

Caffeinated beverages and energy drink: pattern, awareness and health side effects among Omani university students.

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Abstract

Objectives: Due to lack of scientific evidence in Oman regarding caffeine and energy drink consumption, the study aims to demonstrate its prevalence, awareness, and side effects.

Methods: Cross-sectional study including apparently healthy 365 (18-35 years) university students using self-administered questionnaire.

Results: The prevalence of caffeinated beverage consumption was high among participants (97%). Males preferred coffee ($p<0.001$), soda ($p<0.008$) while females consumed tea ($p<0.029$). Females were more aware about caffeine as ingredients of energy drink ($p<0.036$) and its adverse health effects ($p<0.002$). The prevalence of energy drink consumption was high in males (75%, $p<0.001$) with early age of first use 11-15 years (33.3%) as compared to females 16-20 years (51.1%). The major source of information was family and friends (58.3%). Red Bull was the preferred choice (55.5%) among participants for common reasons such as energy boost (68.4%), taste (62.9%), reduce fatigue (52.1%), and better performance (47.3%). Females reported breathing problem, abnormal heart beat ($p<0.004$, 0.054, respectively), while males reported irritability ($p<0.052$).

Conclusion: The prevalence of caffeinated beverage and energy drink consumption is high with lack of knowledge and awareness among participants.

Keywords: Energy drink, Caffeinated beverages, Awareness, Knowledge, Oman.

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Introduction

Caffeine is the most widely used and easily available psychoactive substance across all countries. Over the past decade, the increased use of caffeinated beverages and its products, particularly among young and adolescent population has raised health concern worldwide [1]. The consumption of caffeinated beverages in adolescents on a regular basis has been reported to be as high as 83.2%, while occasional consumption was reported to be around 96% [2,3]. Among caffeinated beverages, energy drink intake among young adults aged between 18-34 years, has been increasing at an alarming rate worldwide [1]. Reports confirm the high consumption of energy drink in many parts of the world including Europe, USA and Middle East [4].

The trend of energy drink got its popularity with the incorporation of red bull energy drink in 1997 [5]. Today, there are myriad of energy drink industries including red bull, burn, monster, barbian and a lot more, which are primarily based on young adults and adolescents as a target group. Energy drinks contain different ingredients including higher doses of stimulant such as caffeine (ranging from 50 mg to 505 mg per can or bottle), taurine, guarana, sweetener such as sucrose, vitamin B, sodium and other minerals, and plant or herbal

extract [1,6,7]. A 250 ml can of energy drink contain 4000 mg/L of taurine and 2400 mg/L of D-glucurono- γ -lactone [8]. Based on its dose, caffeine has been shown to exert positive as well as negative health effects. The intake of caffeine up to 400 mg/day is not associated with adverse health effects [9] but the intake above this level (500-600 mg/day) may increase the possibility of several negative health effects. Low dose of caffeine ranging from 12.5-100 mg, is demonstrated to improve cognitive performances and enhanced mood in adults [10]. However, high caffeine consumption can lead to chronic headaches [11] and increase in blood pressure [12], sleep disorders, anxiety, irritation and nervousness [13]. Other symptoms of caffeine intoxication include gastrointestinal disturbances, trembling of hands, and tachycardia [14,15].

For the last few decades, Gulf cooperation countries (GCC) have witnessed an inclination towards unhealthy diet and sedentary lifestyle behavior. The rapid diversion from traditional to western diet and increased use of high fat, and processed food promoted nutritional deficiencies and health problems like overweight, obesity, diabetes, osteoporosis and other non-communicable diseases, among all ages and genders [16,17].

In addition, change in beverage consumption intake especially caffeinated drinks has been reported from several parts of different gulf countries. UAE university students reported a high prevalence of energy drink (85.1%) and caffeinated beverage consumption (97%) [18,19]. Male students from Saudi Arabia reported high use of energy drinks (54%) [20].

