Short communication

Pattern of beverage intake and milk and dairy products sufficiency among high-school students in Kuwait

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طراز تناول المشروبات وتناول ما يكفي من الحليب ومنتجات الألبان لدى طلاب المدارس الثانوية في الكويت

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الخلاصة: إن استهلاك كميات كبيرة من المشروبات الغازية قد ترافق بانخفاض في تناول الحليب والأطعمة الغنية بالكالسيوم وارتفاع في مؤشر كتلة الجسم (BMI). وقد هدفت هذه الدراسة إلى استكشاف طراز تناول المشروبات لدى طلاب المدارس الثانوية الكويتية. فتم ملء استبيان حول المعارف والمواقف والممارسات المتعلقة بتناول المشروبات والحليب ومنتجات الألبان من قبل 190 طالباً كويتياً بأعمار 16-18 سنة، وتم حساب مؤشر كتلة الجسم لـ 181 منهم. وقد تبين أن تناول المشروبات الغازية المحلاة - وبدرجة أقل عصائر الفواكه المعلبة - قد أثر على تناول ما يكفي من الحليب ومنتجات الألبان لدى عينة طلاب المدارس الثانوية في الكويت. وعلى الرغم من أن مؤشر كتلة الجسم لم يكن مرتبطاً بعدم كفاية الحليب والألبان، فإن كثيراً من الطلاب الذين يعانون من فرط الوزن والسمنة أظهروا ممارسات غير صحيحة. ويوصي الباحثون بالثقيف التغذوي لطلاب المدارس الثانوية حول أهمية الحليب ومنتجات الألبان، وكذلك مخاطر الإفراط في تناول المشروبات الغازية المحلاة والعصائر المعلبة للوقاية من وباء السمنة المنتشر في الكويت.

ABSTRACT High consumption of soft drinks has been associated with lower intakes of milk and calcium-rich foods and higher body mass index (BMI). This study aimed to explore the pattern of beverage intake among Kuwaiti high-school students. A questionnaire on knowledge, attitudes and practices concerning beverages and milk and dairy products intake was completed by 190 Kuwaiti students aged 16–18 years and BMI was calculated for 181 of them. Intake of sweetened carbonated beverages and to a lesser extent packaged fruit juices affected the sufficiency of milk and dairy products intake among the sample of high-school students in Kuwait. Although BMI was not related to milk and dairy insufficiency, more of the overweight and obese students displayed incorrect practices. Nutritional education of high-school students on the importance of milk and dairy products as well as the hazards of excess sweetened carbonated beverages and packaged juice is recommended to prevent the obesity epidemic prevailing in Kuwait.

Caractéristiques de la prise de boissons sucrées et suffisance des apports en lait et produits laitiers chez des élèves d'établissements du secondaire au Koweït

RÉSUMÉ Une consommation élevée de boissons sucrées a été associée à une réduction des apports en lait et aliments riches en calcium ainsi qu'à une élévation de l'indice de masse corporelle. L'étude visait à explorer les caractéristiques de la prise de boissons sucrées chez des élèves du secondaire au Koweït. Un questionnaire sur les connaissances, les attitudes et les pratiques concernant la prise de boissons sucrées, de lait et de produits laitiers a été rempli par 190 élèves du Koweït âgés de 16 à 18 ans, et l'indice de masse corporelle a été calculé pour 181 d'entre eux. La prise de boissons gazeuses sucrées et dans une moindre mesure de jus de fruit préemballés affectait la suffisance des apports en lait et en produits laitiers au sein de l'échantillon d'élèves du secondaire au Koweït. Si l'indice de masse corporelle n'était pas lié à des apports en lait et produits laitiers insuffisants, les élèves en surpoids et obèses étaient plus nombreux à avoir de mauvaises pratiques. Une éducation nutritionnelle des élèves du secondaire sur l'importance du lait et des produits laitiers ainsi que sur les dangers de l'abus de boissons gazeuses sucrées et de jus de fruit préemballés est recommandée afin de prévenir l'épidémie d'obésité prévalente au Koweït.

