

Knowledge, Awareness, Believes toward Sugar-Sweetened Beverages among Nursing Students – A Cross-Sectional Study from Saudi Arabia

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Abstract

Background and Aims: Sugar-sweetened beverages (SSBs) are a major source of excess calories and added sugars, leading to rapid increases in energy intake and a higher risk of metabolic disorders such as obesity and diabetes. This study aimed to evaluate the awareness and consumption patterns of sweetened beverages among nursing undergraduates in Saudi Arabia. **Methods:** A cross-sectional, web-based survey was conducted among undergraduate nursing students between June and August 2025. Participants were recruited through social media platforms, such as WhatsApp, and through the university email, using convenience sampling. Data were collected using a pre-validated questionnaire and analyzed by Statistical Package for the Social Sciences (SPSS) version 26 (SPSS Inc., Armonk, NY, USA). **Results:** A total of 383 undergraduate nursing students participated in the study. More than half of the nursing students were male (55.3%, $n = 196$), and the majority were aged between 18 and 22 years (68.1%, $n = 261$). Overall, nursing students demonstrated a high level of awareness regarding the health risks of sugary beverages, with 86.9% recognizing their association with weight gain and diabetes. However, consumption remained prevalent. Nearly half of the nursing students (43.1%, $n = 165$) reported consuming sweetened soft drinks 1–5 times during the previous week. Knowledge about the difference between SSBs and those containing artificial sweeteners was limited, with only 29.8% indicating familiarity with this distinction. Nevertheless, most nursing students (88.8%) acknowledged that sugary soft drinks could negatively impact health. **Conclusion:** Although nursing undergraduates have demonstrated substantial awareness of the health risks associated with sugary beverages, this knowledge did not consistently translate into healthier drinking behaviors. These findings underscore the need for focused educational initiatives that strengthen not only general awareness but also specific nutritional understanding, enabling students to make more informed choices regarding sweetened beverage consumption.

Key words: Frequency, obesity, Saudi Arabia, students, sweetened soft drinks

INTRODUCTION

Globally, the consumption of sugar-sweetened beverages (SSBs) is becoming more common among people of all genders, raising concerns about possible health risks. The prevalence of SSB consumption has increased significantly, from 6.58% in 1990 to 11.13% in 2021, according to recent projections, with females continuously exhibiting greater consumption levels than males.^[1] SSBs are liquid drinks that a lot of people drink for fun or refreshment.^[2] Sodas, energy drinks, sweetened teas, and sweetened juices are examples of SSBs that often have a high added sugar content and little nutritional

value; however, some people drink them more frequently for pleasure or out of strong desire.^[2,3] This may result in consuming too many calories and raise the risk of metabolic diseases such as obesity, type 2 diabetes, and heart disease.^[4,5] Recent studies highlighted the negative

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health effects associated with long-term consumption of SSBs.^[4,5]

There are natural and artificial sugar substitutes in the food and beverage industry. Artificial sweeteners are increasingly being used to replace traditional sugars such as sucrose and corn syrup.^[6,7] In the United States, the Food and Drug Administration regulates these substances as food additives and maintains a list of those classified as “Generally Recognized as Safe” (GRAS) and approved for use in food products.^[8,9] Despite concerns about potential adverse effects and the risk of chronic diseases, many individuals continue to consume SSBs for various reasons. These reasons may include perceived health benefits, self-management of digestive discomfort, seeking pleasure or enjoyment, or social influences from peers and colleagues.^[7,9] Obesity and weight gain have been rising both globally and within Saudi Arabia, with younger age groups being particularly affected, and sugary beverage consumption remains especially high among young adults, which is the first reason for metabolic diseases.^[10]

University students represent a critical demographic for studying SSB consumption because they are in a transitional life stage, often developing lasting dietary habits while facing academic, social, and lifestyle pressures.^[3,10,11] In the context of the Middle East, where dietary patterns and beverage preferences may differ from Western contexts, understanding consumption trends among students is especially urgent.^[12,13] A 2023 cross-sectional survey of undergraduates at a Saudi university reported that nearly all participants displayed high levels of knowledge about SSBs, and almost all held positive attitudes toward limiting SSB intake, yet fewer demonstrated healthy practices, indicating a disconnection between awareness and actual behavior.^[14] Similarly, another cross-sectional study in Malaysia and other regions reveals that even when knowledge and attitudes toward SSBs are favorable, frequent consumption remains common.^[15] Given this context, examining the knowledge, awareness, and beliefs about SSBs among nursing students in Saudi Arabia is crucial. Nursing students are future health professionals, and their personal behaviors and health beliefs can affect their ability to advise patients and promote healthy lifestyles. This study aims to investigate how nursing undergraduates perceive SSBs, their awareness of associated health risks, how they differentiate between sugar-sweetened and sugar-substituted SSBs, and their personal consumption patterns and beliefs.