Due to increased prevalence and popularity of caffeinated beverages among young population, it is essential to disseminate the information and knowledge regarding their use and adverse physical effects. A recent study in Oman demonstrated unhealthy dietary habits and sedentary behaviour among young adolescent [21]. Another study reported high consumption of energy drink in male (65%) than females (47%) based on ≥ 3 times/week [22]. However, these studies provide no additional data and information about use and health effects of caffeine intake among university students. Hence, there is scarcity of evidence about awareness and knowledge of caffeinated beverages and energy drink consumption among young generation in Oman.

As far as our knowledge is concerned, there is no such study present in Oman till date demonstrating detailed information about caffeinated beverages and energy drink intake in young students. As an attempt to fill this gap, our present study aims to report the prevalence, frequency, knowledge, awareness, and health side effects of caffeinated beverages and energy drink consumption among university students.

Material and Methods

This cross-sectional study included a total of 365 (diploma and graduate) Omani university students (80 males, 285 females) aged 18-30 years. The participants were recruited from different departments of A'Sharqiyah University, Ibra, Sultanate of Oman, including college of business administration (COBA), college of applied and health sciences (CAHS), and college of engineering CoE. The questionnaire was collected from February 2018-June 2018. A self-administered questionnaire was provided to participants available in English and Arabic. The aim of the study was explained to all the participants and a written signed consent was obtained from every subject. The questionnaires were anonymous, and no personal identifiers were used. The questionnaire included several sections including: anthropometry and sociodemographic, pattern and frequency of caffeinated beverage consumption, energy drink consumption pattern, knowledge and awareness of energy drink, motivational reason, and health side effects. Expert faculty members were consulted for editing and assessing the questionnaires validity and reliability. Prior to distribution of the questionnaire among participants, a pilot study was performed in 25 students to assure that pattern and questions used are understandable and does not violate any ethical or cultural aspect of the participants. The questionnaire included those brands of energy drinks and caffeinated beverages which were easily available to students in the vicinity of the university campus (student cafeteria, and canteen), vending machines, major malls and supermarkets. The study was

approved by the ethics committee of A'Sharqiyah University. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and with the 1975 Helsinki declaration and its later amendments or comparable ethical standards.

Statistical analysis

Data was analysed using the Statistical Package for Social Sciences (SPSS) 16.0 (SPSS Inc., Chicago, IL, USA). All categorical variables were presented in frequency and percentages (%) and checked association using Chi-Square test. All continuous variables were checked for normality using Kolmogorov-Smirnov test. A p-value of <0.05 was considered statistically significant.

Results

Table 1 represents anthropometric and demographic characteristic of all participants. Female participants were higher (78.1%) than males (21.9) and majority of the students were 19-24 (85.5%) years of age. Most of the participants were unmarried (82.7%) and persuading bachelor's degree (69.8%).

Table 2 shows the prevalence and pattern of caffeinated beverage consumption among participants. Out of 365, about 354 (97%) reported using caffeinated beverages with 95 and 97% of consumption among male and female, respectively. Males exhibited significantly high consumption of nescafe, coffee (each $p<0.001$), espresso ($p<0.022$), and soda ($p<0.008$). While, females showed significantly high consumption of tea ($p<0.029$). No gender difference was reported in frequency of caffeinated beverage intake. The awareness about negative health impact of caffeine consumption was significantly higher in females as compared to males ($p<0.002$). Majority of the students spend less than 1OMR per day for caffeinated beverage consumption.

Table 3 shows prevalence, pattern, knowledge and awareness of energy drink consumption among participants. Among all (N=354), the prevalence of energy drink consumption was about 42.1% (n=149). The prevalence of energy drink consumption was significantly high ($p<0.001$) in males (75%) as compared to females (33.1%). The frequency of energy drink consumption was high in males in the use of 3-5 and >5 cans/week while females represented high frequency of energy drink consumption for 1-2 cans/day as compared to males. The overall starting age for first time use of energy drink was 16-20 year (42.9%) and 11-15 years (30.8%). A significant high number of female reported the first time use of energy drink at the age of 16-20 years (51.1%). On the other hand, males reported a significant high consumption of energy drink at the age of 11-15 (33.3%), and 16-20 (29.8%), followed by 21-25 years (21.1%). Females were significantly less aware of the volume consumed as compared to males ($P<0.030$). The awareness about energy drink ingredients were low among both genders with males showing even less awareness than females. Majority of females were aware of caffeine as energy drink ingredient than males ($p<0.036$). However, the

knowledge about caffeine amount in an energy drink were negligible among participants. Overall, the major source of information about energy drinks was friends and family (58.3%). However, 36.9% of females ($p<0.026$) reported university and school as their major source of information, as compared to males (19.2%).