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Received: 06/12/13; accepted: 20/05/14

Introduction

The dietary habits of schoolchildren and adolescents in Arab countries are nowadays characterized by a low intake of fresh fruits, vegetables and milk with a high intake of carbonated beverages and so-called "fast foods" (1). In Saudi Arabia, carbonated beverages and canned fruit drinks were shown to comprise 26% and 25% respectively of adolescents' daily fluid consumption (2). Harrington's review noted that soft drinks' consumption in the United States (US) had increased by 300% in the last 20 years (3). As children and teenagers get older, boys and girls drink less milk and more soft drinks and fruit juice (4). Vartanian et al. reported that intake of soft drinks was also associated with lower intakes of milk, calcium and other nutrients, with an ensuing increased risk of several medical problems such as diabetes (5). Additionally, Wyshak demonstrated an association between carbonated beverage consumption and bone fractures (6). More recently, Martin-Cavlo et al. (7) and Nasreddine et al. (8) found a strong and significant association between consumption of sugar-sweetened carbonated beverages and a risk of obesity in children and adolescents.

Although data concerning obesity and beverages intake in the Arab region are abundant, research concerning beverage consumption and its effect on the intake of milk and dairy foods is scarce. This study was therefore designed to explore the pattern of beverage intake among high-school students in Al-Ahmadi Governorate, Kuwait, and its effect on the consumption of milk and other dairy products. A secondary objective was to study any relationship between this pattern of beverage intake and the body mass index (BMI) of students.

Methods

Study design and sample

The study was performed on 98 girls and 92 boys aged 16–18 years, enrolled

from government high schools in Al-Ahmadi Governorate, Kuwait, between 1 March and 31 May 2013. Out of 240 high-school students who attended a scientific lecture on healthy eating behaviour in their schools, 190 (79.2%) were entered in the study.

Data collection

A dietary questionnaire on nutritional knowledge, food choices and eating behaviour was constructed in simple Arabic language, based on the work of Parmenter and Wardle (9) and Turconi et al. (10). Initially, a pilot study was done by introducing the questionnaire to 10 students chosen at random to assess their comprehension of such data. The questionnaire was modified accordingly and administered to the remaining students.

All questions were multiple choice or Yes/No responses. The questionnaire collected data on the students' sociodemographic characteristics and assessed their knowledge about the benefits and the recommended intake of milk and dairy products (2 items); their attitudes to milk and dairy products, i.e. whether they enjoyed consuming them (1 item); and their practices towards milk and other beverages, i.e. sources of milk (home, school), what kinds of milk drunk (cow, soy, camel, goat, milk food supplements), preference for full- or low-fat milk, preference for drinking milk or sugar-sweetened beverages, reasons for choosing milk (5 items). A student's attitude was rated as positive if he or she preferred milk and other dairy products, enjoyed drinking them, believed in their benefits and had no concerns about consuming them. Practice was judged to be correct if milk and other dairy products were available and consumed in preference to other beverages.

A food frequency sheet was included for students to estimate their most recent intake of milk and other dairy products and compare it with the recommended daily allowance (3 cups/day) (11). Regarding fluid milk,

intake of 2 cups/day was considered sufficient (12,13). The daily frequency of packaged fruit juice and carbonated beverages use was documented, and consumption was categorized as: heavy > 12 ounces (~ 355 mL)/day, moderate 8–12 ounces (~ 236–355 mL)/day or mild < 8 ounces (~ 236 mL)/day (14,15).

Anthropometric measurements were obtained by the main researcher according to the methods of Lee and Nieman (16), and BMI was calculated using the standard formula (17).

Data analysis

The collected data were statistically analysed using SPSS, version 20. Descriptive statistics were done for categorical data by numbers and percentages and for continuous data using mean and standard deviation (SD) and median and interquartile range (IQR). The prevalence of intake for a certain item was calculated as the number of cases per 100 students. The chi-squared and Fisher exact tests were used to compare the frequency of qualitative variables among the different groups.

