

Attitudes toward sweetened soft drinks and consumption patterns among Saudi women: A cross-sectional study

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Compliance with Ethical Standards

Approval to conduct this research study was obtained the Research Ethics Committee of College of Health and Rehabilitation Sciences (REC-CHRS) (Ethics number Z-F002) at Princess Nourah

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None.

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Abstract

Although sweetened soft drink consumption (SDC) has negative consequences on health, this dietary habit is common among the Saudi population (Saudi Arabia). Food selection and consumption are complex behaviors and associated with several constructs described by social cognitive theory. This study assessed the pattern of sweetened SDC and its associated behavioral and theoretical factors, with focus on attitude and expectations related to SDC among Saudi women. Participants (n=773) answered an online questionnaire on SDC patterns (frequency of consumption and quantity) and attitudes influencing those patterns. Association of attitudes with frequency of sweetened SDC was assessed using Spearman's test that revealed a positive and significant association between frequency and quantity of SDC (Spearman's rho=0.34, df=771, p<.0001). Highest correlations were observed between frequency of consumption and positive attitudes toward the perception of sweetened soft drinks as indispensable while eating, enjoyable, and value indispensable during social gathering (Spearman's rho=0.58, 0.55 and 0.40, respectively, df=771, p<.0001). Multiple regression analysis of attitudes showed considering soft drinks enjoyable and essential at eating were positively associated with consumption. Saudi Women are consuming soft drinks at high rates despite self-reporting this behavior as unhealthy. Social cognitive factors could potentially be predictors of unhealthy dietary behaviors among Saudi women. Designing nutrition education campaigns and culture-tailored information is warranted.

Key words

Sweetened soft drinks; Saudi Arabia; attitudes; consumption; Saudi women

1. Introduction

Obesity rates in Saudi Arabia are among the highest worldwide. The overall prevalence has increased significantly over the last 3 decades (Alqarni, 2016) reaching 35.4% among the adult population in 2016 and is largely exceeded among women (42% vs 31% in men) (World Health Organization, 2019). In addition, anticipatory projections indicate by 2022 approximately 75% of Saudi women will be overweight or obese (Al-Quwaidhi et al., 2014). Previous research identified obesity as a significant risk associated with many health conditions such as type 2 diabetes, insulin resistance, cardiovascular disease, and cancers (Kopelman, 2007; Renehan et al., 2008). Numerous factors have contributed to the *obesogenic environment* leading to the high prevalence of obesity among Saudi women, including physical inactivity and unhealthy dietary habits (Badran & Laher, 2011; Musaiger, 2011). Among the unhealthy dietary habits, overconsumption of soft drinks was reported in various studies (Al Otaibi & Kamel, 2017; ElTohami et al., 2015; Khabaz et al., 2017). Soft drinks belong to a group of unhealthy food products characterized by energy density and poor nutrient content that could lead to energy imbalance and obesity (Vartanian et al., 2007). In a cross-national Analysis of 75 Countries, Basu et al. (2013) indicated that increased soft drink consumption (SDC) by 1% is associated with increased overweight and obesity among adults by 4.8% and 2.3%, respectively. Martin-Calvo et al. (2014) demonstrated the relative increase risk of obesity was equal to 69% when daily consumption is reported. Among Middle East countries, Saudi Arabia is ranked first with the highest SDC rates (Euromonitor International, 2019). The average per capita consumption in Saudi Arabia stands at 113.8 L in 2020 (Statista Database., 2020).

In addition, daily SDC among Saudi women is demonstrated in several studies as indicated by frequency and quantity. As such, Al Otaibi and Kamel (2017) reported 66.2% student females consumed soft drinks once or more per week, while ElTohami et al. (2015) found 21.5% of adult

women indicated daily SDC. In response to this phenomenon, the Saudi government implemented a selective taxation policy on soft drinks with a 50% price increase to influence consumer buying behaviors. However, this policy addresses health behaviors at the population level through “trickle down” legislative action. Bandura’s social cognitive theory (SCT) suggests observational learning at the community, group, and interpersonal levels presents as a strong action to improve health promotion messaging and complement public health regulations (Pajares et al., 2009). As suggested by the SCT, some individual health behaviors are governed by interpersonal factors (e.g. observational learning, outcome expectations) in addition to environmental factors such as restrictive legislation (Centers for Disease Control and Prevention., 2002).

