term intervention have suggested an association between meal skipping (particularly breakfast) and poor health [15, 16, 17]. [18] reported that skipping breakfast may elicit higher postprandial insulin concentrations and increase fat oxidation, suggesting a metabolic inflexibility that may lead to low-grade inflammation status and impaired glucose homeostasis. Breakfast skipping has been associated with fatigue at noon, higher body mass index as well as increased prevalence of obesity-related chronic illness [19, 20, 21],

increased risk of central adiposity [22], insulin resistance and cardio-metabolic disorders [23]. The abrupt endocrine changes during menopausal transition have important impacts on the physiology of the female body which exacerbate risks for many diseases and disabilities during postmenopausal life [24] and this is made worse when meals are skipped by the postmenopausal group. Hence, postmenopausal status coupled with meal skipping places postmenopausal women at higher risk of cardio-metabolic diseases and its attendant effects. Most studies on meal skipping is focused on breakfast skipping with a dearth of study on lunch and dinner skipping and few studies on skipping any of the traditional main meals. Despite being vulnerable to life-threatening conditions, it is not clear why issues on postmenopausal women has not received the desired attention they deserve especially in Nigeria.

In addition, sociodemographic and postmenopausal statuses of postmenopausal women play an important role in the regularity of their meal consumption. Regular meal consumption, an element of healthy dietary behaviours and an important healthy life indicator, is a vital determinant of the health of postmenopausal women who experience symptoms that may likely affect their food intake and cause them to skip meals, a habit that crucially affects their health. Symptoms experienced include hot flushes, night sweats, sleep disturbances, vaginal dryness, poor memory [25], rheumatic and psychological complaints [26] such as anxiety, depression, irritations, mood swings and emotional problems. Notwithstanding the health implications of meal skipping among postmenopausal women, there seems to be a dearth of information on determinants of meal skipping among this group. This necessitated the need for this study on determinants of meal skipping and nutritional status of postmenopausal women in a rural community in south-eastern, Nigeria.

MATERIALS AND METHODS
Study design and area: This cross-sectional study was carried out in nine villages in Nsukka

community, Nsukka Local Government Area (LGA), Enugu State, South-East geopolitical zone of Nigeria. Nsukka LGA is located on latitude 6'51'24"N and longitude 7'23'45"E with a landmass of 1,810 km. Indigenes of Nsukka LGA are traditionally farmers with a reasonable portion being civil servants of local government authority and University of Nigeria, Nsukka. Major crops grown include: cassava, yam, maize, cocoyam, rice, sweet potato and pepper. Animals reared include: goats, sheep, pigs and poultry.

Study population and sampling technique: Postmenopausal women in Nsukka LGA constituted the study population. The inclusion criteria were being ≥50 years, free-living and self-report of menopause at least 12 months after the last menstrual cycle. Exclusion criteria were women aged < 50 years, unsure whether their periods had stopped and being hospitalized. Multi-stage sampling technique was employed in the selection of the participants.

Stage 1: Eligible postmenopausal women aged ≥50 years in the villages were selected using the women register.

Stage 2: Proportionate sampling was used to determine the number of participants that was used for the study from each village. The proportionate numbers from each village were as follows: Nguru (46), Ihe-Agu Nru (21), Umuoyo (43), Umakashi (17), Ezema/Edem (57), Isiakpu (18), Owerre (43), Echara (17) and Ihe (70).

Stage 3: Random sampling by balloting without replacement was used to select the participants for the study from the women register of each village.

Prior to data collection, permission were sought from the traditional rulers of the selected villages Through the help of the traditional leaders, the research team were linked up with the women leaders who were in possession of the women register for each village. The register was used for sampling and the women leaders helped the researcher locate the homes of the selected women to pre-inform them about the study.

