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Factors Influencing on the Consumption of Sugar-Sweetened Beverages among Adults in Thi-Qar Hospitals, Iraq

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ABSTRACT

Background: Diet-related health problems are on a rising trend due to widespread ingestion of sugar-sweetened drinks, especially by adults in developing countries. Many factors can influence people's food choices and consumption. This study assessed sugar-sweetened beverage consumption among adults admitted to hospitals in Nasiriyah, Iraq.

Methods: A descriptive cross-sectional study from August 20, 2024 to January 20, 2025 using non-random convenient sampling was conducted in four hospitals in Thi-Qar Governorate, Iraq enrolling 384 participants.

Results: Most participants (50.0%) were 18-27 years old. Totally, 31.3% of subjects drank carbonated soft drinks two to three times per week; while a significant proportion (66.9%) consumed hot beverages more than five times a week. However, half of the participants (49.7%) fell into the fair (moderated) consumption score, with only 22.9% having a healthy consumption score and 27.3% had an unhealthy score. However, significant links were noted for age groups, educational level, socioeconomic status, and body mass index (BMI).

Conclusion: This study showed that more than half of the individuals consumed sugar-sweetened beverages moderately. Age, educational level, socioeconomic status, and BMI of the participants were significantly correlated to consumption of sugar-sweetened beverages.

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Introduction

Nutrition plays a crucial role in shaping overall health, preventing diseases, and supporting human longevity. A balanced, nutritious diet is essential for physical development, mental well-being, and protection against all forms of malnutrition (1). Also, lifestyle factors (such as regular physical activity, abstinence from smoking, and good mental health) and genetics influence the individual health outcomes (2). However, rapid urbanization, globalization, and lifestyle changes have contributed to a shift toward unhealthy dietary patterns, notably the increased consumption of foods and beverages which are high in sugars. A major contributor to these unhealthy diets is the rising intake of sugar-sweetened beverages, which has become a pressing global public health concern (3).

The World Health Organization (WHO) defines "free sugars" as those added by manufacturers, cooks, or consumers, as well as sugars naturally present in honey, syrups, and fruit juices (4). sugar-sweetened beverages (such as soft drinks, sweetened fruit juices, energy drinks, sweetened milk, and flavored teas) are a primary dietary source of these sugars (5). High intake of sugar-sweetened beverages is associated with increased risk of chronic diseases, including cardiometabolic disorders, hypertension, obesity, and type 2 diabetes mellitus (6). Chronic diseases such as diabetes and cardiovascular illnesses are responsible for 71% of global deaths annually (7). The burden of these diseases is similarly high in the Middle East and North Africa, where six of the ten countries with the highest diabetes prevalence are located. So a reduction in sugar-sweetened beverages consumption has been suggested as a key preventive measure (8).

Nowadays, based on industrial style to make the drinks sweet, palatable, and acceptable to many people, as well as their reasonable prices to afford the consumption, sugar-sweetened beverages have become a necessity in daily life, and their demand has increased due to advertisements (9). Consumption of sugar-sweetened beverages is especially high among young adults who often face multiple lifestyle transitions; while the environmental factors can affect the dietary habits too (10). Cultural, economical and environmental factors can further impact beverage consumption in different regions. In Saudi Arabia and Kuwait, high intake of sugar-sweetened beverages has reached to alarming rates of obesity and diabetes (11, 12).

In Iraq, the research on intake of sugar-sweetened beverages is still limited. However, a recent study in Erbil reported high consumption of sugar-sweetened beverages among adolescents with significant associations with being overweight and obese (13). An additional survey found that 42.7% of the population in Erbil city, particularly teenagers and young people (those under 25 years) drank sugar-sweetened beverages as energy drinks, while males consumed more than females (55.7% and 29.8%, respectively) (14). Furthermore, 24.8% of participants in a research among teenagers aged 15 to 24 years in Duhok, Iraq, consumed at least four "istican" of tea (a local measurement comparable to 30 mL) every day, and 70.8% of individuals drank four or more cans of soft drinks weekly (15). These findings highlight the need for region-specific researches and public health interventions (16). Therefore, this study aimed to assess the frequency and determinants of sugar-sweetened beverages consumption among adults admitted to hospitals in Thi-Qar, Nasiriyah, Southern Iraq.