Results

Beverages intake and milk and dairy products knowledge, attitudes and practice

A total of 190 students provided data on beverages intake and nutritional practices: 92 (48.4%) males and 98 (51.6%) females. The mean age of the students was 17.3 (SD 0.7) years; median age was 17 (IQR 17–18) years.

Sufficient milk and dairy products intake was reported by 30.0% and 45.3% of the studied students respectively. Out of all the studied students 36.8% preferred low-fat milk and other dairy products over full-fat types. Regarding the beverages consumed, 91.6% drank regular sugar-sweetened beverages and the rest preferred noncalorie-sweetened ("diet") beverages.

Table 1 shows a significant insufficiency in daily milk intake among drinkers of sweetened carbonated beverages ($P = 0.019$); this was more common in males than females but not significantly so ($P = 0.063$). Higher rates of milk insufficiency were seen with higher intakes of packaged fruit juices, but this also did not reach

Table 1 Daily frequency of beverages intake and daily sufficiency of of milk and dairy products intake among students

Beverages intake ^a by sex	Milk intake ^b				χ^2	<i>P</i> -value	Dairy products intake ^c				χ^2	<i>P</i> -value	
	Sufficient		Insufficient				Sufficient		Insufficient				
	No.	%	No.	%			No.	%	No.	%			
Carbonated beverages													
<i>Males</i>													
Mild	14	43.8	18	56.2	5.520	0.063	17	53.1	15	46.9	4.289	0.117	
Average	6	17.6	28	82.4			16	47.1	18	52.9			
Heavy	7	26.9	19	73.1			7	26.9	19	73.1			
<i>Females</i>													
Mild	17	39.5	26	60.5	2.872	0.238	24	55.8	19	44.2	3.029	0.220	
Average	5	23.8	16	76.2			7	33.3	14	66.7			
Heavy	8	23.5	26	76.5			15	44.1	19	55.9			
<i>All students</i>													
Mild	31	41.3	44	58.7	7.921	0.019	41	54.7	34	45.3	4.730	0.094	
Average	11	20.0	44	80.0			23	41.8	32	58.2			
Heavy	15	25.0	45	75.0			22	36.7	38	63.3			
Packaged fruit juice													
<i>Males</i>													
Mild	11	35.5	20	64.5	1.299	0.522	19	61.3	12	38.7	7.182	0.028	
Average	8	30.8	18	69.2			11	42.3	15	57.7			
Heavy	8	22.9	27	77.1			10	28.6	25	71.4			
<i>Females</i>													
Mild	13	41.9	18	58.1	3.853	0.146	12	38.7	19	61.3	1.409	0.494	
Average	8	33.3	16	6.7			13	54.2	11	45.8			
Heavy	9	20.9	34	79.1			21	48.8	22	51.2			
<i>All students</i>													
Mild	24	38.7	38	61.3	4.835	0.089	31	50.0	31	50.0	1.672	0.433	
Average	16	32.0	34	68.0			24	48.0	26	52.0			
Heavy	17	21.8	61	78.2			31	39.7	47	60.3			
Tea and coffee													
<i>Males</i>													
Mild	11	35.5	20	64.5	0.951	0.622	14	45.2	17	54.8	1.999	0.368	
Average	10	27.8	26	72.2			18	50.0	18	50.0			
Heavy	6	24.0	19	76.0			8	32.0	17	68.0			
<i>Females</i>													
Mild	16	35.6	29	64.4	5.345	0.069	22	48.9	23	51.1	1.234	0.540	
Average	13	35.1	24	64.9			15	40.5	22	59.5			
Heavy	1	6.2	15	93.8			9	56.2	7	43.8			
<i>All students</i>													
Mild	27	35.5	49	64.5	4.447	0.108	36	47.4	40	52.6	0.375	0.829	
Average	23	31.5	50	68.5			33	45.2	40	54.8			
Heavy	7	17.1	43	82.9			17	41.5	24	58.5			

^aBeverages intake: mild < 8 ounces (~236 mL)/day; moderate 8–12 ounces (~236–355 mL)/day; heavy > 12 ounces (~355 mL)/day (14,15).

^bMilk intake: sufficient ≥ 2 cups/day; insufficient < 2 cups/day (12,13).