Figure 1 shows the choice of energy drink brands consumed among male and female. The overall consumption of Red bull was higher (55.5%) with almost 44.7% of consumption among male students. Based on gender, male preferred red bull (44.7%), power gold (17.1%), power energy drink (7.9%), burn (5.3%), and lipton ice tea (14.5%) while females opted for Barbican turbo (10.1%) and red bull (10.8%).

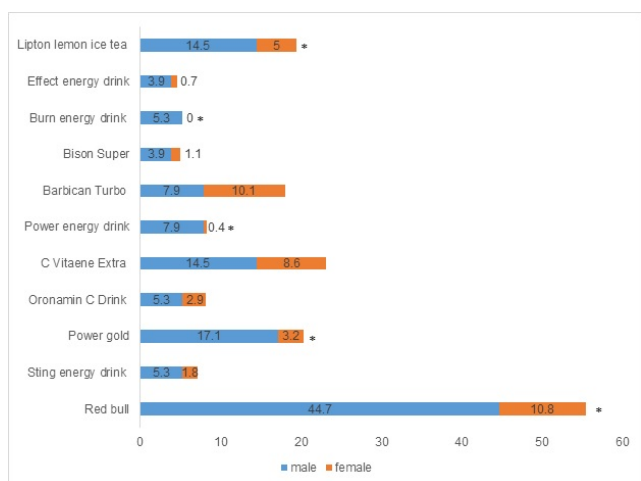


Figure 1. Energy drink brands consumed among participants. * $p<0.05$ is significant among gender.

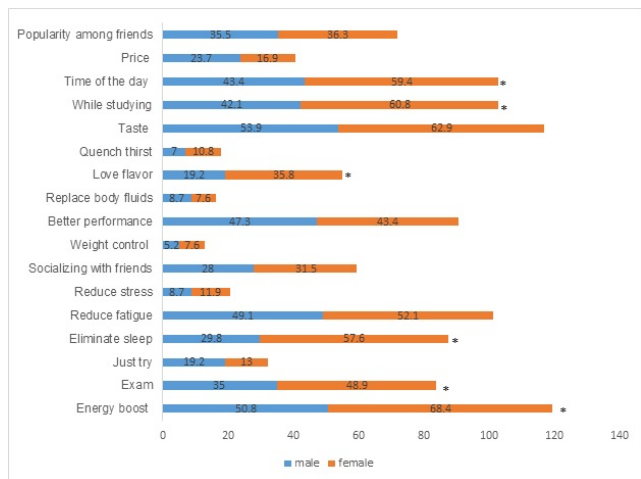


Figure 2. Motivational reasons for the consumption of energy drinks among participants. * $p<0.05$ is significant among gender.

Figure 2 shows the reasons for consumption of energy drink among participants. A significant high percentage of females consumed energy drink due to reasons such as energy boost ($p<0.042$), exam ($p<0.041$), eliminate sleep ($p<0.001$), flavor preference ($p<0.036$), while studying ($p<0.004$) and time of the day ($p<0.013$). On the other hand, males consumed energy drink for the purpose of exhibiting better performance, to give

a try, and replace body fluids (slightly higher than females but non-significant).

Figure 3 represents the health side effects of energy drink consumption among participants. Females were significantly high in reporting the breathing problem, and abnormal heart beat ($p<0.004$, 0.054, respectively), while higher percentage of males reported irritability than females ($p<0.052$).