Materials and Methods

From August 20, 2024 to January 20, 2025; a descriptive cross-sectional study was designed to evaluate the frequency of consumption of sugar-sweetened beverages among Nasiriyah hospitalized adults in Nasiriyah, Southern Iraq. Adult participants (≥18 years old and <60 years old) who visited public hospitals in Nasiriyah, Iraq made up the study population. Inclusion criteria were all people (ages 18-60 years) who were patients or guests in the hospital and gave their permission to be enrolled. Participants who were consent to participate and showed that they could listen and understand the study protocol were included. Exclusion criteria were participants who were on certain diets or had backgrounds for specific dietets. Additionally, people who were pregnant, had sugar sensitivity, or had chronic illnesses like diabetes were excluded.

Sampling technique was non-probability sample collection. A convenient sampling method was applied to enroll 384 subjects as a suggested sample that was determined by the use of the formula of Daniel's equation: . It was used to calculate the right sample size (n); while taking a 95% confidence level (CI) into account. A *p* was the rate of property availability of being 0.50, d as the error ratio of 0.05, and Z as the standard deviation of 1.96 (17-19). Lastly, by dividing the total number of patients that visited each hospital by the total number of necessary sample (384), the number of samples from each of four hospitals was determined. The dependent variable in this study was the frequency of sugar-sweetened beverages consumption over the previous week (more than five times per week, four to five times per week, two to three times per week, once per week, or none). The independent variables were age, marital status, educational level, socio-economic status, and body mass index (BMI).

A questionnaire was developed based on earlier studies on the same subject to collect the data. Each interview lasted between twenty and twenty-five minutes. Data were collected on participants' age, marital status, educational level, socio-economic status, and BMI. Socio-economic status was divided into three categories (low, medium, and high) by asking the participants many indirect questions and giving them appropriate scores (13). The frequency of consumption of particular drinks was based on prior researches on the topic as "no", "once a week", "twice to three times a week", "four to five times a week", and "more than five times a week" based on five Likert scale responses. By using the total

frequency of consumption, the overall consumption score was calculated (17-19).

Every item on the survey was copied to a code sheet, the data was entered into a computer, and the SPSS statistical program (Version 27, Chicago, IL, USA) was used to analyze the data. Basic statistics such as range, standard deviation (SD), average, frequency, and percentages were presented. Additionally, the significance of percentage differences in qualitative data was determined using the Chi-square test (X2-test). When the *p* value was 0.05 or less, it was deemed statistically significant. The Directorate of Health of Thi-Qar and the Research Ethics Committee of Southern Technical University authorized our visit to hospitals for the study. Participants were included in Bint Al-Huda, Al-Hussein, Al-Nasiriyah, and Al-Haboubi teaching hospitals. We conducted interviews with participants who provided their consent both orally and in written. To foster collaboration, we clearly stated the study's goals, assured them that their information would be used solely for the study, and guaranteed the privacy.

Results

Participants between the ages of 18 and 27 years made up the largest percentage (50.0%), followed by those between the ages of 28 and 37 (40.4%). The marital status of the individuals showed that 4.2% were widow or divorced, 45.3% were single, and 50.5% were married. In terms of educational level, secondary school graduates made up the largest percentage (22.1%), followed by those with a university degree (20.6%) and intermediate graduates (20.1%). The majority of participants had an average socioeconomic status (76.0%). In terms of BMI categories, 45.8% of participants were categorized as normal weight (18.5-24.9 kg/m^2), 35.7% as overweight (25-29.9 kg/m^2), and 18.5% as obese (≥30 kg/m^2). None of the subjects (0%) were categorized as underweight (BMI<18.5 kg/m^2) (Table 1).