Data collection: Structured and validated interviewer-administered questionnaire was used to obtain information on the sociodemographic characteristics (age, educational attainment, employment status and monthly income) and meal skipping habits of the participants. Meal skipping was assessed by asking the participants how often over the past two weeks they had skipped breakfast and/or lunch and/or dinner. Meal skipping habit was assessed by questions on frequency of skipping meals: those who answered "daily" or "sometimes" were regarded as skippers while those who answered "never" were regarded as non-skippers. Postmenopausal status classification by Hodis (27) was modified and used as follows: early postmenopausal status (< 6 years from last menstruation) and late postmenopausal status (≥ 6 years from last menstruation).

Anthropometric measurements of height, weight, waist and hip circumferences were obtained from the participants. Participants' body mass index (BMI) and waist-hip ratio were calculated. WHO (28) was used to categorize participants' BMI. Waist circumference and WHR of participants were classified using WHO (29) and WHO (30) classifications. Blood pressure of the participants was measured using aneroidsphygmomanometer and was classified using WHO (31) classification. Fasting blood sugar (FBS) of the participants was measured after 8-10 hours post-absorptive fast using an Accu-chek glucometer. FBS was classified using WHO classification (32). Venous blood samples (5ml) were obtained from the participants after 10 - 12 hours post-absorptive fast for lipid profile assessment. Serum concentrations of total cholesterol, high density lipoprotein cholesterol (HDL-c), low density lipoprotein-cholesterol (LDL-c) and triglycerides were determined with Randox commercial kits (Randox Laboratories, Crumlin, England). Lipid profile was classified using NCEP (33) classification.

Statistical analysis: Data obtained was coded and analysed using Statistical Product and Service

Solution (SPSS) for windows version 21. Descriptive statistics were performed for categorical variables. Multinomial logistic regression was used to examine whether sociodemographic variables were associated with skipping breakfast, lunch or dinner. Odds ratio (OR) and the corresponding 95% CIs were calculated for the logistic regression model. p value of < 0.05 was considered significant.

Ethical consideration and informed consent:
An application for ethical clearance was made to the Health Research Ethics Committee, University of Nigeria Teaching Hospital Ituku-Ozalla, Enugu State. The application was approved by the committee and an ethical clearance certificate (NHREC/05/01/2008B-FWA00002458-IRB00002323) issued. The informed consent to participate in the study was obtained from the participants after a detailed explanation on the study objectives. Only participants who consented were recruited for the study.

RESULTS
Sociodemographic information and meal skipping habits of the participants is shown in Table 1. A good number of the participants was aged ≥ 62years (48.5%), had secondary education (38.2%),were self-employed (75.6%), earned ≤ ₦27, 000 monthly (54.2%), ate 3 times in a day (57.2%) and skipped meals (42.8%).

Table 2 shows the age, anthropometric and biochemical indices of the participants by postmenopausal status. Early postmenopausal women had higher mean waist circumference (88.04 ± 18.59 cm), total cholesterol (171.60 ± 37.05 mg/dl), low density lipoprotein-cholesterol (96.33 ± 16.38 mg/dl), triglycerides (135.28 ± 21.36 mg/dl), fasting blood glucose (100.03 ± 20.73 mg/dl) and body mass index (25.64 ± 7.07 kg/m^2) than late postmenopausal women. High density lipoprotein cholesterol and age of the two groups differed significantly (p < 0.05).

Anthropometric and biochemical indices of the participants by postmenopausal status are shown in Table 3. Obesity, overweight, abdominal overweight/obesity, diabetes mellitus and hypertension prevalence were 15.7%, 37.0%, 38.0%, 1.8% and 13.0%, respectively. Borderline high total cholesterol and triglyceride existed in 24.2% and 9.1% of the participants, respectively whereas the prevalence of low HDL-c was 66.7%.

Determinants of meal skipping among the participants are presented in Table 4. Participants who were unemployed, had no formal education, earned ₦28, 000 – ₦57, 000 monthly, aged 50-55 years and were in their early postmenopausal status had higher odds of skipping meals. Monthly income, age and postmenopausal status were significantly (p < 0.05) associated with meal skipping.

