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Empty calories: Awareness (knowledge), attitude, and practice of some university students in Sokoto, Nigeria

Yusuf Sarkin Gobir

Department of Environmental Education, Shehu Shagari University of Education, Sokoto State, Nigeria

Email: *superoxidedismutase594@gmail.com*

Abstract:

This study examines the awareness, attitudes, and consumption of empty calories (ECs) among undergraduate university students in Sokoto, Nigeria. The results show that majority of respondents (91.8%) were aware of ECs and could list examples, with school (60.0%) and media (23.6%) being the primary sources of awareness. However, most respondents (80.0%) believed ECs are healthy, but 20.0% believed they are only needed moderately. Taste (60.0%) and ease of consumption (20.0%) were the primary reasons for consuming ECs. Few respondents (20.0%) believed ECs are harmful, while majority (80.0%) believed they are not harmful. Most respondents (60.0%) consumed ECs seriously, while 40.0% consumed them less frequently. The study highlights the need for education and awareness programs to control ECs consumption among undergraduate university students in Sokoto, Nigeria. Education and awareness programs, laws and policies, and provision of organic foods are recommended as strategies to control ECs consumption.

Keywords: *Empty calories, beverages, fast foods, junk foods, university, students, diabetes, awareness*

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1.INTRODUCTION

Any solid or liquid material that undergoes ingestion, digestion, and assimilation in a bid to provide nutrients to keep the body healthy culminates a food (Islam, 2020; Horowilz et al., 2023). Food is of different classification, mostly there are five good groups, namely, cereals and grains (such as maize, rice, barley), pulses and legumes (such as lentil, cowpea, soybeans, peas), milk and meat (such as curd, milk, cheese, egg, liver, chicken, fish), fruit and vegetables (for instance, guava, mango, tomato, papaya, orange, spinach, watermelon, pumpkin), and lastly the empty calories (such as junk foods, fast foods, added sugars, added solid fats, jaggery) (Khalid et al., 2020; Arimond et al., 2021; Jack, 2023). The food groups provide energy, nutrients, vitamins, minerals,

except the empty calories. The vegetables and fruits, where the pumpkin and watermelon belonged are providing energy, vitamins and minerals among other things needed by the body. However, the empty calories group is apparently dangerous especially if consumed habitually. The increasing prevalence of non-communicable diseases (NCDs) such as obesity, diabetes, and cardiovascular disease has become a major public health concern worldwide (Arimond et al., 2021; Jia et al, 2022). According to the World Health Organization (WHO), NCDs are responsible for over 70% of deaths globally, with the majority of these deaths occurring in low- and middle-income countries (UNICEF, 2019; UNICEF, 2021). One of the contributing factors to the rise of NCDs is the consumption of empty calories, which are foods and beverages that provide energy but lack essential nutrients (Lane et al., 2024). Empty calories (ECs) are denoted by different names, such as junk foods, fast foods, ultra-processed foods, etc. fast foods are types of foods of quick service, fostered by convenience, busy nature of current world economies, good taste, cheapness (Nipun et al., 2017; Aimuson-Quampah et al., 2022). Fast food is processed and rapidly made type food from markets, restaurants, and it is ready for consumption by consumers. Fast foods examples include, chips, sausages, cold beverages, confectioneries, desserts, pizzas, canned foods, processed food (USDA, 2015; Shankar et al., 2024). Junk foods are described as those that are highly processed, highly refined, pleasantly t6asty, and readily available (Subedi & Timalsina, 2021). The cited examples of junk foods include, chips, chocolate, pizza, etc (Subedi & Timlasina, 2021; Whiteland, 2022). Elbastawey et al. (2022) defined junk food simply as calorie-depleted food, contain elevated calories, but few nutrients (like vitamins, minerals, fiber, and amino acids). Likewise, Mahmoud et al. (2021) defined fast food as deficient food, prepared for take away, and is unhealthy in turn. Empty calories are dangerous because they contained excessive levels of sodium or potassium, saturated fats, trans-fats, sugars, in turn leading to weight gain, obesity, diabetes, hypertension, and other cardiovascular diseases (Harris et al., 2023). Empty calories are also due to their ability to cause food intoxication or toxicity such as effect on gastrointestinal system, and it has been reported for causing behavior changes (such as aggressiveness), inadequate growth, malnutrition, depression, anxiety, and other nervous system disorders as well (Vidya et al., 2015; Abonmai et al., 2022). Empty calories are often high in added sugars, solid fats, and sodium, and low in fiber, vitamins, and minerals. The consumption of empty calories can lead to weight gain, decreased energy levels, and increased risk of chronic diseases (Al-Ibrahim & Jackson, 2019). University students are a vulnerable population to the negative effects of empty calories due to their lifestyle and dietary habits. They often have busy schedules, rely on convenience foods, and have limited access to healthy food options (Raouf et al., 2022). Despite the importance of healthy eating habits, many university students in Nigeria engage in unhealthy dietary practices, including the consumption of empty calories. There is limited research on the awareness, attitude, and practice of university students in Nigeria towards empty calories. This lack of knowledge hinders the development of effective interventions to promote healthy eating habits among this population. This study is significant because it will provide information on the awareness, attitude, and practice of university students in Sokoto, Nigeria towards empty calories. The findings of this study will be useful in developing effective interventions to promote healthy eating habits among university students in Nigeria. The objective of this work is to perform an assessment of awareness (knowledge), attitude, and practice of some university students in Sokoto, Nigeria regarding empty calories.