METHODOLOGY

Study design, setting, and population

A cross-sectional study was conducted among university students residing in the Riyadh region, Saudi Arabia, to assess and capture awareness and consumption patterns of

SSBs. It was a prospective self-reporting survey using an online questionnaire-based study conducted between June and August 2025. Our target population included adults aged ≥ 18 years, of both genders, able to understand Arabic, and willing to complete the survey, currently pursuing their degrees at King Saud University. Individuals who did not meet the inclusion criteria or lived in other regions of Saudi Arabia were excluded from the study. Respondent anonymity and confidentiality were ensured throughout the study. Submission of the completed survey was considered consent to participate in the study.

To assess awareness and consumption patterns of SSBs, the questionnaire was adapted from previous studies published in a similar context.^[3,5] The questionnaire was initially designed in English and later translated into Arabic using forward and backward translation procedures.^[3,5] A pre-validated questionnaire on awareness and consumption patterns of sweetened drinks was developed from previous literature,^[3,5] consisting of a total of 14 items. The 14-item tool was divided into two sections. The first section focused on demographic characteristics of the students with a total of four items, including age, gender, social status, and education. The second section asked students about their awareness of the harms of SSBs, frequency of sweetened drink use, consumption patterns, and beliefs about sweetened drinks, with a total of 10 items. All questionnaires were assessed using a binary scale and multiple-choice questions. Before the study began, the designed questionnaire underwent two validation steps. First, the initial draft was evaluated by a research expert in survey design to check content accuracy and flow. Second, a pilot study was conducted among a randomly selected sample of 30 healthcare students to gather opinions and assess the feasibility of the study by pre-testing the questionnaire.

Written informed consent was obtained from undergraduate students. Any amendments or recommendations from the pilot study were considered and incorporated into the final questionnaire. The reliability test was conducted by calculating Cronbach’s alpha using SPSS v.26, which was found to be 0.85. Data from the pilot study were not included in the final analysis. The final questionnaire was distributed using online survey tools. A Google Form was created, and participants were invited through social media applications such as WhatsApp, Twitter, and Facebook, as well as via email. An invitation link containing the survey questionnaire was sent to participants. For data collection, the snowball technique was used, where participants recruited others to complete the survey.

Statistical analysis

Descriptive statistical methods were used to summarize data on sociodemographic characteristics. For categorical variables, data were summarized as frequencies (n) and

percentages (%), whereas continuous data were presented as means and standard deviations. Statistical Package for Social Sciences version 26.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. The chi-square or Fisher's exact test was used to determine significant associations between variables, with a $P = 0.05$ considered statistically significant.

RESULTS

Characteristics of study subjects

A total of 383 nursing undergraduates responded to the questionnaires. Among those, 55.3% ($n = 196$) of them were male, 68.1% ($n = 261$) of them were young, aged between 18 and 22 years 91.1% of them were single ($n = 349$). The majority of the respondents (96.6%) were pursuing a bachelor's degree in Nursing. The details regarding the demographic characteristics of nursing undergraduates are given in Table 1.

The current findings show that nursing undergraduates in Saudi Arabia consume sweetened beverages; however, their consumption pattern is varied (Table 2). For example, 43.1% ($n = 165$) nursing undergraduates consumed sweetened soft drinks between 1 and 5 times in the past week, whereas 17.8% ($n = 68$) never consumed soft drinks in the whole week. In this study, we observed that 70.5% of the undergraduates did not drink the soft drink daily ($n = 270$), whereas 15.9% ($n = 61$) drank once in a day. However, 86.9% ($n = 333$) undergraduates revealed that frequent consumption of soft beverages increases the risk of weight gain and diabetes.

Knowledge about the difference between SSBs and those made with sugar substitutes was limited. Only 29.8% said they understood this distinction, whereas 70.2% did not. However, most participants (88.8%) recognized that sugary soft drinks can be harmful.

Table 1: Demographic characteristics of Saudi participants

Variables	Frequency (n)	Percentage
Gender		
Male	196	51.2
Female	187	48.8
Age (years)		
18–22	261	68.1
23–25	93	24.3
26	29	7.6
Social Status		
Single	349	91.1
Married	34	8.9
Education		
Bachelor's in Nursing	370	96.6
Masters	13	3.4

Awareness of health risks was generally high. Nearly nine in ten students (86.9%) believed that frequent intake increases the risk of weight gain and diabetes, although 10.4% were unsure and 2.6% did not share this belief. When asked what comes to mind when hearing "fizzy sugary drinks," over half (54.3%) associated them with soda, whereas others mentioned energy drinks (17.5%), local juices (16.7%), or other SSBs (11.5%). Students held mixed opinions about increasing the price of sweetened beverages as a public-health measure. About one-third (33.2%) strongly agreed, and 19.3% agreed, whereas 26.4% were neutral and 21.1% opposed the idea. More than half (56.4%) believed that difficulty avoiding soft drinks is related to addiction, whereas 43.6% did not. When it comes to reducing consumption, 53% said they try to replace carbonated drinks with healthier alternatives such as natural juices, 37.3% do this sometimes, and 9.7% do not attempt substitutions.

