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Contribution of Snacks to Energy and Nutrient Intake of Undergraduates in a Nigerian University

Ukegbu PO*, Uwaegbute AC & Usonka VA

Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, PMB 7267, Umuahia, Abia State, Nigeria

ABSTRACT

Introduction: The caloric contribution from snacks is a growing public health concern. University students tend to depend on snacks rather than consuming foods of high nutritional value. This study was aimed at assessing contribution of snacks to nutrient intake of undergraduates. **Methods:** A validated questionnaire was distributed to 200 purposively selected undergraduates (106 males and 94 females), aged between 16 and 25 years, of Michael Okpara University of Agriculture, Umudike Abia State, Nigeria. The survey included questions regarding personal characteristics and dietary habits. Nutritional status was assessed by anthropometry. Dietary intake was by 24-hour recall for two consecutive days including a weekend day. Descriptive statistics and student test were performed using SPSS version 16. **Results:** The commonly consumed snacks were pastries (35%), biscuits (32.5%) and cakes (16.5%), while carbonated (69%) and malt (23%) drinks were their favourite. Many of them skipped meals especially breakfast (41.5%) mainly due to lack of time (34.0%). Males had a significantly higher energy intake (2819.0kcal) than females (2051.0kcal) ($p<0.05$). Snacks contributed 85.7% and 87.7%, 41.8% and 41.7%, and 55.9% and 50.6% to energy, protein and fat intake of males and females respectively. In terms of iron, calcium and vitamin C intakes, snacks contributed 55.9% and 58.3%, 27.4% and 40.0% and 61.5% and 70.4% for males and females, respectively. The prevalence of overweight and obesity was 29.5% and 4.0% for males and females, respectively. **Conclusion**: Energy contribution from snacks represented a large percentage of total calorie intake of the students. Nutritional education should be provided to enable students make healthy food choices.

Key words: Nutrient intake, nutritional status, snacks, university undergraduates

INTRODUCTION

Snacking is the consumption of food and drinks between meals (Savige *et al.*, 2007). Snacks make significant contribution to the daily intake of individuals (Joshi, 2002) and its consumption is popular among adolescents and young adults. Snacking itself is not a problem, but poor food choices in terms of type and quantity are of great concern. University students tend to depend on snacks rather than consuming foods of high nutritional value due to certain factors such as lack of time, limited resources, socio-economic factors and peer pressure. All these factors may make them compromise their diets (Rakicioglu & Akal,

*Correspondence: Ukegbu Patricia Ogechi; Email: *adanna2025@yahoo.com* or *ukegbu.patricia@mouau.edu.ng*

2011). The calorie contribution from snacks is a growing public health concern. Snacks with a high content of saturated fat, salt and refined sugars such as cakes, pastries, chocolate bars etc are termed unhealthy and responsible for life threatening non communicable diseases (Lloyd-Williams *et al.*, 2008). Snacking on the wrong foods in addition to large portions of snacks has been shown to contribute to the increasing prevalence of overweight and obesity (Wardlaw & Smith, 2009).

Poor food habits of undergraduates which include skipping of meals, replacing main meals with snacks and increasing soft drink intake tend to lead to inadequate nutrient intake (Rakicioglu & Akal, 2011). Foods which have better nutritional value are often not patronised by this population group; rather they snack on junk foods with low nutritional value. Because of the low satiety value of some of these snacks, they are often overeaten and there is over indulgence due to their ease of availability and sweet taste. Unless these are balanced by selecting nutrient-dense foods from other sources, their diets are likely to be nutritionally inadequate.

With the proliferation of fast food joints everywhere on campus, youths and undergraduates become target for fast food owners. As a result of their busy school schedule and financial status, these fast food outlets provide readily available, cheap and quickly served snacks which can be eaten anywhere and anytime. This thus makes it a choice for them and may in the long run have significant influence on their health (Redondo *et al.*, 1999).

It therefore becomes imperative to examine the contribution of these snacks to energy and nutrient intake of this group of individuals so as to help nutritionists/ dieticians and policy makers design more effective interventions for these population group.

METHODS

Study area

The study was carried out in Michael Okpara University of Agriculture, Umudike. The institution is situated about 9 kilometres East of Umuahia, the Abia State capital along the Ikot-Ekpene road.

