Sugar Sweetened Beverages Consumption Behavior and Knowledge among University Students in Saudi Arabia

Hala Hazam Al Otaibi

***Abstract*—Sugar Sweetened Beverages (SSBs) represent a significant dietary source of add sugars in the Saudi population and a common practice among 75% of Saudis. The current study aimed to identify the consumption pattern of SSBs as daily and weekly among university students, to assess student's knowledge about the actual calories in one can or bottle of SSBs associated with their consumption. Across sectional study conducted utilizing pretested self-administered questionnaire among 414 undergraduate students at King Faisal University (KFU) in Al-Ahssa, Saudi Arabia. About 40% of students reported consuming SSBs once daily, and almost one third of them (27.5%) two or more daily. The majority of them consumes soft drinks weekly (69.6%) then energy drinks (40.6%) and sport drinks was less popular drink (25.6%). Multivariate logistic regression analyses predicted greater SSBs consumption among students how had incorrect answer about regular SSBs kilocalories content (OR 1.66, 95% CI 1.13 to 3.69), and less SSBs consumption among students in fourth year, class rank (OR 0.72, 95% CI 0.42 to 1.23). SSBs consumption was prevalent among student's and knowing the kilocalories content of SSBs associated with a lower consumption of SSBs health education programs aim to reduce the consumption and increase students knowledge in order to have healthier choices are needed.**

***Index Terms*—Sugar Sweetened Beverages, university students, knowledge, kilocalories.**

I. Introduction

Sugar Sweetened Beverages (SSBs) consumption have a negative health effects associated with excessive sugars, calories and caffeine, which increasing diabetes, risk of heart disease, metabolic syndrome and promoting weight gain especially in young adults (Brown et al., 2008). Globally the mean daily SSBs consumption is higher in upper-middle income countries (189 mL) (as Saudi Arabia) and lower-middle income countries (140 mL) than in high-income (121 mL) and low-income (83 mL) countries [1]. The WHO recommended that total added sugar consumption for adults and children must be not more than 10% of total daily energy intake (around 12 teaspoons of table sugar), but they preferred to be 5% of total daily energy intake (around six teaspoons of table sugar) to avoid dental caries [2], which is less than the 25g of added sugar that can found in can or bottle of soft drink. Furthermore, 75% of Saudis consume soft drinks, energy drink, sport drinks and canned fruit drinks which are rich in added sugar [3]. The researchers observed advertising usually target young adults (18-28 years old) and teens to market soft drinks, sports drinks and energy drinks in Saudi Arabia as refreshing drinks, especially in hot weather, more energy to do amazing things (speed, strength, power), good body shape, enhance academic performance, to be the coolest person in school, university, enjoying leisure with friends. All that usually advertisement by athletic or music icons. However, Alsunni and Badar [4] found 45.6% of Saudi college students in the eastern region consumed energy drinks daily. A recent study conducted at the same region found 81% of students consume a soft drink or sweet beverages one-twice/week [5]. Another study conducted among adolescent and adult in Hail (north region) reported 46% of their subject's consumer's energy drinks daily [6]. Studies suggest that enough knowledge about the bad health effect of high sugars and calories of SSBs intake are associated with lowering levels of SSBs consumption [7]. However, the present study has been undertaken to study the consumption pattern of SSBs as daily and weekly among university students, and to assess students knowledge about the actual calories in one can or bottle of SSBs associated with their.

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II. Methods

Across sectional study conducted utilizing pretested self-administered questionnaire among 414 undergraduate students at King Faisal University (KFU) in AL-Hasa, Saudi Arabia. Questionnaires were distributed to the selected subjects (Saudi, disease free, undergraduate students at KFU, and not pregnant for female) who recruitment by general invitation via, posters, social media as Whats App, and announcements at beginning of their lecture or tutorials by researchers . All students signed consent sheet and assured that responses would be kept confidential. The questionnaire was collected at the end of the lecture or tutorials by researchers. The Ethical Committee at King Faisal University a provided the study protocol. The questions were divided into four sections including: 1- Demographic information, 2- Anthropometric measurements (weight, height and Body Mass Index [BMI]) based on WHO guidelines [7]. 3- Consumption pattern as daily "How many can or bottle did you drink usually every day?", and weekly "In the past week how many can or bottle of (…….) did you drink?" Specific examples of name brands available in the local markets used to increase the clarity (Coca Cola, Pepsi, RedBull etc). 4- Nutritional knowledge about the kilocalories content one can or bottle of SSBs "How many calories does a regular 330gm SSBs as soft, sports, and energy drinks have?" Response as a- less than 130 kilocalories, b- 132-140 kilocalories (correct answer), c. more than 140 kilocalories. Independent samples t-teste and Chi-square were used to examine the difference and the

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relationship between the variables. Multivariable logistic regression analysis used to estimate odds ratios and 95% CIs for the predicting of SSBs consumption among students. All data analyzed using SPSS statistical package version 19, and a *P*-value <0.05 the cut-point for statistical significance.