2. Materials and Methods

2.1 Study Design

This study employed a descriptive cross-sectional design to assess the awareness, attitude, and practice of university students in Sokoto, Nigeria towards empty calories.

2.2 Study Setting

The study was conducted at the Sokoto State, Nigeria.

2.3 Study Population

The study population consisted of undergraduate students. The inclusion criteria were: Registered undergraduate students of the university, Students who were willing to participate in the study, and Students who were present in the university during the data collection period. The exclusion criteria were: Postgraduate students, Students who were not willing to participate in the study, and Students who were not present in the university during the data collection period.

2.4 Sample Size

The sample size was calculated using the Raosoft calculator for estimating the proportion of a population: with a presumed population size of 900, the confidence level was 95%, response distribution of 25%, and margin of error of 5%. The calculated sample size was 220.

2.5 Sampling Technique

The sampling technique utilized in this study is the stratified random sampling so as to select the participants. The university's faculties were used as strata, and students were randomly selected from each faculty.

2.6 Data Collection

Data was collected using a self-administered questionnaire. The questionnaire was designed to collect information on the students' demographic characteristics, awareness (knowledge), attitude, and practice towards empty calories.

2.7 Data Collection Tool

The data collection tool was a structured questionnaire with the following sections: Demographic characteristics, Awareness (knowledge) towards empty calories, Attitude towards empty calories, and Practice towards empty calories

2.8 Data Analysis

Data was analyzed using SPSS version 25. Descriptive statistics were used to summarize the students' demographic characteristics, awareness (knowledge), attitude, and practice towards empty calories. Inferential statistics (chi-square test and logistic regression analysis) were used to identify the factors associated with good awareness (knowledge), attitude, and practice towards empty calories.

2.9 Ethical Considerations

Informed consent was obtained from the participants before data collection. The participants' confidentiality and anonymity were ensured throughout the study.

3. Results and Discussion

Table 1: Characteristics of the respondents

Characteristics	Frequency (N= 220)	Percentage
Sex		
Male	160	72.7
Female	60	27.3
Age		
Below 20 years	30	13.6

21-24 Years	170	77.3
25 and above years	20	9.1
Level of Study		
100 level	70	31.8
200 level	100	45.5
300 level	50	22.7

The respondents are mostly males (2.7%), and some are females (27.3%). In terms of age, they are mostly (77.3%) 21-24 years old, ad few (9.1%) are 25 and above years. The study levels of the respondents are; 200 level (45.5%), 100 level (31.8%), and 300 level (22.7%).

Table 2:Awareness level of undergraduate university students in Sokoto, Nigeria

Parameter	**Frequency**	**Percentage**
Can be able to describe (and list) empty calories		
Yes	154	70.0
No	66	30.0
What is the contents?		
Chemicals	202	91.8
Foods	18	8.2
Source of awareness		
School	132	60.0
Media	52	23.6
Others	36	16.4

Table 3:Attitude towards empty calories

Attitude parameter	**Frequency**	**Percentage**
Empty calories are healthy when taken moderately (balanced with nutritious foods)	44	20.0
Empty calories are healthy	176	80.0

Table 4:Reasons for consuming empty calories

Parameter	**Frequency**	**Percentage**
Tasty (sweet, yummy)	132	60.0
Easy to eat	44	20.0
I don't know	44	20.0

Table 5:Perceived effects of empty calories

Effects	**Frequency**	**Percentage**
Cause diabetes, obesity, cancer	132	6.0
Dysentery	44	20.0

Stomach pain	44	20.0
Are they harmful Yes No	 44 176	 20 60.0

Table 6:Practice of empty calories consumption

Parameters	**Frequency**	**Percentage**
Consumed seriously (like every day)	132	60.0
Consumed infrequently	88	40.0