^cDairy intake: sufficient ≥ 3 cups/day; insufficient < 3 cups/day (11).

statistical significance ($P = 0.089$). A similar trend for milk insufficiency was noticed among the heavy tea and coffee drinkers but, again, without statistical significance ($P = 0.108$). Table 1 also shows that although higher intake of different kinds of beverages was more common in students with dairy intake insufficiency, there was no statistically significant relationship with drinking carbonated beverages, packaged fruit juices or tea and coffee. However, we found a significantly higher intake of packaged fruit juice in male students with dairy insufficiency ($P = 0.028$), an effect which was not evident among female students ($P = 0.494$).

Assessment of knowledge regarding milk and dairy products needs and functions showed that 59.5% of students had correct knowledge of the needs while 81.6% had correct knowledge regarding the function. No statistical significant differences were detected when comparing the knowledge of needs or function with respect to sufficiency of other dairy products and milk intake, BMI and sex [data not shown].

Table 2 underscores that significantly more students with sufficient milk intake than those with insufficient intake reported correct practices (59.6% versus 40.6%) ($P = 0.024$). Similarly 54.7% of students with sufficient dairy products intake had correct practice versus 39.4% of those with insufficient dairy intake and this was close to statistical significance ($P = 0.051$).

Regarding attitudes 69.0% of the studied students had a positive attitude towards milk and dairy products intake. More students with sufficient milk and dairy intake had a positive attitude than those with insufficient intake, and for milk the relationship nearly reached statistical significance ($P = 0.059$ for milk and $P = 0.379$ for dairy products).

BMI and beverages and milk and dairy products intake

Of the surveyed students, 181 had their weight and height assessed; 9 (4.7%)

students (1 male and 8 females) refused weight measurement. Among these 87 students (48.1%) had normal weight, 50 (27.6%) were overweight, 21 (11.6%) were underweight, and 23 (12.7%) were obese. Although more male students were overweight and obese compared with female students, there was no significant difference in BMI between the sexes ($P = 0.078$) [data not shown].

There were no significant differences in BMI among students with respect to dairy intake ($P = 0.264$), milk intake ($P = 0.180$), drinking carbonated beverage ($P = 0.231$), packaged fruit juice usage ($P = 0.591$) or tea and coffee intake ($P = 0.418$) [data not shown].

Table 2 shows that although more obese (66.0%) and overweight (53.2%) students reported incorrect practice compared with normal (47.1%) and underweight (46.7%) students this result did not reach statistical significance ($P = 0.183$).

Discussion

The present study revealed a statistically significant insufficiency in daily milk intake among students who drank sweetened carbonated beverages, an effect which was more evident in males than females. Although carbonated beverages intake did not significantly affect dairy products intake, package fruit juice intake in males was significantly associated with dairy insufficiency. Blum et al. reported significant decreases in milk consumption in children who consumed soft drinks (18). Marshall et al. also found that milk intakes were inversely associated with intakes of juice drinks, carbonated drinks and added-sugar beverages (19). Recently, Libuda et al. reported that the consumption of all soft drinks has a bone catabolic effect and was negatively associated with total protein and milk consumption (20).

The current study showed that 27.6% of the included students were overweight while 12.7% were obese,

figures which are close to the reported prevalence of obesity in the USA (16.9% in children and adolescents in 2009–10) (21). In Kuwait, Al-Refaei et al. also published close figures in a younger cohort (21.3% were at risk of overweight and 14.4% were overweight) (22).

There was no significant difference in BMI among the studied students with respect to milk or dairy intake. In the United Arab Emirates, Kerdaki et al. reported a low prevalence of daily consumption of milk yet could not correlate this with overweight among female schoolchildren (23). On the other hand in Portugal, Abreu et al. found an inverse association between milk intake and both BMI and percentage body fat in adolescent girls (24), but, elsewhere, there is only moderate quality evidence that dairy products supplementation stimulates linear growth (25). Our findings are consistent with Lin et al. in Hong Kong who reported a lack of association between milk or other dairy products consumption and BMI and suggested that the negative association observed in Western populations may be due to confounding by socioeconomic status (26).