Table 1: Sociodemographic information and meal skipping habits of the participants

Variables	Frequency	Percentage
Age (years)		
50-55	30	9.0
56 – 61	141	42.5
≥ 62	161	48.5
Educational attainment		
No formal education	43	13.0
Primary education	63	19.0
Secondary education	127	38.2
Tertiary education	99	29.8
Employment status		
Unemployed	27	8.1
Government employed	54	16.3
Self-employed	251	75.6
Monthly income (₦)		
≤ 27, 000	180	54.2
28, 000 – 57, 000	77	23.2
≥ 58, 000	75	22.6
Skip meals		
Yes	142	42.8
No	190	57.2
Frequency of skipping meals		
Daily	11	3.3
Sometimes	131	39.5
Never	190	57.2
Meals skipped (n = 142)		
Breakfast only	64	45.1
Breakfast and lunch	6	4.2
Breakfast and dinner	5	3.5
Lunch only	34	24.0
Dinner only	33	23.2
Reasons for skipping meals (n = 142)		
Late for work	13	9.2
Not hungry	69	48.6
Lack of access to food	13	9.2
Fasting	21	14.8
Disliked the food	19	13.3
Weight conscious	7	4.9

Table 2: Age, anthropometric and biochemical indices of the participants by postmenopausal status

Variables	Early postmenopausal status	Late postmenopausal status	Group mean
Age (years)	51.09 ± 3.07	62.80 ± 7.83	61.57 ±8.29*
Weight (kg)	73.23 ± 12.52	72.28 ± 10.73	72.38 ± 10.92
Body Mass Index (kg/m^2)	25.64 ± 7.07	25.03 ± 5.91	25.10 ± 6.04
Waist circumference (cm)	88.04 ± 18.59	83.52 ± 14.20	84.00 ± 14.76
Waist-hip ratio	0.77 ± 1.14	0.78 ± 0.53	0.78 ± 0.50
Total cholesterol (mg/dl)	171.60 ± 37.05	157.95 ± 28.08	160.68 ± 30.03
LDL-c (mg/dl)	96.33 ± 16.38	93.60 ± 15.60	94.38 ± 15.60
HDL-c(mg/dl)	49.14 ± 18.72	63.57 ± 8.97	60.45± 12.87*
Triglyceride (mg/dl)	135.28 ± 21.36	129.05 ±20.47	130.83 ±20.47
Fasting blood glucose (mg/dl)	100.03 ± 20.73	95.21 ± 13.57	95.71 ± 14.53
Blood Pressure (mmHg)	118.17 ±16.12 / 80.03 ± 10.05	117.95 ±13.43 / 81.40 ± 9.23	117.97 ±13.71 / 81.26±9.31

*= $p < 0.05$; Early postmenopausal status = < 6 years from last menstruation; Late postmenopausal status = ≥ 6 years from last menstruation

DISCUSSION

This study assessed the determinants of meal skipping and nutritional status of rural post-menopausal women in south-eastern Nigeria. There is a dearth of information on meal skipping among postmenopausal women, however, findings of this study revealed that postmenopausal status is associated with meal skipping as more than one-third of the women studied skipped meals. This is worrisome as meal skipping on its own has negative effects on health coupled with reduced oestrogen production from the ovaries experienced by postmenopausal women that predisposes them to lipid profile derangement, adverse changes in glucose and insulin metabolism, body fat distribution, coagulation, fibrinolysis and dysfunction of vascular endothelium (34, 35).