III. Results

A total of 414 university students mean age of 21.26±4.61 years, most of them female (51.4%) with monthly household income more than 5000 Saudi Real, single (85.7%) and 42.5% in the fourth year. The mean BMI was in normal category (23.11±4.28) which indicated most of students had normal weight. Overweight-obese subjects represent 26.3% Table 1. About 40% of students reported consuming SSBs once daily and almost one third of them (27.5%) two or more daily. Most of the students consumes soft drinks daily (46.4%) then energy drinks (35.7%) and sport drinks was less popular as a daily drink (17.9%) Table II.

However, 68.8% of students did not know the kilocalories content, only one third (31.2%) of the them accurately reported the kilocalories. Knowledge about the kilocalories content was significantly difference by gender were more female (62.7%) than male (37.3%) correctly identify the kilocalories. Only one quarter (24.8%) of students how correctly answers the kilocalories content consumed >2 can or bottle of SSBs comparable to (28.8%) incorrectly answer students, fourth year students were more knowledgeable (51.2%) about the kilocalories content than other students. Daily SSBs consumption and class rank were significantly different Table III. Low knowledge of the kilocalories content was predicted of greater SSBs consumption (odds ratio 1.66 vs. correct answer). Class rank was a significant predictor for less SSBs consumption among students in fourth year (odds ratio 0.72, vs. other class ranks). Gender and BMI category were not a significant predictor of SSBs consumption Table IV.

TABLE I: Subjects Characteristics (N=414).

Variables	
Male	201(48.6%)
Female	213(51.4%)
Household income (Saudi Real)	
≤5000	134(32.4%)
>5000	280(67.6)
Marital status	
Single	355(85.7%)
Married	59(14.3%)
Education years	
First year	87(21%)
Second year	80(19.3%)
Third year	71(17.1%)
Fourth year	176(42.5%)
Body Mass Index (kg/m^2), (Mean, s.d)	23.11±4.28
underweight- normal	305(73.7%)
overweight- obese	109(26.3%)
Age *(Mean, s.d)*	21.26±4.61

TABLE II: SSBs Consumption among Students (N=414).

Weekly SSBs consumption			
Variables	Soft drinks	Energy drinks	Sports drinks
Daily	192(46.4%)	148(35.7%)	74(17.9%)
4-5 times/week	30(7.2%)	6(1.4%)	10(2.4%)
2-3 times/week	66(15.9%)	14(3.4%)	22(5.3%)
Rarely/ seldom	126(30.4%)	246(59.4%)	308(74.4%)
Daily SSBs consumption			
Variables	All SSBs drinks		
Once daily	164(39.6%)		
≥2daily	114(27.5%)		
Rarely/ seldom	136(32.9%)		

TABLE III: Nutritional Knowledge about SSBs Consumption (N=414).

Variables	kilocalories content		
	Correct answer	Incorrect answer	P
	129(31.2%)	285(68.8%)	0.304
BMI (kg/m^2), (Mean, s.d)	22.90±3.97	23.23±4.44	0.636
Underweight-normal	97(75.2%)	208(73%)	
Overweight-obese	32(24.8%)	77(27%)	
Gender (n%)			
Male	48(37.3%)	206(72.5%)	0.045*
Female	81(62.7%)	79(27.5%)	
Education years (n%)			
First year	18(14%)	69(24.2%)	0.038*
Second year	26(20.2%)	54(18.9%)	
Third year	19(14.7%)	52(18.3%)	
Fourth year	66(51.1%)	110(38.6%)	
Daily SSBs consumption(n%)			
Once daily	41(31.8%)	108(37.9%)	0.041*
≥2daily	32(24.8%)	82(28.8%)	
Rarely/ seldom	56(43.4%)	95(33.3%)	
*P<0.05			

TABLE IV: The Prediction of Daily SSBs Consumption among Students (N=414).