According to the latest report released by Euromonitor International (2019), current perception of Saudi consumers suggests soft drinks are costly and unhealthy and may explain consumer reduction or choosing healthier alternatives. However, soft drink companies adopted parallel strategies to maintain the same consumption level by Saudi consumers, e.g. reducing prices on multipacks of single-serve pack sizes, increasing availability of family pack size, and increasing promotional campaigns (Euromonitor International, 2019). Consequently, Saudi government efforts to reduce obesity among the Saudi population might be hindered. Food selection and consumption are complex individual choices and is the subject of interactions between several determinants including cultural, socio-economic, health value, and attitudes (Asp, 1999). Thus, exploring different factors influencing dietary patterns, rather than a single factor, has become increasingly important in addressing adverse health behaviors.

In Saudi Arabia, public health efforts are focused on changing lifestyle factors in the Saudi population. According to the Vision 2030 and the National Transformational Program, reducing the obesity incidence rate by 1% by 2020 is one of two goals set by the Ministry of Health (Saudi Ministry of Health, 2017). Thus, in addition to the selective taxation on soft drinks, culturally

tailored nutrition education campaigns could be effective. Understanding factors leading to high SDC, especially among Saudi women, is needed. Screening the literature revealed most research related to SDC emphasized descriptive reporting (frequency and quantity of consumption) (Al Otaibi & Kamel, 2017; ElTohami et al., 2015). Other studies measured the association of SDC with some health outcomes such as osteoporosis and osteopenia (Hammad & Benajiba, 2017; Khabaz et al., 2017), overweight and obesity (Alhakbany et al., 2018), or applied a specific health behavior model (Kassem et al., 2003). Therefore, this study assessed the pattern of SDC and associated factors while focused on attitudes, observational learning factors, and value expectations among Saudi women. The knowledge and understanding gained in this study could be beneficial when designing culturally appropriate nutrition education programs for Saudi women as current or potential soft drink consumers.

2. Methods

A cross-sectional study was conducted from July - September, 2016. Data were collected using an online questionnaire, while participants were recruited using social media applications.

2.1. Sample Population

A total of 905 Saudi women aged 20-60 years participated in the study. Inclusion criteria were as follows:

1. Living in Saudi Arabia
2. Not under specific diet to lose weight
3. Not diabetic
4. Not diagnosed with osteopenia and/or osteoporosis

Criteria 2-4 were selected to control the potentially negative influencers of SDC patterns.

Approval for the study protocol was obtained from the Research Ethics Committee of College of

Health and Rehabilitation Sciences (REC-CHRS) (Ethics number Z-F002) at Princess Nourah University (Riyadh, KSA) in May 2016.

2.2. Instrumentation

The online questionnaire used for data collection contained 3 sections. Section 1 gathered socio-demographic information including age, sex, monthly income, marital status, and educational level. Section 2 collected data on patterns of Saudi women related to sweetened SDC. Patterns comprised frequency and quantity of soft drinks consumed. Quantity was estimated as ½ can, 1 can, 2 cans, or more than 2 cans, at each time the soft drink is consumed. Section 3 focused on attitudes toward soft drinks as developed by Pettigrew et al. (2015) and was modified to fit the objectives and population of this study. This section **included six items** to measure how participants consider soft drinks including: Healthy, enjoyable, value for money, indispensable at the moment of eating, could be allowed to children and indispensable during social gathering. The response categories used a 5-points Likert scale (Likert, 1932): 1- I strongly agree, 2- I agree, 3- I neither disagree nor agree, 4- I disagree, and 5- I strongly disagree. The same scale was used to evaluate frequency of SDC, including no consumption at all, rarely (1-3 times a month), sometimes (1-2 times a week), usually (3-6 times a week), and daily basis consumption.