Significant ($p < 0.05$) association between monthly income and meal skipping was observed with low and middle income earners having 1.5 and 2.0 odds of skipping meals compared to high income earners in this study. In their studies, Tee et al. (36) and Merten, Williams and Shriver (37)

reported that breakfast skipping was significantly higher among participants with low income compared to those with high income similar to the findings of this study. Contrary observation was made by AlTamimi et al. (38). Low income is a vital factor associated with meal skipping since it leads to inadequate financial resources for adequate food and nutrition. This could be the reason why unemployed postmenopausal women had 1.7 odds of skipping meals as their source of income may be from their partners, children or pension. Leaving early for work and working during the day could be the reason why government employed respondents had 1.7 odds of skipping meals. Chances of meal skipping were more among those with lower or no education with those who had no formal education having 1.3 odds of skipping meals. Similar finding was reported by Bjørnarå et al (39) that breakfast skipping was significantly higher among participants with low education than those with high education contrary to the findings of AlTamimi (38). Having no formal education known to be associated with less employability

and income may have played a role in meal skipping observed among this group as these women probably did not have enough finances to meet their food and other needs. Gradual adaptations to the structural, physiological and biochemical changes associated with menopause could be the reason for the significant ($p < 0.05$) association between meal skipping and postmenopausal status and age as early postmenopausal women and those aged 50 - 55 years were 2 times more likely to skip meals.

Hormonal changes, decreased basal metabolic rate, irregular eating habits and physical inactivity associated with this group could be the reason for high prevalence of overweight, obesity and abdominal overweight/obesity seen among the participants. Prevalence of overweight and obesity reported in this study was lower than earlier reports by Ranasinghe et al. (40) in Karnataka (42.1% obesity prevalence) and Achie et al. (41) in Zaria (73.86% overweight/obesity prevalence). Simbar et al. (42) noted that decreased oestrogen levels leads to an increase in fat mass, and a relative increase in androgen/oestrogen ratios changes the body's fat distribution pattern during menopause. The new pattern of fat distribution observed after establishment of oestrogen deficiency is decrease in gluteo-femoral or gynecoid fat deposition and increase in abdominal or android fat accumulation (43, 44). This could be the reason for the presence of abdominal overweight/obesity seen in more than one-thirds of the participants though lower than 79% reported among postmenopausal women in Zaria, northern Nigeria (41). Abdominal obesity is metabolically different from gynecoid obesity and contributes to the development of insulin-resistance, type 2 diabetes mellitus, and dyslipidemia which are important risk markers of cardiovascular disease (CVD), the major cause of death among postmenopausal women (45).

Hypertension was seen more among early postmenopausal women congruent to the observations of Maas and Franke (46) who noted that hypertension is by far the most important risk factor for coronary heart diseases that affects women in early postmenopausal years.

Awotidebe et al. (47) reported 70% prevalence of hypertension higher than the report of this study. Oestrogen has a regulatory effect on the renin-angiotensin system and affects angiotensinogen production and sodium metabolism (48). The usual decline in oestrogen/androgen ratio dilutes the vaso-relaxant effects of oestrogen on the vessel wall and promotes the production of vasoconstriction factors such as endothelin (49). Increase in peripheral resistance of the blood vessel walls may be responsible for the larger increase in blood pressure in postmenopausal years (48).

Low circulating levels of stimulating hormone that exerts a significant effect on the metabolism of plasma lipids and lipoproteins (50) could be responsible for the lipid profile derangements present in some participants as low HCL-c and borderline high total cholesterol and triglyceride levels. Fonseca, da Silva and Ferreira (51) noted that increased levels of total cholesterol and triglyceride and low density lipoprotein cholesterol and a decrease in HDL-c are derangements in lipid profile that occur after menopause.

Conclusion: The study indicated that more than one-third of the postmenopausal women skipped meals. Meal skipping was significantly associated with age, monthly income and postmenopausal status. No formal education, unemployment, earning ₦28, 000 – ₦57, 000 monthly, age (50 - 55years) and early postmenopausal status were factors with higher odds of skipping meals among this group. Awareness on the need for regular and adequate meal consumption among postmenopausal women should be created to prevent its negative effect on health. This may lower overweight/obesity, abdominal obesity, cardio-metabolic and hormonal disorders associated with postmenopausal status. Further investigation is needed to assess adequacy of meals consumed by this group and to evaluate the causal relationship between meal skipping, anthropometry and postmenopausal status.