Participants

The study was cross-sectional in design involving 200 undergraduates of Michael Okpara University of Agriculture, Umudike, comprising 106 males and 94 females aged 18-25 years. Participation in the study was voluntary and consent was obtained from students who were attending lectures on the day of data collection. Inclusion criteria were full time students residing in the hostels on campus, those willing to participate voluntarily and had complete data at the end of data collection. Those excluded were sick students or those who had diseases such as hypertension, diabetes as well as pregnant or lactating females and those on diet. The study protocol was approved by the Ethics Committee of the Federal Medical Centre, Umuahia.

Data collection

A pre-tested self-administered questionnaire was used to collect information on personal characteristics, dietary habits, anthropometry and 24-hour dietary recall.

Anthropometry

The body weight of the undergraduates was measured using a portable scale (HANSON scale) with minimal clothing and without shoes to the nearest 0.1kg. Height was measured to the nearest 0.1cm using a portable scale affixed with fibre-glass tape. All measurements were taken using standard procedures (WHO, 1995). BMI was calculated for each subject as weight (kg) divided by height (m^2).

Table 1. Personal characteristics of the undergraduates

Parameters	*Frequency*	*Percentage*
Gender		
Male	106	53
Female	94	47
Total	200	100
Age		
≤19	23	11.5
20-22	100	50
23-25	77	38.5
Total	200	100
Year of study		
1st year	32	16.0
2nd year	39	19.5
3rd year	41	20.5
4th year	68	34.0
5th year	20	10.0
Total	200	100

Food intake

Food intake was assessed using 24-hour recall for two consecutive days inclusive of a weekend day. The 24-hour dietary recall was carried out by asking the subjects to recall all foods and drinks consumed in the past 24 hours. Measuring cups, slices and food models were used to illustrate potion sizes and to help participants recall accurately the foods they consumed. Commonly consumed snacks were bought from local vendors within the campus, pooled together and chemically analysed. Energy and nutrient intakes were calculated using Food Composition Tables (FCT) (Oguntona and Akinyele, 1997). Some other foods and snacks not found in the tables were collected and analysed in the laboratory for proximate composition and selected minerals and vitamin (calcium, iron and vitamin C) using standard methods (AOAC, 2000). Results were compared with the Recommended Nutrient Intakes (RNI) based on age and gender (FAO/WHO, 2002; 2004).

Statistical analysis

Statistical analysis was performed using SPSS version 15.0. Results were presented as means (±standard deviations), frequencies and percentages. T-test was used to define differences between male and female undergraduates. A p-value of less than 0.05 was accepted as statistically significant.

RESULTS

Results in Table 1 reveal that males account for slightly over half (53%) of the respondents; half of the respondents (50%) were within the age range of 20-25 years while about one-third (34%) were in their fourth year of study.

Data on dietary habits (Table 2) revealed that more than half (57%) consumed three meals a day. Breakfast was skipped very often by many of them (41.5%), followed by lunch (21.5%) and this was mainly due to their busy schedule (34.0%). The favourite snacks consumed by the undergraduates were mainly

Table 2. Dietary habits of the undergraduates (n=200)

Parameter	*Frequency*	*Percentage*
Number of meals eaten per day		
One	3	1.5
Two	57	28.5
Three	114	57
>Three	26	13
Meals usually skipped		
Breakfast	83	41.5
Lunch	43	21.5
Dinner	14	7.0
None	60	30
Reason for skipping meal		
Busy schedule	85	42.5
To control weight	47	23.5
Religious reasons (fasting)	43	21.5
Financial reasons	25	12.5
Favorite snacks		
Pastries (meat/fish pie, buns, doughnut)	70	35
Biscuits	65	32.5
Cakes	33	16.5
Legume products (*moimoi, akara, okpa*)	32	16
Responses on snacks consumption times		
Between breakfast and lunch	48	24.0
Between lunch and dinner	72	36.0
Between lunch and bedtime	22	11.0
Anytime of the day	58	29.0
Reasons for consuming snacks		
Busy schedule	68	34.0
Usually hungry before the next meal	58	29.0
I like snacks	46	23.0
It's a habit formed	24	12.0
Others	4	2.0
Favorite drinks		
Carbonated soft drinks	138	69.0
Malt drinks	46	23.0
Alcoholic drinks	13	6.5
No favorites	3	1.5
Amount of money spent weekly on snacks		
<#1,000	89	44.5
#1,000-#1,500	54	27
#1,501-#2,000	37	18.5
>#2,000	20	10

Table 3. Mean anthropometry of the undergraduates

Parameters	*Males (n=106) Means (SD)*	*Females (n=94) Means (SD)*
Height (m)	1.69 ± 0.09a	1.62 ± 0.08a
Weight (kg)	66.74 ± 9.14a	62.84 ± 8.41b
BMI (kg/m2)	23.86 ± 3.94a	23.29 ± 2.90a
Arm circumference (cm)	24.40 ± 3.36a	22.66 ± 1.94a

Mean values in the same row with different superscripts are significantly different (p<0.05).

pastries such as meat /fish pie, doughnut, buns (35%), followed by biscuits (32.5%). Generally, the undergraduates took their snacks between lunch and dinner (36.0%), while 29.0% took snacks anytime of the day they felt like. Carbonated (69%) and malt drinks (23%) accounted for their favorite, while 55.5% spent > ₦1,000 (>$6.25) on snacks weekly.