Prior to use, the questionnaire was pre-tested among 15 Saudi women through two focus groups to assess face validity. Additionally, Content validity Index for individual items (I-CVI) and Content validity index for scale (S-CVI) were assessed by a panel of 6 experts who reviewed the relevance of each question based on a 4 point Likert scale (1=not relevant, 2=somewhat relevant, 3=relevant and 4=very relevant). S-CVI/Average and S-CVI/Universal agreement were calculated as reported by Rodrigues et al. (2017). The obtained values were ≥ 0.83 for I-CVI and equal to 0.91 and 0.83 for CVI/Average and S-CVI/Universal agreement, respectively. The questionnaire was modified according to suggestions made during focus groups and before it was

adopted. A clear definition of sweetened soft drinks was indicated at the beginning of the questionnaire to reduce potential confusion by participants. A Cronbach's coefficient ($\alpha=0.72$) with a 95% confidence interval [0.69, 0.75] was obtained indicating the questionnaire demonstrated acceptable internal consistency (Nunnally, 1978).

2.3. Data Collection

The questionnaire was made available online from July - September, 2016, and delivered using a social media applications (WhatsApp and Twitter). Potential participants were asked to provide consent before they could take part in the study. Participants were provided with an explanatory introduction to the purpose and nature of the study, inclusion criteria, and what was expected from them as participants. Rights to accept or refuse participation and to withdraw at any time while answering the questionnaire was also explained and guaranteed. Participant data were kept anonymous and confidential.

2.4. Data Analysis

Results in the presented study are expressed in percentages or in mean \pm standard deviation (SD). ANOVA was applied to test significance of mean differences according to frequency of sweetened SDC and attitudes among participants. To determine which of the responses had significantly different attitude values, a multiple comparison using Tukey-Kramer honestly significant difference (HSD) procedure was performed. Associations between frequency of sweetened SDC and quantity, and attitudes were assessed using the Spearman's rho correlation coefficient. Only attitudes with significant association were entered in the multiple regression analysis. A cut-off point of <0.05 for p-value was set for significance. All statistical analysis was performed using the SPSS software (version 24.0).

3. Results

A total of 905 Saudi women responded to the questionnaire of which 132 women were excluded due to missing information in scoring one or more attitudes towards consumption of soft drinks. Socio-demographic characteristics of the 773 participants included in this study were summarised (see Table 1). Approximately two thirds of participants belonged to the 20-29 years age category. More than half (52%) of participants were single and 76.8% had a university educational.

Nearly 40% of participants indicated they consume soft drinks either 1-2 times or 3-4 times per week. Daily consumption of these drinks was reported by 4.3% of participants. In terms of quantity consumed at each time, 61.2% of the participants had <1 can (=330 ml), while 35.8% had 1 can. Results included a positive and significant association (Spearman's rho=0.34, df=771, p<.0001) between frequency and quantity of SDC among the study population (see Table 2).

“Strongly disagree” was the degree of agreement with the highest scoring for attitudes “healthy” (76.5%), “indispensable at the moment of eating” (50.2%), “could be allowed to children” (59.6%) and “indispensable during social gathering” (34.5%). For both “enjoyable” and “value for money”, participants showed neutral attitude by 23.4% and 26.3%, respectively. Highest correlations were obtained between frequency of consumption and positive attitudes toward perceiving sweetened soft drinks as indispensable at the moment of eating (Spearman's rho=0.58, df=771, p<.0001), enjoyable (Spearman's rho=0.55, df=771, p<.0001) and , value indispensable during social gathering (Spearman's rho=0.40, df=771, p<.0001) (see Table 3).

Average scores based on the frequency of sweetened SDC were tabulated (see Table 4). All consumption frequencies except “allowable to children” showed a significant increase across the Likert scale (“Healthy”: $F [4, 768]=11.0, p<.001$; “Enjoyable”: $F [4, 768]=83.7, p<.001$; “Value for money”: $F [4, 768]=30.1, p<.001$; “Indispensable at the moment of eating”: $F [4, 768]=118.5, p<.001$ and “indispensable during social gathering”: $F [4, 768]=2.2 p<.001$). The obtained average score was in general low for the lowest frequency of consumption “never” compared to the highest frequency “always”.