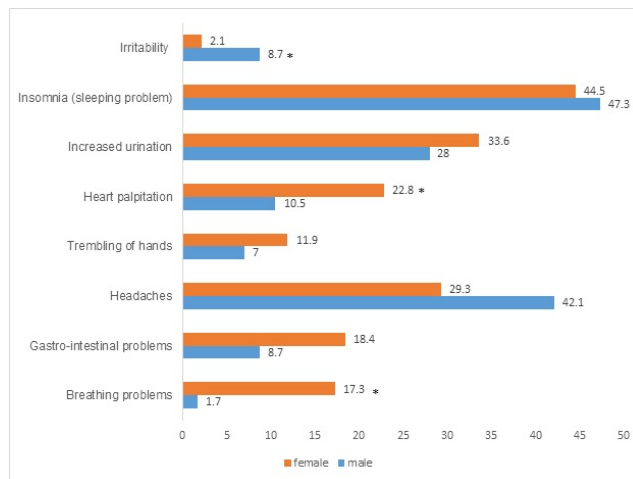


Figure 3. Health side effects of energy drink consumption among participants. * $p<0.05$ is significant among gender.

Table 1. Characteristics of the study participants.

Parameters	Total	Male	Female	p value
Gender	365	80 (21.9)	285 (78.1)	
Age				
<18	5 (1.4)	1 (1.2)	11 (3.86)	
19-24	312 (85.5)	47 (58.8)	261 (91.6)	0.001
25-29	35 (9.5)	20 (25)	12 (4.2)	
>30	13 (3.5)	12 (15)	1 (0.3)	
Marital status				0.003
Married	63 (17.2)	21 (26.2)	42 (14.7)	
Unmarried	302 (82.7)	59 (73.7)	243 (85.2)	
College				0.001
^a COBA	162 (44.3)	53 (66.2)	111 (38.9)	
^b CAHS	183 (50.1)	14 (17.5)	174 (61)	
^c COE	20 (5.5)	13 (16.2)	0	
Degree				0.001
Diploma	110 (30.1)	50 (62.5)	53 (18.5)	
Bachelors	255 (69.8)	30 (37.5)	232 (81.4)	
Year				0.001
First	37 (10.1)	9 (11.2)	29 (10.1)	
Second	132 (36.2)	48 (60)	81 (28.4)	

Third	75 (20.5)	10 (12.5)	66 (23.1)
Fourth	121 (33.1)	13 (16.2)	109 (38.2)

Note: Data presented as N (%); p-value significant at 0.05. ^acollege of business administration, ^bcollege of applied and health sciences, ^ccollege of engineering.

Table 2. Consumption of caffeinated beverages among participant's.

	Total	Male	Female	p value
N	365	80	285	
Do you consume caffeinated products?				
Yes	354 (96.9)	76 (95)	278 (97)	
Nescafe				
Yes	148 (41.8)	46 (60.5)	102 (36.6)	0.001
No	206 (58.1)	30 (39.4)	176 (63.3)	
Coffee				
Yes	150 (42.4)	46 (60.5)	104 (37.4)	0.001
No	204 (57.6)	30 (39.5)	174 (62.6)	
Cappuccino				
Yes	101 (28.5)	17 (22.4)	84 (30.2)	0.179
No	253 (71.5)	59 (77.6)	194 (69.8)	
Espresso				
Yes	22 (6.2)	9 (11.8)	13 (4.7)	0.022
No	332 (93.8)	67 (88.2)	265 (95.3)	
Tea				
Yes	275 (77.7)	52 (68.4)	223 (80.2)	0.029

Table 3. Prevalence, pattern, knowledge and awareness about energy drink consumption among participants.