Table 7:Prevention against empty calories consumption

Strategy	**Frequency**	**Percentage**
Awareness or education	110	50.0
Laws	55	25.0
Availability of organic foods	35	15.9
Policies	20	9.1

Table 2 shows the level of awareness (knowledge) about ECs among undergraduate university students in Sokoto, Nigeria. Out of the 220 respondents, majority (91.8 %) were able to describe or list empty calories foods such as beverages, biscuits, yoghurts, burger, ice creams; while, 8.2% were unable to describe or list empty calories. Nayuk (2020) reported similar data from North Karnataka, that medical students had more preference and knowledge of empty calories. Meena et al. (2023) reported moderate to inadequate knowledge of empty calories (junk foods) in adolescents in India. Dalrymple (2013) in a study composing of university students in West indices, show good knowledge of nutrition but not translated to actions. Dalrymple (2013) argues that nutrition awareness (knowledge) lead to prevention of chronic disorders such as diabetes, obesity, and cardiovascular diseases. Subedi & Timalsina (2021) submitted that, there was mostly adequate knowledge about junk food among adolescents in Nepal. Majority, 80.0% of the respondents stated that empty calories contain chemicals and 20.0% (minority) believed that empty calories are foods. Islam (2020) asserted that empty calories diet is containing chemicals (additives) that incite taste, but their accumulation is harmful. Empty calories are cited as diet with high sugar content, saturated fats, salts, calories, that are cause of disabilities such as hypertension, obesity, glucose intolerance, and dyslipidemia (Bagyalkashmi et al., 2022). Hamish & Angus (2019) decried that fast foods (empty calories) are full of fats, added sugars, added fats, that are unhealthy. In Table 2, the sources of awareness were school (60.0%), media (23.6%), and others (16.4%). Hamish % Angus (2019) related that, media such as radio, posters, magazines, etc are in favour of empty calories marketing, thereby speeding the trend of empty calories consumption around the world. Mukoru et al. (2023) in a study of youngsters in western Nigeria, avail the need for health education to alleviate the of excessive empty calories intake among the public, especially

the young students. In Table 3, attitudes towards empty calories were revealed, majority (80.0%) of the respondents believed empty calories are healthy absolutely, but minority (20.0%) believed empty calories are only needed moderately. This is similarly reported by another work in Assiut University that, show, majority of participants having positive attitude towards junk foods (Mahmoud et al., 2021). Nipun et al. (2017) in Bangladesh show that, most of the students involved in the study are knowledgeable about effects of empty calories, buy they are seriously addicted to it. In Table 4, reasons for consuming empty calories were stated, they are: the empty calories are tasty (sweet or yummy) 60.0%, easy to eat (20.0%), and I don't know (20.0%). The finding in this work is somehow related to the work of Rezaei et al. (2022) in Iran that state reasons for taking empty calories, including, easy preparation (33.1%), and taste of the empty calories (77.0%). Mageswari et al., (2021) among pregnant women in Tirunelveli, India revealed that 80.0% of the respondents are derived to empty calories by taste. Vaida (2013) in a study in Kashmir India shows the factors driving adolescent's students to empty calories include flavor and availability. Nayak (2020) in north Karnataka medical students stated taste as a driving force to empty calories. Hamish & Angus (2019) stayed availability, cheapness, among the reasons for empty calories consumption among people. In Table 5, out of the 220 participants, few (20.0%) of them submitted that empty calories are harmful, and majority (80.0%) believed they are not harmful. In Table 6, perceived effects of empty calories were submitting by the students, namely, cause diabetes, obesity, cancer (60.0%) dysentery (20.0%), stomach pain (20.0%). Zehra et al. (2018) reported effects of empty calories such as obesity, dental caries, skin cancers and diabetes as some forms of empty calories consumption effects. Rajveer & Monika (2012) asserted that empty calories incite diabetes, obesity, skin cancers, and diabetes. Sheena (2020) reports, obesity, diabetes, and skin cancers as adverse effects of empty calories. Nagothi (2021) believed that, empty calories cause some cancers and liver disease and diabetes among many other effects. Das (2015) ascribed some effects of empty calories such as obesity, diabetes, and dyslipidemia. In Table 6, out of 220 participants, 60.0% of them consume empty calories seriously, and 40.0% consumed empty calories less frequently. The findings of this work is dissimilar to that of Rezaei (2022) from Iran that revealed, most of the participants do not consume the empty calories frequently. Mageswari et al. (2021) in an Indian study shows that 60.0% of the respondents (pregnant women) consume empty calories in a similar pattern to this study. In a similar, vein, a study among university students in Iraq, shows that most of the students and teachers are aware of the hazards of empty calories. Nayak (2020) in North Karnataka, among medical students reveal an awareness about empty calories. In Table 7, the methods of prevention or control of empty calories consumption stated by the respondents are: awareness or education (50.0%), laws (25.0%), provision or availability of organic foods (15.9%), and policies (9.1%). This is similar to may works, for instance, Hamish & Angus (2019) ascribe education, laws as good methods in controlling dietary habits among young people. Meena et al. (2023) suggested health education to curb empty calories intake in young ones. Collado-Soler et al. (2023) reported in a review of high schools' programs that, interventions improve knowledge and resultantly feeding habits of students stressing the impact of school as an avenue for teaching people about healthy eating. Das (2015) stress that, availability of organic foods at cheap price, laws that regulate sale of empty calories, campaign, improve dietary habits of children. The other author submitted that, nutrition knowledge is a determinant preventing chronic diseases such as obesity, diabetes, stroke, and cardiovascular diseases (Dalrymple, 2013). Subedi & Timalsina (2021) also asserted that nutritional knowledge invariably serve as a factor affecting dietary behaviors of young people. Likewise, Raouf et al. (2022) in a study of some students in Egypt come to the term that educational interventions could