Multiple regression analysis was conducted to assess the relative importance of the variables related to attitude on frequency of consumption, except of “allowed to children”. In general, the model explains 42% ($R^2 \text{ adjusted}=.42$) of the variance of the frequency of SDC ($F [5, 767]=114.98, p<.001$).

Three of the five variables (“enjoyable”, essential at eating”, and “essential for social gathering”) showed significant association with the frequency of consumption. Attitudes including soft drinks are enjoyable and essential at the time of eating were associated with more consumption compared to other attitudes (see Table 5).

4. Discussion

In this study, frequency of consumption and quantity of sweetened soft drinks consumed were significantly associated. SDC among women in the Arabic-speaking region is highest in Saudi Arabia with nearly half reporting regular consumption and some reporting daily consumption. Evidence suggests this female population is at increased risk for adverse health associated with SDC (Kang & Kim, 2017; Tucker et al., 2006). As such, we measured these associations to better understand this pattern among Saudi women. We recommend reducing the

frequency of consumption rather than the quantity would lead to a decrease in SDC among this population.

Our participant data might suggest implicit support for how soft drinks are viewed in the research literature and by the Saudi Food and Drug Authority. We found strong agreement among our sample for soft drinks as an unhealthy beverage option. Similarly, a significant number in our sample acknowledged soft drinks are largely inappropriate for children and half agreed soft drinks aren't required at mealtime. Our findings are in alignment with a recent study that suggested SDC was related to parental attitudes towards soft drinks, social norms, and social expectations (Pettigrew et al., 2015). Additionally, Saudi women were neutral when asked if they enjoyed SDC yet also identified soft drinks as a component of social functions. In addition to attitudes toward the products, participants expressed neutral attitudes towards perceived value for the cost of soft drinks. This could be a considerable finding given population-level soft drink taxation is used as an attempt to reduce consumption. When considering these findings, we could interpret SDC as a necessary element of social occasions or socializing among family, friends, co-workers, and community members as perceived by Saudi women. As a value expectation, a core SCT construct described by Bandura, a self-identified negative behavior (SDC) could be influenced by observational learning elements during social situations. As an example, the Arabic speaking region is experiencing an influx of westernized and convenience diets (Aboul-Enein et al., 2017; Coats et al., 2019) and SDC could also be a function of this trend. Current research corroborates our findings. In a large Pakistani study, researchers found consumer socialization, defined as expectations among cultural and social groups, is a key influencing factor in SDC (Shahzad et al., 2015).

Obesity rates are high in Saudi Arabia (Al-Quwaidhi et al., 2014; Alqarni, 2016; Badran & Laher, 2011; Memish et al., 2014), SDC is increasing (Al-Hazzaa et al., 2012; Al Otaibi &

Kamel, 2017; Alhakhbany et al., 2018; Khabaz et al., 2017; Serafi et al., 2017), and some attitudes about SDC among Saudi women are positive (Alfaris et al., 2015; Alnusayri et al., 2017).

Although our research focused specifically on attitudes toward SDC, these trends collectively present as a potentially significant public health issue for Saudi women and the population as a whole. Our study was performed prior to soft drink taxation implementation and therefore cannot predict the effectiveness of taxation efforts by the Saudi government or predict potential outcomes of the National Transformational Program. As evidenced in our study, Saudi women understand soft drinks are not healthy for adults or children yet view them (to some degree) as necessary at mealtime and during social interactions, and here we see elements of Bandura's outcome expectations: Soft drinks may be viewed as a complimentary element to family or social gatherings. As such, the attitudes "enjoyable" and "essential at eating" were significant predictors of SDC. Public health education and health promotion programs may need to shift their focus away from health messaging or add new segments that address attitudes currently associated with SDC (negative behavior) and social cognitive factors represent a significant disagreement (positive attitudes towards consumption). This type of strategic shift could also be in alignment with the National Transformation Program's focus on lifestyle factors. Working in joint fashion with health information campaigns that identify soft drinks as unhealthy, nutritionally deficient, and linked to overweight/obesity could be the next logical step forward in Saudi Arabia. Without accounting for the socio-environmental and cultural factors associated with Saudi women's preference for SDC, relying on educational campaigns alone could impede long term and sustainable outcomes.