	Total	Male	Female	p value
N	354	76	278	
Energy drink intake				
Yes	149 (42.1)	57 (75.0)	92 (33.1)	0.001
At what age did you first start consuming energy drink				
0-5 years	3 (2.0)	3(5.3)	1 (0.1)	0.001
6-10	19 (12.7)	6 (10.5)	13 (14.1)	
11-15	46 (30.8)	19 (33.3)	27 (29.3)	
16-20	64 (42.9)	17 (29.8)	47 (51.1)	
21-25	17 (11.4)	12 (21.1)	4 (4.3)	
Frequency of energy drink consumption (can)				
<1/day	27 (18.1)	10 (17.5)	17 (18.5)	0.001
1-2/day	104 (69.7)	37 (64.9)	67 (72.8)	

No	79 (22.3)	24 (31.6)	55 (19.8)	
Soda				
Yes	23 (6.5)	10 (13.2)	13 (4.7)	0.008
No	331 (93.5)	66 (86.8)	265 (95.3)	
Caffeinated soft drinks				
Yes	108 (30.5)	24 (31.6)	84 (30.2)	0.819
No	246 (69.5)	52 (68.4)	194 (69.8)	
Frequency of caffeinated beverage intake				
<1/day	4 (1.1)	2 (2.6)	2 (0.7)	0.694
1-2/day	152 (42.9)	34 (44.7)	118 (42.4)	
3-5/day	169 (47.7)	32 (42.1)	137 (49.3)	
>5/week	29 (8.1)	6 (7.9)	17 (6.1)	
Do you believe that caffeine can negatively affect your health?				
Yes	255 (72)	44 (57.9)	211 (75.9)	0.002
No	99 (28)	32 (42.1)	67 (24.1)	
On an average, how much do you spend per day on caffeinated products?				
<1 OMR	291 (82.5)	58 (76.3)	234 (84.2)	0.4
1-2 OMR	46 (13)	13 (17.1)	33 (11.9)	
3-5 OMR	11 (3.1)	3 (3.9)	8 (2.9)	
5-8 OMR	5 (1.4)	2 (2.6)	3 (1.1)	

Note: Data presented as N (%); p-value significant at <0.05.

3-5/day	15 (10.0)	7 (12.2)	8 (8.7)	
>5/week	3 (2.0)	3 (5.2)	0	
Awareness about ED ingredients				
Yes	37 (24.8)	15 (26.3)	22 (23.9)	0.317
No	73 (49)	31 (54.4)	42 (45.7)	
Don't know	39 (26.2)	11 (19.3)	28 (30.4)	
Awareness of caffeine as ED ingredient				
Yes	72 (48.3)	21 (36.8)	51 (55.4)	0.036
No	41 (27.5)	22 (38.6)	19 (20.7)	
Don't know	36 (24.2)	14 (24.6)	22 (23.9)	
Caffeine amount in an energy drink				
Yes	22 (14.8)	10 (17.5)	12 (13)	0.643
No	77 (51.7)	30 (52.6)	47 (51.1)	
Don't know	50 (33.6)	17 (29.8)	33 (35.9)	
Volume of beverage				
0.3 l	62 (41.6)	28 (49.1)	34 (37)	0.03
0.5 l	13 (8.7)	4 (7)	9 (9.8)	
1.0 l	6 (4)	5 (8.8)	1 (1.1)	
Don't know	68 (45.6)	20 (35.1)	48 (52.2)	
Source of information				
Advertisements	26 (17.4)	10 (17.5)	16 (17.3)	0.942
Internet	43 (28.8)	18 (31.5)	25 (27.1)	0.518
Friends/family	87 (58.3)	29 (50.8)	58 (63)	0.119
University/school	45 (30.2)	11 (19.2)	34 (36.9)	0.026
Social gatherings	34 (22.8)	12 (21)	22 (23.9)	0.727

Note: Data presented as N (%); p-value significant at <0.05.

Discussion

The present study demonstrated a high prevalence of caffeinated beverage consumption among university male and female students (95 and 97%, respectively). In addition, the prevalence of energy drink consumption among participants was 42.1% with a high use in males (75%) as compared to females (33.1%). Lack of awareness and knowledge exist among majority of the students.

Demographics and rates of caffeinated beverage consumption

Generally, the consumption of caffeinated products among its users depends on their personal preferences (such as taste and flavor) and thus may differ based on genders. Moreover, adolescent and young adults consume more caffeinated beverages and energy drinks for short term benefits such as enhancing mood and physical energy, and increase in alertness

[10,23]. Tannous et al. [24] demonstrated a high ingestion of caffeinated beverages among majority (97%) of the North Lebanese university student. A recent study from UAE has reported almost the same prevalence (n=290, 97%) of caffeinated beverage consumption in the form of coffee (53%), tea (43%), energy drinks (17%), and carbonated drinks (18%) [19]. Our present study corroborates the above findings [19,24] showing a high consumption (96.9%) of caffeinated beverages among Omani students.