Variables	P- value	Odds ratio	95% CI
Knowledge of kilocalories content			
Correct answer	Reference		
Incorrect answer	0.039*	1.66	1.13-3.69
Gender			
Male	0.875	0.96	0.65-1.44
Female	Reference		
Body Mass Index			
Underweight- normal	Reference		
Overweight- obese	0.398	1.08	0.64-1.59
Education years			
First year	Reference		
Second year	0.567	0.83	0.44-1.56
Third year	0.642	1.17	0.60-2.29
Fourth year	0.039*	0.72	0.42-1.23
*P<0.05.			

IV. Discussion

Undergraduate students at KFU reported high prevalence (67.1%), (once daily and ≥2daily) of SSBs consumption with only 32.9% of students never or seldom consume SSBs. This is consistent with Gase et al. [6] study were 73.9% of their subjects reported consuming a SSBs with only 23.8% never consume SSBs. Another study reported a different result among students from the University of Sydney were only 25% consume SSBs and most of them consume soft drinks (36%) [8]. However, O'Leary and colleagues had only 50 students participated in their study also the types of SSBs were fruit drinks, sweetened milk, tea and coffee. Nevertheless, our study included only three items and that can explain the difference between the results. Furthermore, we found concern result were almost one third (27.7%) of students consumed SSBs as ≥2 daily that more than the WHO recommendation for add sugar and can affect their future health.

The researchers observed that 40.6% of students drink energy drink as a common practice (daily, 4-5, 2-3times/week), Alsunni and Bader [4] found a similar prevalence (45.6%) among 410 university students in the eastern region. On the other hand, the current study result is less than Bulut et al. [9] found that 53.5% of Turkish university students consumed energy drinks. However, the researchers observed that energy drink usually sale in corner shops or restaurants mixed with add flavors as lemon, blueberry, strawberry... etc to make energy drinks tasty and that very popular not only among young adults also in teens and children with absence control from the health ministry. Most of the students consume soft drinks (69.6%), (daily,4-5,2-3times/week). Majeed [10] reported higher percentage (81%) among students in the eastern region. However, soft drink is the popular SSBs. Almost half (46.4%) of students drink it as daily basis, Larson et al. [11] found young adults who drinking one and more soft drink every day three times or more a week.

Sports drinks were less popular among students (25.6%), (daily,4-5,2-3times/week) which is different than Rampersaud et al, [12] who reported higher percentages (58%), may be their study as an online survey (3361 adults ≥18 years) which is a large sample size from various geographic regions not only university students. Another reason may be the current study included 51.4% females, energy and sports drinks are mostly marketed for increasing physical performance and it can appear more muscles which is inappropriate for females [13], or may be sports drinks not available everywhere only in gyms and large supermarkets and most of the brands in the market not tasty.

Moreover, we found only one third of students correctly answers the kilocalories content one can or bottle of SSBs which is remains low. Due to our knowledge, there is no previous local study for comparison among Saudi university students. However, compared with previous studies, American university students reported low percentage were only 12.3% can correctly estimate calorie content authors explain that students had lacked knowledge or they under-over estimate calorie [14]. Consistent with our findings, 32% of low-income American knows the kilocalories content one can or bottle of SSBs [15]. Inconsistent results a phone survey targeted adults aged 18 and older and asked subjects to answer the kilocalories content of SSBs, most of subjects knowledgeable they can correctly identify the kilocalories content (78% male and 69% female)[16]. We observed significant differences in kilocalories content knowledge by gender, more female can correctly identified the calories content and that observed in previous studies [17], were college female (80.9%) more likely to know the calories content compared to male. Class rank was significant differences, while students in fourth year more knowledgeable (51.2%) comparable to students in the other years. Furthermore, a student with correct answer had low significant SSBs consumption. The significant differences reported in the current study not observed in other studies [14], [16].

Furthermore, our study indicates that high knowledge of kilocalories content and class rank was predicted of low SSBs consumption. Similar result reported by Gase et al. [6] where high school graduate (P<0.01), some of college study (P<0.05) and be female (P<0.01) significantly predicted for low SSBs consumption among adults in Los Angeles. The significant findings confirm that knowledge can influence the dietary behaviors of adults. This study has a limitation as: First, this is a cross-sectional design the association does not provide on the direction of causality. Second, it was representative students from KFU only, which might not be representative of other universities in other regions or other population. Third, we use convenience sample volunteer students that can cause selection bias. Finally, all measures were self-reported as weight, height, daily and weekly SSBs consumption that cause under-over estimated results. In conclusion this study confirms the majority of students consume SSBs and soft drinks the popular SSBs then sports and energy drinks. Students who incorrectly identified kilocalories content, lower class rank had a significantly greater odd ratio for SSBs daily consumption. Further research should investigate associations between environmental, social factor and SSBs consumption among university students.

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