There are several noteworthy limitations within this study. The online survey to collect data might be the main factor that could influence a selection bias. Online surveys are becoming more common assessing food patterns research as they have the advantages to be conducted at

low cost and in a short period of time. The sampling technique used in this study was convenient, however, as the target population was clearly defined and consecutive respondents were recruited, this **may reduce** the sampling bias in the sampling procedure. The results obtained in this study may, therefore, be considered applicable to our target population. The self-reported questionnaire by the participants could be another limitation. Although online self-reporting tools allow researchers to engage a large sample of people quickly, efficiently, and at low financial cost, when responding to the questions participants may not always answer truthfully (Demetriou et al., 2015). From a statistical perspective, the questionnaire was valid (Item-CVI ≥ 0.83 , CVI/Average=0.91 and S-CVI/Universal agreement=0.83) (Lynn, 1986), and reliable with the Cronbach value of 0.72 which is acceptable as indicated by Nunnally (1978). **However, internal consistency measured by Cronbach's alpha must be used and interpreted with caution (Streiner, 2003). In fact, the value of Cronbach alpha is significantly affected by the length of the scale (Tavakol & Dennick, 2011). Cortina (1993) demonstrated that a 6-item scale with an average item correlation of .30 has a Cronbach's alpha value of 0.72. Maintaining the average correlation and increasing the number of items to 12 improved internal consistency ($\alpha=.84$). Similar results were previously reported by Lord et al. (1968). In our study, the scale is considered short because it used six items. This could explain the low level of internal consistency we obtained.**

Our study has the strength of being a descriptive study. Consequently, it can provide an in-depth view of the attitudes influencing of sweetened SDC among Saudi women. Finally, the large sample size ($n=773$) is of crucial consideration.

5. Conclusions

Our study showed women in Saudi Arabia are consuming soft drinks at high rates even though they self-report this behaviour as unhealthy. Within our data, this high rate of consumption could

be influenced by positive attitudes mainly considering soft drinks enjoyable and essential at eating. These results could generate opportunities for new overweight and obesity interventions at the interpersonal level and focused programs tailored to SDC among Saudi females. In fact, designing appropriate nutrition education campaigns, complete with information tailored to specific population strata and/or a priority health issue, is a logical foundation to address the trends outlined in this study. Additionally, we recommend future researchers study SDC patterns among Saudi women by applying social cognitive theory to assess how attitude, observational learning, and outcome expectations might positively affect behaviour as a next logical step in public health research and health promotion programming.

Compliance with Ethical Standards

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Declaration of interest statement

The authors declare that they have no declaration of interest.

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Table 1

Demographic Characteristics of Participants (n=773)

Parameter	Number of participants	% of participants
Age (year)		
20-29	495	64.0
30-39	175	22.7
40-49	85	11.0
50-59	18	2.3
Marital status		
Single	403	52.1
Married	335	43.4
Divorced	27	3.5
Widow	8	1
Educational level		
Primary	8	1.0
Secondary	104	13.5
University	594	76.8
Master/PhD or equivalent	67	8.7
Monthly income (SAR)*		
<5000	365	47.2
5001-10000	227	29.4
10001-20000	140	18.1
>20000	41	5.3

*SAR = Saudi Riyals

Table 2

Patterns of Sweetened Soft Drinks Consumption by Participants (n=773)

Patterns of soft drinks consumption	Number of participants	% of the participants
Frequency of soft drinks consumption		
Never	93	12.0
Rarely (1-3 times a month)	349	45.2
Sometimes (1-2 times a week)	225	29.1
Usually (3-6 times a week)	73	9.4
Daily	33	4.3
Quantity of soft drink consumed at each time		
Less than 1 can	473	61.2
1 can	277	35.8
2 can	18	2.3
More than 2 cans	5	0.7

Note: Spearman's test indicates a significant positive correlation between frequency and quantity of consumption (Spearman's rho= 0.34, P<.0001), df = 771 for all the studied parameters.