The anthropometric characteristics of the male and female undergraduates as presented in Table 3 showed no significant difference in all the anthropometric parameters except for weight in which the males had a significantly higher value than the females (p<0.05). BMI classification showedthat 4.5%, 62.0%, 29.5 and 4.0% were underweight, normal, overweight and obese, respectively.

The energy and selected nutrient intake revealed that females had significantly higher fat, calcium, iron and vitamin C intake (p<0.05), while males had higher energy intake than their female counterparts (p<0.05). Intake of iron, calcium and protein were below recommendations, while carbohydrate exceeded recommendation in both sexes (Table 4).

Table 5 shows the percentage contribution of snacks to energy and nutrient intake of the undergraduates. Snacks contributed 85.7% vs 87.7%, 41.8% Vs 41.7%, 55.9% Vs 50.6% to total energy, protein and fat intake of males and females, respectively. Iron and vitamin C intake was over half of the requirement for both sexes, that is, 55.9 vs 58.3% and 61.5 vs 70.4%, respectively, while calcium contributed 27.4% vs 40.0% for males and females, respectively. Generally, results in Table 5 reveal that the contribution of snacks to fat intake is highest and this is followed by protein in both sexes.

DISCUSSION

The prevalence of obesity in this study (4%) was similar to that of a study conducted among university undergraduates in Nigeria and Zimbabwe (Olusanya & Omotayo, 2011; Mushonga *et al.*, 2013). This could be due to similarities in the socio-economic characteristics of the undergraduates. The gradual increase in obesity in the mentioned studies was attributed to poor eating habits such as consumption of energy dense foods as is found in fatty and sugary foods.

Skipping of breakfast has been reported to be a common practice among undergraduates around the world (Horikawa *et al.*, 2011). The prevalence of breakfast skipping was high in this study and corroborates that reported among a group of undergraduates in Abeokuta, Nigeria (Afolabi *et al.*, 2013). Another study conducted among a group of university students in Turkey found that breakfast and lunch were the frequently skipped meals, with a total of 47.7% students

Table 4. Energy and nutrient intake of male and female undergrdautes

Nutrients	*Mean intake*	**FAO/WHO*	*% of FAO requirements met*
Energy (kcal)			
Males	2819.0a	2750	102.5
Females	2051.0b	2200	99.9
Protein (g)			
Males	72.8a	56	77.3
Females	72.5a	46	93.0
Fat (g)			
Males	36.5a	20-35% of EI	-
Females	40.3b	20-35% of EI	-
Carbohydrate (g)			
Males	560a	130-325	141.9
Females	375a	325	113.3
Calcium (mg)			
Males	365.4a	700	52.2
Females	425.5b	700	60.8
Iron (mg)			
Males	7.7a	11.3	68.1
Females	9.0b	14.8	60.8
Vitamin C			
Males	39.0a	40	97.5
Females	46.7b	40	116.8

EI= Energy intake, * (FAO/WHO, 2002, 2004); Mean values in the same row with different superscripts are significantly different ($p<0.05$).

Table 5. Mean percentage contribution of snacks to total energy and nutrient intake

	Males			*Females*		
Nutrients	*Total intake*	*Mean intake from snacks*	*% contribution of snacks to intake*	*Total intake*	*Mean intake from snacks*	*% contribution of snacks to intake*
Energy (kcal)	2819.0	2413.2	85.7	2051.0	1800	87.7
Protein (g)	72.8	30.4	41.8	72.5	30.0	41.7
Fat (g)	36.5	20.5	55.9	40.3	20.0	50.6
Calcium (mg)	365.4	100.6	27.4	425.5	170.4	40.0
Iron (mg)	7.7	4.28	55.9	9.0	5.25	58.3
Ascorbic acid (mg)	39.0	24.0	61.5	46.7	32.9	70.4

skipping breakfast and 25.2% skipping lunch (Rakicioglu & Akal, 2011). Skipping of breakfast was generally attributed to lack of time by the undergraduates in this study. Chapman (1992) opined that lack of time/convenience, money and health concerns topped the list of reasons as to why undergraduates eat the way they do.