Conflicts of Interest: Nil

Table 3: Anthropometric and biochemical indices of the participants by postmenopausal status

Variables	Early postmenopausal status N (%)	Late postmenopausal status N (%)	Total N (%)
Body mass index			
Underweight	3 (8.6)	20 (6.7)	23 (6.9)
Normal	16 (45.7)	118 (39.7)	134 (40.4)
Overweight	7 (20.0)	116 (39.1)	123 (37.0)
Obese	9 (25.7)	43 (14.5)	52 (15.7)
Waist circumference			
Normal	18 (51.4)	188 (63.3)	206 (62.0)
Abdominal overweight / obesity	17 (48.6)	109 (36.7)	126 (38.0)
Waist-hip ratio			
Normal	28 (80.0)	215 (72.4)	243 (73.2)
Above normal	7 (20.00	82 (27.6)	89 (26.8)
Total cholesterol			
Desirable	4 (66.7)	21 (77.8)	25 (75.8)
Borderline high	2 (33.3)	6 (22.2)	8 (24.2)
HDL-c			
Low	2 (33.3)	20 (74.1)	22 (66.7)
Borderline	1 (16.7)	6 (22.2)	7 (21.2)
Desirable	3 (50.0)	1 (3.7)	4 (12.1)
LDL-c			
Optimal	6 (100.0)	27 (100.0)	33 (100.0)
Triglyceride			
Normal	5 (83.3)	25 (92.6)	30 (90.9)
Borderline high	1 (16.7)	2 (7.4)	3 (9.1)
Fasting blood glucose			
Normal	21 (60.0)	183 (61.6)	204 (61.4)
Pre-diabetes	13 (37.1)	109 (36.7)	122 (36.7)
Diabetes mellitus	1 (2.9)	5 (1.7)	6 (1.8)
Blood pressure			
Normal	19 (54.3)	148 (49.8)	167 (50.3)
High normal	11 (31.4)	111 (37.4)	122 (36.7)
Hypertension	5 (14.3)	38 (12.8)	43 (13.0)

Table 4: Determinants of meal skipping among the participants

Variables	Skip meals		Total	COR	95% CI
	Yes	No			
Educational status attained					
No formal education	21 (14.8)	22 (11.6)	43 (13.0)	1.338	0.650 – 2.755
Primary education	27 (19.0)	36 (18.9)	63 (19.0)	1.154	0.608 – 2.192
Secondary education	54 (38.0)	73 (38.4)	127 (38.2)	1.102	0.645 – 1.883
Tertiary education	40 (28.2)	59 (31.1)	99 (29.8)		
Employment status					
Unemployed	14 (9.9)	13 (6.8)	27 (8.1)	1.710	
Government employed	29 (20.4)	25 (13.2)	54 (16.3)	1.710	
Self employed	99 (69.7)	152 (80.0)	251 (75.6)		
Monthly income (₦)					
≤ 27,000	77 (54.2)	103 (54.2)	180 (54.2)	1.589	0.900 – 2.803
28, 000 – 57, 000	39 (27.5)	38 (20.0)	77 (23.2)	2.071*	1.071 – 4.004
≥58, 000	26 (18.3)	49 (25.8)	75 (22.6)		
Postmenopausal status					
Early postmenopausal status	24 (16.9)	11 (5.8)	35 (10.5)	2.991*	1.433 – 6.242
Late postmenopausal status	118 (83.1)	179 (94.2)	297 (89.5)		
Age (years)					
50-55	17 (12.0)	13 (6.8)	30 (9.0)	2.261*	1.026 – 4.982
56 – 61	64 (45.0)	77 (40.5)	141 (42.5)	1.396	0.880 – 2.215
≥ 62	61 (43.0)	100 (52.6)	161 (48.5)		

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