Regarding the frequency of consumption of sugar-sweetened beverages, carbonated soft drinks were moderately consumed, while 31.3% drank 2-3 times weekly, followed by answer of "none" consumption (28.9%). A significant number of participants (66.9%) consumed hot drinks more than five times a week. Most of participants (29.9%) had abandoned such drinks, with no answer above the percentage. Additionally, most participants (79.2%) reported that they did not consume energy drinks. It was demonstrated that 46.4% of participants did not consume traditional and regional drinks; while others consumed the beverage in varying amounts, but with less frequency. Finally, the majority of individuals (32.3%) did not drink any dairy products added by sugar when compared to 31.8% who drank once a week (Table 2). It was illustrated that 49.7% of participants had a fair (moderated) consumption

Table 1: Distribution of socio-demographic characteristics of participants.

Variable		No.	%
Age (Years)	18-27	192	50.0
	28-37	155	40.4
	38-47	16	4.2
	>47	21	5.5
	Mean±SD (Range)	28.6±8.4 (18-59)	
Marital status	Single	174	45.3
	Married	194	50.5
	Divorced/Widow	16	4.2
Educational level	Illiterate	11	2.9
	Read and write	22	5.7
	Primary school	58	15.1
	Intermediate graduate	77	20.1
	Secondary graduate	85	22.1
	Diploma (Institute)	52	13.5
	College graduate and above	79	20.6
Socio-economical status	Low (1-4 score)	43	11.2
	Medium (5-8 score)	292	76.0
	High (>8 score)	49	12.8
BMI categories (kg/m^2)	Underweight (<18.5)	-	-
	Normal weight (18.5-24.9)	176	45.8
	Overweight (25-29.9)	137	35.7
	Obese (30 and more)	71	18.5

BMI: Body mass index.

Table 2: Distribution of participants' responses regarding consumption of sugar-sweetened beverages.

Consumption	More than 5 times weekly		4-5 times a week		2-3 times a week		Once a week		None	
	No.	%	No.	%	No.	%	No.	%	No.	%
How frequently do you consume carbonated soft drinks such as Pepsi?	46	12.0	33	8.6	120	31.3	74	19.3	111	28.9
How frequently do you consume hot drinks such as sweetened tea?	257	66.9	62	16.1	21	5.5	12	3.1	32	8.3
How frequently do you consume fruit or vegetable juice with added sugar?	71	18.5	55	14.3	75	19.5	68	17.7	115	29.9
How frequently do you consume energy drinks like Tiger?	13	3.4	23	6.0	15	3.9	29	7.6	304	79.2
How frequently do you consume traditional and regional beverages such as Qamar Al-Din?	42	10.9	32	8.3	37	9.6	95	24.7	178	46.4
How frequently do you consume dairy products that contain sugar, such as flavored milk drinks?	42	10.9	34	8.9	62	16.1	122	31.8	124	32.3

score, 27.3% had an unhealthy consumption score, and only 22.9% exhibited a healthy consumption score (Figure 1).

This study found no significant relationship between marital status and the overall consumption score, as indicated by a *p* value greater than 0.05. Participants older than 47 years had a healthy consumption score of 47.6% for sugar-sweetened beverages (p=0.006). Additionally, participants with university degrees (bachelor's degrees and higher) had a healthy consumption score of 30.4% regarding sugar-sweetened beverages consumption. Furthermore, 25% of participants with a middle socioeconomic status demonstrated healthy consumption patterns; while scoring over 24 points was related to sugar-sweetened beverages. Notably, 26.8% of obese participants reported adhering to healthy consumption patterns (scoring more than 24 points). In contrast, significant differences were observed among various socio-demographic characteristics, such as age groups, educational level, socioeconomic status, and BMI categories, all of which showed a *p* value of less than 0.05 (Table 3).

Discussion

This study provided a thorough analysis of the consumption of sugar-sweetened beverages that were commonly sold in Thi-Qar, Iraq. In this study, participants between the ages of 18 and 27 years made up the largest percentage (50.0%) as this age group tend to be more cooperative, responsive, and motivated to engage in surveys. Our findings are in line with a study that involved 628 participants from the population registration of the Arab city of Umm Al-Fahm in Palestine. This study found that the majority of participants (25.60%) were between the ages of 17 and 26 years identical to the results of a study performed before (20).