Similarly, Shaw (1998) was of the view that breakfast is the highest skipped meal and this can lead to higher probability of snacking during the day. Abdull-Hakim, Muniandy & Danish (2012) reported that skipping of meals may not necessarily lead to weight loss; however, the individuals may tend to overeat at the next meal and this could in turn make them add weight. Horikawa *et al.* (2011) was of the opinion that skipping of breakfast is associated with lower nutritional status and increases the risk of cardio-vascular disease. It is therefore very important for undergraduates to understand the importance of consuming regular meals, more importantly breakfast which is the most important meal of the day that replenishes the body and brain after a night's fast (Ming, Ying & Kassim, 2006).

The commonly consumed snacks were observed to be pastries with quite a high percentage consuming sweetened carbonated drinks along with these pastries which are energy dense and contain high sugar and fat content. The main reason why these students consume snacks was due to their busy academic schedule which may not allow them have time to prepare nutritious meals. A study by Arulogun & Owolabi (2011) reported that the common snacks consumed by university undergraduates they studied were mainly flour based products. Rolls *et al.* (1999) reported that consumption of snacks go hand in hand with consumption of highly sugared beverages. The study further affirms that these carbonated soft drinks are energy dense and this makes them unhealthy and predisposes individuals to overweight, obesity and other cardio-vascular risk factors.

Energy intake was found to be below recommendation for females but adequate for males. The values obtained for males in this study was, however, lower than that reported among undergraduates in Abeokuta, Nigeria (3405.6±13kcal) but was similar to 2061.9±83kcal reported for female students in the same study (Afolabi *et al.*, 2013). The reason for the similarities in energy intake between females in this study and the earlier could be attributed to the fact that generally, females tend to watch their weight and as such do not eat voraciously like their male counterparts. Similarly, studies conducted in other countries (Casper & Offer, 1990; Chapman, 1992) reported that females were more concerned with their body image than males who are usually heavy eaters, hence their lower energy intake. The undergraduates met only 68.1% and 60.8% of their iron intake for males and females, respectively. This is quite low especially for the female students who require iron to make up for losses during the menstrual cycle. Low intake of iron could be due to inadequate intake of iron rich foods, low bioavailability of iron in the diet and consumption of foods high in substances that inhibit iron absorption such as tea (Pekcan & Karaağaoğlu, 2000). Similarly, calcium intake was low for both male and female undergraduates. This could be because consumption of animal milk is generally low especially among African and Asian countries (Zapata *et al.*, 2004). The little quantity of milk these undergraduates could have consumed may be that added to tea or maize gruel/ custard. Intake of vitamin C was significantly higher for females than males ($p<0.05$). The higher vitamin C intake of the females supports the views of Rakicioglu & Akal (2011) that females are more likely to eat fruits and vegetables than males.

Findings from this study indicate that snacks were a major contributor to energy intake among the undergraduates. Similarly, Afolabi *et al.* (2013) reported that fast foods contributed a higher percentage to total calorie intake of undergraduates they studied. Snacks also supplied more than one-third (41.8 vs 41.7%) of protein intake and about half of fat intake (55.9% vs 50.6%), in males and females, respectively. This corroborates reports of other studies

(Afolabi *et al.*, 2013; Oguntona and Kanye, 1995; Oguntona, Razaq & Akintola, 1998) that found fast foods and street foods to be major contributors to dietary protein and fat intake of students in Nigeria. Similarly, Sjoberg *et al.* (2003) reported that in-between meals in the form of snacks contribute more energy to the diet than the three main meals eaten in a day and this happens to be the case with results of this study. Snacks also contributed more than half to vitamin C and iron intake than calcium in both sexes, though the mean intake for these nutrients were below recommendations in both sexes. The result indicate that frequent consumption of snacks may lead to poor diet quality among the undergraduates.

CONCLUSION

The findings of this study pointed to a high consumption of snacks among the undergraduates. Snacks contributed a high percentage to energy, carbohydrate, fat and protein intake. However, micronutrient intake from snacks was low especially for iron and calcium. Continuous nutrition education should be provided to these undergraduates to help them make healthy food choices.

LIMITATIONS OF THE STUDY

Caution should be exercised in interpreting results from this study since it is just descriptive in nature. However, the results obtained are informative as regard the population group and provides valuable information on the contribution of snacks to their nutrient intake.

Conflict of interest

The authors report no conflicts of interest in this work.

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