With regards to consumption of SSBs, 41% of the undergraduates consumed during lunch time, whereas 43% of them preferred dinner time, and 13% of them between meals, as shown in Figure 1.

In this study, no significant differences in beliefs toward sweetened drinks were observed between male and female nursing undergraduates (Figure 2a). In contrast, age was significantly associated with beliefs toward sweetened drinks ($p = 0.011$), as illustrated in Figure 2b. However, the educational level of nursing undergraduates was not significantly associated with beliefs regarding the dangers of sugar-sweetened beverages (SSBs), as shown in Figure 2c.

DISCUSSION

The current findings revealed that most respondents tend to have good awareness of the risk of SSBs. For instance, about 87% consider frequent soft-drink consumption harmful. These findings were consistent with earlier findings.^[3,16] For example, awareness tends to be high even when consumption

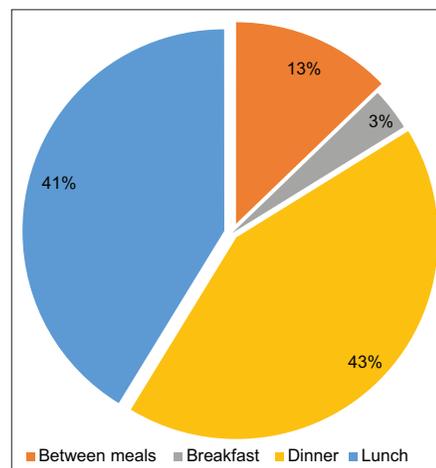


Figure 1: Consumption pattern of SSBs among undergraduate nursing students

Table 2: Frequency of intake, and beliefs of sweetened soft drinks among the nursing undergraduates (n=383)

Variables	Frequency (n)	Percentage
Over the past week, how many times did you consume a sweetened beverage?		
Between 1 and 5 times	165	43.1
Between 6 and 10 times	64	16.7
Between 11 and 15 times	42	11.0
I don't know exactly	44	11.5
I did not consume	68	17.8
How many times do you drink a sweetened soft drink per day?		
Once in a day	61	15.9
Twice in a day	17	4.4
Thrice in a day	17	4.4
Not on a daily basis	270	70.5
Do you believe that frequent consumption of sweetened soft drinks increases the risk of weight gain and diabetes?	333	86.9
Yes	10	2.6
No	40	10.4
I don't know		
Do you know the difference between sweetened drinks with sugar and drinks sweetened with sugar substitutes?	114	29.8
Yes	269	70.2
No		
Do you know how dangers of sugary soft drinks?		
Yes	340	88.8
No	43	11.2
When you hear the word fizzy sugary drinks, what comes to your mind?		
Energy drink	67	17.5
Local juice drink	64	16.7
Soda	208	54.3
Other	44	11.5
How do you feel about raising the price of sweetened beverages in your community as a tool to reduce negative health outcomes?	74	19.3
Agree	127	33.2
Strongly agree	101	26.4
Neutral	81	21.1
I don't support raising price		
Do you think that the inability to stay away from soft drinks is due to addiction to them?		
Yes	216	56.4
No	167	43.6
Are you trying to reduce the use of carbonated drinks by replacing them with non-carbonated drinks such as natural juices?	203	53
Yes	37	9.7
No	143	37.3
Sometimes		

remains substantial. For example, a study among Saudi and Arab students found that although consumption was higher among male students, female students tended to show greater knowledge about soft-drink risks and more support for preventive policies.^[16] In another recent study among university students, similar findings were reported, and revealed a high awareness of the health risks associated with frequent SSB consumption.^[3] More than 90% of students recognized the role of SSBs in contributing to obesity, type 2 diabetes, and tooth decay, while awareness of their association with cardiovascular, kidney, and liver diseases

was also substantial.^[3]

The present study shows that nursing undergraduates in Saudi Arabia exhibit varied patterns of SSB consumption. While 43.1% reported drinking soft drinks 1–5 times in the past week, 17.8% did not consume any, and only 15.9% reported daily intake. Overall, this pattern is somewhat lower than what many previous studies have documented among student populations. Several earlier investigations have noted a higher prevalence of soft-drink use among university students. For example, Alzaben *et al.*^[17] found that a large