Our study participants' age ranged from 18 to 59 years (mean=28.6±8.4 years) and this finding closely resembled a related study conducted in the US, which found an average age of 28.9 years (21).

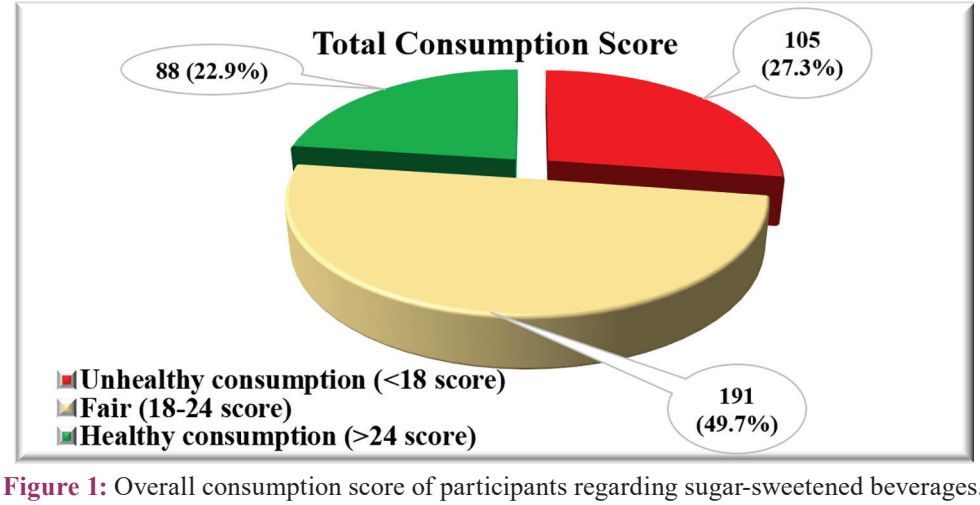

Figure 1: Overall consumption score of participants regarding sugar-sweetened beverages.

Table 3: The association between the socio-demographic parameters and the consumption score of sugar-sweetened beverages by participants.

Variable		Total consumption score						*P* value
		Unhealthy consumption (<18 score)		Fair (18-24 score)		Healthy consumption (>24 score)		
		No.	%	No.	%	No.	%	
Age (Years)	18-27	57	29.7	84	43.8	51	26.6	0.006
	28-37	38	24.5	92	59.4	25	16.1	
	38-47	6	37.5	8	50.0	2	12.5	
	>47	4	19.0	7	33.3	10	47.6	
Marital status	Single	50	28.7	87	50.0	37	21.3	0.070
	Married	47	24.2	96	49.5	51	26.3	
	Divorced/Widow	8	50.0	8	50.0	0	.0	
Educational level	Illiterate	7	63.6	2	18.2	2	18.2	<0.001
	Read and write	13	59.1	6	27.3	3	13.6	
	Primary school	27	46.6	27	46.6	4	6.9	
	Intermediate graduate	18	23.4	39	50.6	20	26.0	
	Secondary graduate	17	20.0	44	51.8	24	28.2	
	Diploma (Institute)	13	25.0	28	53.8	11	21.2	
	Bachelor's degree (college) and above	10	12.7	45	57.0	24	30.4	
Socio-economic status	Low (1-4 score)	23	53.5	16	37.2	4	9.3	<0.001
	Medium (5-8 score)	66	22.6	153	52.4	73	25.0	
	High (>5 score)	16	32.7	22	44.9	11	22.4	
BMI categories (kg/m^2)	Normal weight	50	28.4	86	48.9	40	22.7	<0.001
	Overweight	20	14.6	88	64.2	29	21.2	
	Obese	35	49.3	17	23.9	19	26.8	

The marital status of the individuals showed that 50.5% were married and this outcome is in contrast to a study done in Saudi Arabia, where the largest number of individuals were single (59.62%) and only 36.94% were married. Additionally, the percentage of widows and divorces in our study was 4.2% which is quite similar to the findings in another study to be 3.43% (22). In terms of educational level, secondary school graduates were the largest percentage (22.1%). The study findings are in conflict with another study which revealed that 52.4% of respondents were in higher educational level than a high school level (23).