Table 3

Attitudes Related to Sweetened Soft Drink and Correlation Frequency of Sweetened Soft Drinks Consumption (n=773)

Variables	I strongly disagree	I disagree	I neither disagree no agree	I agree	I strongly agree	Spearman's rho	p-value
Healthy	76.5	16.0	5.7	1.2	0.6	0.23	<.0001
Enjoyable	19.5	19.5	23.4	16.4	21.2	0.55	<.0001
Value for money	25.7	16.9	26.3	14.2	16.9	0.36	<.0001
Indispensable at the moment of eating	50.2	16.2	17.2	8.5	7.9	0.58	<.0001
Could be allowed to children	59.6	14.9	7.5	3.8	14.2	0.01	0.8
Indispensable during social gathering	34.5	14.4	19.9	14.1	17.1	0.40	<.0001

Note. Results are presented as % of total population. Response categories used a 5 point Likert scale. Correlation with frequency of sweetened soft drinks consumption is performed by Spearman's test. Significance was set for $p < .05$. $df = 771$ for all the studied parameters.

Table 4

Respondents Attitudes About Sweetened Soft Drink According to the Frequency of Consumption (n=773)

Variables	Never	Rarely	Sometimes	Usually	Always	df	F	p-value
Healthy	1.1±0.6 ^e	1.2±0.5 ^b	1.5±0.8	1.5±0.8	1.7±1.0	4, 768	11.0	<.001
Enjoyable	1.7±1.0 ^a	2.6±1.3 ^b	3.5±1.2 ^c	4.3±1.0	4.6±1.2	4, 768	83.7	<.001
Value for money	1.8±1.1 ^a	2.6±1.4 ^b	3.1±1.2 ^c	3.6±1.2	3.8±1.3	4, 768	30.1	<.001
Indispensable at the moment of eating	1.2±0.5 ^e	1.6±1.0 ^b	2.4±1.2 ^c	3.7±1.1	4.0±1.3	4, 768	118.5	<.001
Could be allowed to children	2.1±1.6	2.0±1.5	1.9±1.3	1.7±1.1	2.5±1.1	4, 768	37.7	>.05
Indispensable during social gathering	1.7±1.2 ^a	2.2±1.4 ^b	3.1±1.4 ^c	3.7±1.3 ^d	3.9±1.4	4, 768	2.2	<.001

Note. Data are presented as mean ± SD. P-value was determined using ANOVA. Comparison of mean attitudes for all pairs using the Tukey-Kramer HSD procedure shows significant difference (P-value<.05) as follows: **a**: “Never” versus “Rarely”, “Sometimes”, “Usually” and “Always”; **b**: “Rarely” versus “Sometimes”, “Usually” and “Always”; **c**: “Sometimes” versus “Usually” and “Always”; **d**: “Usually” versus “Always” and **e**: “Never” versus “Sometimes”, “Usually” and “Always”.

Table 5

Multiple Regression on the Frequency of Soft Drinks Consumption

Variable	beta	Std. Error	B	p-value	95.0% CI for b	Part R ²
(Constant)		.089	.897	<.0001	0.97, 1.27	
Healthy	.027	.039	.037	.346	-0.04, 0.12	.034
Enjoyable	.229	.026	.157	<.0001	0.14, 0.24	.214
Money for value	.006	.023	.004	.849	-0.,04, 0.05	.007
Indispensable at the moment of eating	.385	.026	.284	<.0001	0.24, 0.35	.371
Indispensable during social gathering	.069	.021	.045	.032	0.01, 0.09	.077

Note: Dependent Variable: Frequency of consumption. Model **F [5, 767]** = 114.89, Adjusted R²=0.44, p<.0001