It has been shown that young males prefer coffee (50.8%), while young females chose to consume more tea (37.7%). This gender disparity was due to dis-likeliness for coffee taste in majority of the females (64.8%) [25]. Our present study is in line with the above findings [25] showing high percentage of males consuming coffee (60.5%) or other coffee beverages such as nescafe (60.5%), and espresso (11.8%), while majority of the females (80.2%) preferred tea. There is a positive association of high soda consumption especially with male

gender and unhealthy dietary behaviors [26]. The present study supports the above findings [26] showing higher soda consumption in males rather than females (13.2 vs. 4.7%).

There are several stimulating factors for the high use of caffeinated beverages among students [27-29]. Majority of the Lebanese students consumed caffeinated beverages 1-2 times/day (46.6%), while 40% consumed more than 3 times/day, and a minor proportion of students (6.7%) used 1-4 times/week [24]. Our present study shows the frequency of caffeinated beverage consumption among participants as 42.9% (1-2 times/day), 47.7% (3-5 times/day) and 8.1% (>5 times/week).

Females have higher interest in the nutrients than males [30]. Moreover, females have higher knowledge about nutrition and its health effects as compared to males possibly due to their more involvement in food choice for their family and a greater care to their own appearance and body weight [31]. Supporting the above findings [30,31], the present study demonstrates high awareness in females about negative health impacts of caffeine as compared to males (75.9 vs. 57.9%, respectively). Majority of the participants (82.5%) spend less than one Omani Riyal (<1 OMR or 2.6 US dollar) for caffeinated beverage consumption on per day basis.

Demographics and rates of energy drink consumption

The consumption of energy drinks varies in most part of the GCC countries with as much as 45% in Saudi Arabia [32] and 85.1% in UAE [19]. Moreover, high consumption of energy drinks is associated especially with males as compared to females [33]. Study from Saudi Arabia has demonstrated a high rate of energy drink consumption among males (71.3%) as compared to females (35.9%) [32]. In contrast, a US study [34] demonstrated low prevalence of energy drink consumption (51%) in college student with more female (53%) consuming energy drinks rather than male (42%). Nowak et al. [33] demonstrated that the energy drink consumption in some student is based on no particular reason or when they feel tired or thirsty. The prevalence of energy drink consumption in our present study was low as compared to US study (42.1%) and shows high energy drink consumption in males (75%) rather than females (33.1%). Moreover, the females consume more energy drink (1-2 cans/day) as compared to males. This high consumption of energy drink in females could be due to their motivational reasons such as to eliminate sleep, study during exam and reduce fatigue and thirst.

Study from Saudi Arabia demonstrates a significantly high consumption of 3 or more cans per day in females as compared to males. Moreover, 12.4% males compared to 6% females consume energy drinks 4-7 times per week [20]. In contrast, UAE students demonstrated a significantly higher proportion of males using 1-3 can/day [23]. Our present study shows high use of energy drink (1-2 cans/day) in females while males were higher in using 3-5 cans/day. In addition, our present result shows a low proportion of males (5.2%) and no females using energy drink >5 times/week.

Starting age for the use of energy drinks

The starting age of energy drink consumption in young adults had been shown in the range of 14 years (7%)-16 years (38%) [35]. UAE students started consuming caffeinated beverages at less than 16 years of age (47%) and between 16-18 years of age 38% [19]. Al-Sunni demonstrated the mean age at first time use of energy drink in females to be less than 15 years as compared to males (16 years) [20]. In our present study, majority of the participant (42.9%) especially females (51.1%), reported the first use of energy drink at 16-20 years of age. Males reported the first use of energy drink between 11-15 years (33.3%), 16-20 years (29.8%), followed by 21-25 years (21.1%).