As most people in a society avoid answering direct questions about their monthly income and socioeconomic position; therefore, indirect questions were utilized to evaluate socioeconomic status, and as a result, the majority of participants reported an average socioeconomic status (76.0%). In most cultures, the middle-class group is the largest. Our indirect questions revealed that the level of economic and social status was average and the income and home ownership were reported on socioeconomic status. These results are consistent with another study carried out in Armenia (24). In terms of BMI categories, 45.8% of participants were classed as normal weight (18.5-24.9 kg/m^2). In a study in Johannesburg, South Africa, the result was contradictory and the majority was classified as overweight or obese (25).

When this study evaluated the consumption of sugar-sweetened beverages, it was shown that carbonated soft drinks enrolled 31.3% of drinks as 2-3 times weekly. Increased awareness from health campaigns about the dangers of soft drinks, linked to conditions has led to varying consumption levels among participants. The results of our study are in agreement with the study conducted in Saudi Arabia revealing that 15.9% consumed soft drinks (26). The results of our study revealed that 66.9% of participants consumed hot drinks more than five times per week, suggesting a culturally rooted habit. These results are consistent with the finding from Anbar, Iraq, where 40% reported drinking hot beverages 2-3 times daily (27). However, they contrast with a study from Babylon City, where 58.5% reported infrequent consumption (28). Similar pattern was observed in Iran, where daily hot drink consumption reflected cultural traditions (29).

Our results found a variation in the consumption of fruit and vegetable drinks added with sugar. However, we found that most participants (29.9%) abandoned such drinks. The low consumption of these drinks may stem from participants' awareness of their sugar content or their preference for other drinks. Most participants were in favor of homemade, sugar-free juices. Meanwhile, our results

are in consistent with another study conducted in the Klang Valley, Malaysia, which found that 67% of the participants never consumed fruit or vegetable juices added with sugar (30). Regarding the extent of consumption of energy drinks, the vast majority of the participants answered that they did not consume these drinks (79.2%), as they were aware of the amount of sugar in the drinks and the high number of calories they contained, while they may not need this amount of energy. The results of our study are in agreement with a survey conducted in Iraq among members of the Iraqi community from different cities, including university students, gym goers, and public places, where 784 men and women participated in the study. The study revealed that 74.5% of the participants did not consume energy drinks (14).

Our study also revealed that 46.4% of participants did not consume traditional and regional drinks. This trend is driven by several factors, including changing dietary habits and consumer preferences. Nowadays, many people are in favor of industrial and packaged products for their convenience, leading to decreased consumption of traditional beverages. Additionally, traditional drinks may be less accessible in major markets, resulting in lower consumption among younger generations who feel less connected to their food heritage. Our findings are in contrast with a research conducted in European countries. Their study indicated an increased consumption of traditional drinks over the past few decades, particularly in countries with standardized production. For instance, it was shown that 91.6% of participants in Finland consumed these beverages (31). Finally, our study found that most participants did not consume dairy products with added sugar (32.3%), followed by 31.8% of participants who drank once a week, as most participants fell into two categories. (i) Those who did not prefer dairy products at all and (ii) those who preferred dairy products without added sugar. The results of our study are in consistent with a study conducted in Erbil city in the Kurdistan Region of Iraq. The study revealed that 17.2% of participants consumed dairy products with added sugar (32).

Based on an overall consumption score, the results of our study indicated that 49.7% of participants had a moderate consumption score. This trend can be attributed to participants' limited knowledge about sugar-sweetened beverages, their harmful effects, and the association between these drinks and various chronic diseases. Additionally, many participants may be unaware of healthy alternatives to sugar-sweetened beverages. However, our findings are not in consistent with those of a study conducted in Thailand. In that study, most participants (86%) reported consuming sugar-sweetened beverages despite their medical training (33). Furthermore, our results are different from those of a survey conducted in Duhok, Iraq, which included 729 participants. This survey found a high consumption rate of sugar-sweetened beverages (70.8%), indicating that unhealthy eating habits are prevalent among young people in Duhok (15).