The current study found no significant difference in BMI and the amount of carbonated beverages, packaged fruit juices or tea and coffee consumed. Similarly, Rajeshwar et al. reported no significant association between soft drinks consumption and BMI (27). The consumption of sugar-sweetened beverages has been linked to rising rates of obesity in the USA as these drinks are less satiating than solid foods (28). A study from Saudi Arabia reported an association between sugar-sweetened carbonated beverages intake and BMI in 10–19-year-old boys and that their beverage intake correlated with poor dietary choices (29).

Poor knowledge did not seem to affect milk and dairy intake among the studied high-school students, but more

Table 2 Daily sufficiency of milk and dairy products intake and body mass index (BMI) category, in relation to practice among students

Milk/dairy sufficiency ^{a,b} and BMI category ^c by sex	Practice ^d				χ^2	P-value
	Correct		Incorrect			
	No.	%	No.	%		
Milk intake						
Males						
Sufficient	16	59.3	11	40.7	3.017	0.082
Insufficient	24	36.9	41	63.1		
Females						
Sufficient	18	60.0	12	40.0	1.514	0.219
Insufficient	30	44.1	38	55.9		
All students						
Sufficient	34	59.6	23	40.4	5.081	0.024
Insufficient	54	40.6	79	59.4		
Dairy products intake						
Males						
Sufficient	23	57.5	17	42.5	4.697	0.030
Insufficient	17	32.7	35	67.3		
Females						
Sufficient	24	52.2	22	47.8	0.154	0.695
Insufficient	24	46.2	28	53.8		
All students						
Sufficient	47	54.7	39	45.3	3.799	0.051
Insufficient	41	39.4	63	60.6		
BMI category						
Males						
Underweight	3	50.0	3	50.0	1.424	0.700
Normal	19	45.2	23	54.2		
Overweight	10	35.7	18	64.3		
Obese	8	53.3	7	46.7		
Females						
Underweight	8	53.3	7	46.7	5.276	0.153
Normal	27	60.0	18	40.0		
Overweight	7	31.8	15	68.2		
Obese	3	37.5	5	62.5		
All students						
Underweight	11	52.4	10	47.6	4.848	0.183
Normal	46	52.9	41	47.1		
Overweight	17	34.0	33	66.0		
Obese	11	47.8	12	52.2		

^aMilk intake: sufficient ≥ 2 cups/day; insufficient < 2 cups/day (12,13).^bDairy intake: sufficient ≥ 3 cups/day; insufficient < 3 cups/day (11).^cBMI categories: underweight < 18.5 kg/m²; normal 18.5–24.9 kg/m²; overweight 25–29.9 kg/m²; obese > 30 kg/m².^dPractice: correct when milk was chosen over other, sweetened beverages.

students with sufficient milk intake reported correct practices. It was also evident that more males who had insufficient milk and dairy intake reported incorrect practices, with more obese

and overweight students displaying improper practice too. Luckily, the attitude of the majority of students (69.0%) towards milk and dairy products was positive. Du et al. indicated that milk

had a beneficial effect on bone mass and suggested that promotion of milk consumption should be considered for achieving optimal bone mineral content (30).

In conclusion, the intake of sweetened carbonated beverages and to a lesser extent packaged fruit juices are affecting the sufficiency of milk and dairy intake among our high-school student sample in Al-Ahmadi, Kuwait. While our results cannot be generalised to the overall high-school student population in Kuwait, they may suggest a wider problem as our students are

not untypical of Kuwait high-school students. Although BMI was not related to insufficient milk and dairy intakes, more overweight and obese students displayed incorrect practices. This emphasizes the importance of improving nutrition practices to achieve the goal of prevention of the obesity epidemic in Kuwait. We thus recommend nutritional education of high-school students,

laying stress on the milk and dairy products needed as well as the dangers of excess sweetened carbonated beverages and packaged juice intake. This recommendation is coupled with a plea for government and nongovernmental decision-makers to highlight the magnitude of improper beverage consumption and warn against its hazards.

Competing interests: None declared.

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