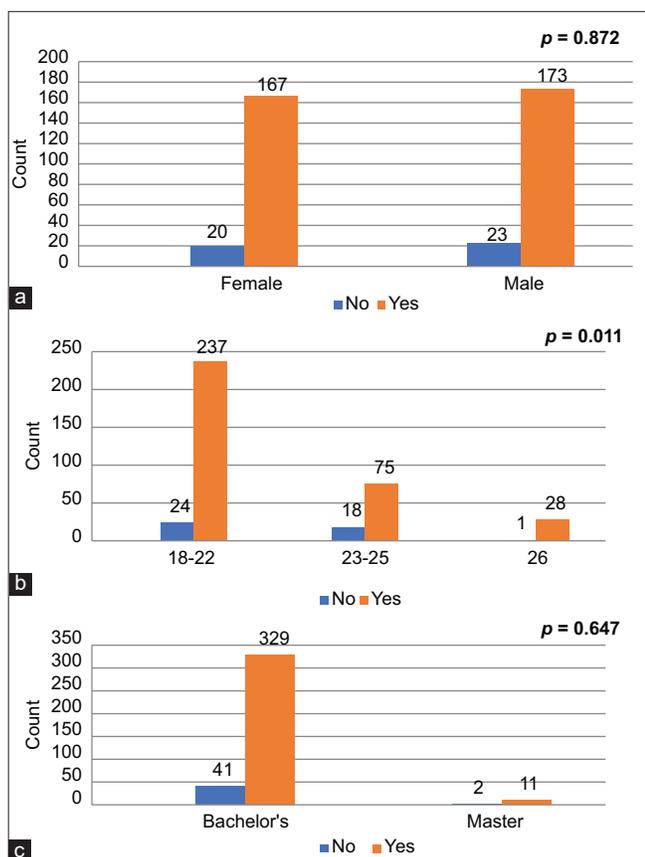


Figure 2: (a-c) Association between gender, age, and educational levels and beliefs of nursing undergraduates about the dangers of sugar-sweetened beverages

proportion of participants (82.9%) consumed sweetened soft drinks 1–3 times/month, with habitual drinking identified as the most common reason (27.1%). Social gatherings (12.9%) and eating at restaurants (12.4%) also contributed to consumption, whereas advertising had the least influence (7.1%).^[17]

Similarly, Bawadi *et al.* reported that the most frequently consumed SSBs among college students were hot drinks, averaging four servings per day and contributing approximately 180 calories daily. Although fruit drinks were consumed less often, they contributed nearly the same caloric intake. In total, students consumed sugary beverages higher per day from SSBs.^[18] Similarly, another recent study among university students in 2023 revealed that students consume sweet drinks six or more times per month as well as the frequency of consumption was higher on one occasion.^[19] Furthermore, students who were engaged in sports or physical fitness activity were significantly more likely to consume soft drinks than non-physically active individuals, as well as smokers, in comparison to non-smokers.^[19-21] Most participants recognized that regular consumption of sweetened beverages and drinks could raise the risk of weight gain and diabetes, yet only 29.8% understood the difference between SSBs and those made with sugar substitutes. While Bawadi *et al.*'s findings

revealed that only 1.2% of students reported drinking a can, bottle, or a glass of energy drink ≥ 1 time/day.^[18] These results indicated that students were concerned about their health, and that they were substituting sweet ones to healthy drinks such as water and non-carbonated drinks. Studies also suggested that raising awareness of the negative effects of excessive sweet drink consumption could help reduce its use, which would help stabilize various metabolic disorders.^[22]

Although this study has some limitations, first, it has a limited sample size, despite all efforts to include as many undergraduates as possible. Second, this study included only nursing undergraduates from a single university in the capital region of Saudi Arabia, limiting the generalizability of the results to other categories of undergraduates from other regions of Saudi Arabia and other international countries. Despite these limitations, our study has several merits. To begin, this study considers the significance of students' expertise in finding out the frequency of unhealthy drink consumption and its pattern, which provides a better control plan of consumption of carbonated drinks through raising awareness and knowledge about the harmful events associated with such drinks. There is also a scarcity of such research in the field, notably among university students in Saudi Arabia. Furthermore, we focused on students because most literature reported that students are higher than individuals to consume unhealthy drinks.

CONCLUSION

The findings from this study highlight that while nursing undergraduates in Saudi Arabia show strong awareness of the health risks linked to SSBs, this understanding does not fully translate into healthier consumption habits. Most students recognized the dangers of frequent intake, yet a considerable proportion continued to drink sweetened soft drinks, with many reporting recent use. The limited distinction students made between SSBs and those containing sugar substitutes further suggests gaps in more detailed nutritional knowledge. Overall, the results point to a need for targeted educational efforts that not only reinforce general health risks but also address specific misconceptions, helping students make more informed choices about their beverage consumption.

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AVAILABILITY OF DATA AND MATERIAL

The datasets used and analyzed during the current study are

available from the corresponding author upon reasonable request.

COMPETING INTERESTS

The authors declare no conflict of interest.

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