positively affect dietary habits of students. Foods are supposed to be taken to improve health, ensure growth and development, and as well prevent disease. Nowadays, there is preponderance intake of empty calories (fast foods, junk foods, ultra-processed foods) that trigger a lot of abnormalities and disorders such as cardiovascular diseases, cancers, obesity, diabetes (Rasheed et al., 2021; Berkley, 2023). Therefore, this study surveyed some university students in Sokoto with the aim of analyzing knowledge (awareness), practice, and attitude. Based on the findings stated in this work, the participants are mostly knowledgeable about empty calories through diverse medium strategies such as school, and media. Therefore, it is significant to utilize the two vehicles (schools and media) to communicate health education messages about healthy eating habits to improve public health (Jia et al., 2022; Shamsol & Fisol, 2023). Moreover, this work revealed that the positive attitude of university students in Sokoto toward empty calories consumption, this may indicate that awareness did not impact (translate) well to a better attitude among the majority. It might be, the knowledge (awareness) was number by the attitude (among majority) or the determinants or risk factors of empty calories consumption, such as (accessibility or portability) easy to get by the respondents are behind the inclination of attitude most of the respondents towards empty calories. And astonishingly, despite the claim about the effects, most of the respondents take empty calories frequently, but they suggested educational or awareness approach, laws, and policies to tackle empty calories. It is important to state that, awareness, should be created especially using behavior change theories such as health belief model, (HBM) and socioecological model (SEM), etc. The HBM emphasized knowledge as control, while the SEM emphasize taking all environmental determinants into cognizance, for instance through effective policies that hamper availability, accessibility of empty calories at learning institutions or environments. This can be achieved though making laws in respect to that effect (Sarac & Butnariu, 2020; Tegmire et al., 2021).

Conclusion

Currently, this research's main objective was to assess the awareness /knowledge, attitude, and practice of university students in Sokoto, Nigeria towards empty calories. The result of the study unveiled that, the majority of the students had a moderate level of awareness (knowledge) about empty calories, but their attitude and practice towards empty calories were poor. The study found that the students' awareness (knowledge) about empty calories was influenced by their demographic characteristics, such as age, sex, and level of study. The students' attitude towards empty calories was found to be influenced by their perceived benefits and risks of consuming empty calories. The study also found that the students' practice towards empty calories was influenced by their awareness (knowledge) and attitude towards empty calories. The students who had a higher level of awareness (knowledge) and a more positive attitude towards empty calories were more likely to practice healthy eating habits. The findings of this study have implications for public health interventions aimed at promoting healthy eating habits among university students in Nigeria. The study suggests that interventions should focus on improving the students' awareness (knowledge) and attitude towards empty calories, as well as providing them with the skills and resources needed to practice healthy eating habits.

Recommendations

Based on the findings of this study, the following recommendations are made:

- Public health interventions are needed to increase awareness (knowledge) and attitude of university students with regards to empty calories excessive consumption.
- Interventions are to be provided to students to inculcate healthy eating habits
- Universities and other related learning institutions should try to provide healthy food options at their premises.

- The is strong need for public health campaigns with a view to raise awareness about the risks of consuming empty calories.
- Further research should be conducted to explore the factors influencing the awareness or knowledge, attitude, and practice of university students towards empty calories.

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