We found an association between the socio-demographic parameters and the consumption score of participants. Our results indicated no significant relationship between certain socio-demographic characteristics (marital status) and the overall consumption score, as evidenced by a p value greater than 0.05. Our finding is different from a research conducted at Seyhan University in Duhok, Kurdistan Region of Iraq, that found that gender and race/ethnicity could significantly influence consumption of sugar-sweetened beverages (34). The results of our study showed that participants older than 47 years had a healthy consumption score of 47.6% for sugar-sweetened beverages (p=0.006). The high score in this group is largely due to the awareness to chronic diseases that come with aging. This led them to be cautious about their health, particularly regarding consumption of unhealthy foods and sugar-sweetened beverages. However, our results differ from those found in a study conducted in Erbil, Iraq. In that study, no statistically significant difference was observed across age groups regarding the association between daily consumption of sugar-sweetened beverages and sociodemographic variables (13).

Regarding educational level, the results of our study showed that participants with university degrees (bachelor degree and higher) had a healthy consumption score of 30.4% about consumption of sugar-sweetened beverages. This outcome may be attributed to two interrelated factors. First, higher educational level was correlated to an improved health literacy, which enhanced individuals' understanding of nutritional information and encouraged healthier eating habits (35). Second, individuals with a university education typically had better accesses to resources and environments that promoted health, making it easier for them to reach informed dietary choices (36). Our findings align with the research conducted in Kuwait identifying a significant positive correlation between educational level and consumption score, revealing that a majority of college graduates exhibited higher consumption scores (12).

At some point, the findings of our study are in consistent with a research conducted in Peru, revealing

that educational level could significantly impact the consumption of sugar-sweetened beverages (37). In contrast, our findings contradict a study finding that educational level did not significantly account for the participants' differences in consumption of sugar-sweetened beverages (38). Our study found that 25% of participants with middle socioeconomic status demonstrated healthy consumption patterns, scoring over 24 points about sugar-sweetened beverages. This finding is largely due to the group's significant population size and overrepresentation in our sample. The prevalence means that health-related behaviors, including dietary habits, reflect the characteristics of the larger segment of society. Individuals in the middle socioeconomic bracket generally have better access to nutritional information and resources than lower-income groups and maintain more balanced consumption patterns than those in higher-income brackets. This aligns with existing literature suggesting that socioeconomic status is a key factor influencing dietary behavior. These outcomes contrast with a study conducted in Erbil, Iraq. In that study, no statistically significant association was found between socioeconomic status and the consumption of sugar-sweetened beverages (13).

Our study results revealed that the outcome of healthy consumption scores were generally similar according to BMI category. However, 26.8% of obese participants reported adhering to healthy consumption patterns (scoring more than 24 points). This may be due to their focus on avoiding sugar-sweetened beverages; while overlooking other factors, such as foods high in fat, salt, and other unhealthy choices. Our findings align with a study conducted in South Korea that revealed a slight numerical difference in consumption of sugar-sweetened beverages, with the obese group showing a marginally higher rate (39). However, our results differ from those of a study involving 1,013 adults in the United States. Their analysis on consumption of sugar-sweetened beverages revealed specificity for the occasions, locations, and reasons for consumption of sugar-sweetened beverages. Ultimately, they found no significant difference between consumption of sugar-sweetened beverages and BMI (40).

Conclusion

This study showed that more than half of the individuals had moderate consumption of sugar-sweetened beverages. The majority of participants reported avoiding drinking of fruit or vegetable juices, energy drinks, traditional and regional drinks, and dairy products with added sugar during the previous week of our study. We found the age groups, educational level, socioeconomic status, and BMI categories of the participants to be important with significant effects on how much sugar-sweetened beverages were consumed.

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Authors' Contribution

A.S.N.A: Conceptualization, Data Curation, and Writing-Original draft preparation. J.T.A: Supervision, Methodology, and Validation. W.A.A.F: Resources, Software, and Formal Analysis. All authors have read and agreed to the final version of the manuscript.

Conflict of Interest

No conflict of interest is declared.

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