Awareness and knowledge about energy drink

Awareness about energy drink did not correlate well with knowledge among young adults. Unexpectedly, the positive awareness about energy drink among students prompted them towards more consumption [36]. This might be due to the marketing strategies adopted by selling companies to attract their target groups with a message of positive effects regarding their health and social image [37]. Around 63% of UAE university students showed awareness about energy drink ingredients but were not sure about safest amount to be consumed [19]. Another study demonstrated that majority of the students knew about one or more component of energy drinks but a large number of students lack the knowledge about caffeine being an energy drink ingredient (37.14 vs. 44.77%, male vs. female) [20].

Adding to similar results, study from Jeddah, Saudi Arabia, demonstrated a lack of knowledge among more than half of the students (57.7% of males, 51.1% of females) about caffeine as an energy drink ingredient. Moreover, the same study showed a higher knowledge in female students about the side effects of energy drinks on health as compared to males [38]. In contrast to above studies from Saudi Arabia [20,38], our present study demonstrated high awareness among females about caffeine as energy drink ingredient (55.4%), but most of the energy drink consumers (75.2%) were not aware about any other ingredient of energy drink. Majority of the energy drink consumers (85.3%) do not have any knowledge about the caffeine amount in their energy drink. In addition, 45.6% of the participants were not aware of the energy drink volume they are consuming. Finding from US demonstrates that although the adolescents had negative attitudes toward caffeine, they continue intake of energy drinks [39]. Overall, our present results indicate that despite having knowledge of caffeine as an energy drink ingredient, majority of the participant continue consuming it in high amount.

Source of information about energy drink and preferred brand

The main source of information for caffeine and energy drink intake among students is media and commercials. In addition, to get the reliable information, the adolescent also prefers

parents, followed by doctor and teacher [36,39]. Some other factors like social situations and spending time with friends is being considered as a common reason for energy drink consumption in young adult [40]. Majority of females and considerable proportion of male students from A'Sharqiyah University resides in hostel (especially during their working days) and get a chance to visit their families only on weekends. Therefore, students are in constant touch with their friends, whether in hostel or in university, sharing their information among themselves. Our present study demonstrates friends and family members as one of the common major source of energy drink information (58.3%), followed by university and school (30.2%) and social gatherings (22.8%). The above explanation also justifies our result showing higher number of females relying on information from university and schools.

Several brands of energy drinks are available in each country based on choice and fame. There are studies demonstrating high use of red bull apart from other brands based on regions availability and preferences [18,33]. Our present study demonstrated high use of following brands mostly among male respondents: Red bull (44.7%), Power gold (17.1%), C vitamin extra and Lipton lemon ice tea (14.5% both). The females preferred Red bull (10.8%) and Barbican turbo (10.1%).

Motivational reasons for the use of energy drinks

There are motivational reasons that incline young adults towards more use of energy drink [27]. More frequent energy drink consumption in Saudi male students was observed for reasons such as better driving and performance in sports, while females consumed more energy drink during exams. The reasons like eliminate sleep, give company to friends and energy gain were also reported [20]. Regardless of gender, energy boost is one of the major motivational reasons for high energy drink consumption. More use of energy drink for reasons such as insufficient sleep (67%) are also reported among US students [34]. Students from UAE reported common reasons for consumption as taste (39.9%), gain energy when tired (27.7%), and during study (13.1%) [18]. Other reasons for high energy drink consumption among university student were: to eliminate sleep for study purpose (53%), to feel fresh (51%), taste and flavor (49%), for energy boost (36%), and to release fatigue and stress (27%) [19]. Study performed by Reid et al. demonstrated major reasons for energy drink use among students as, energy boost (50%), staying awake (45%), and involvement in major projects (40%). Moreover, weight control (<10%) was another reason for energy drink consumption [28].

The present study demonstrated several reasons for the use of energy drink consumption among university students. The major reasons for energy drink consumption in females were to boost energy (68.4%), followed by studying (60.8%) during exam (48.9%), time of the day (59.4%), eliminate sleep (57.6%) and flavor preference (35.8%). Supporting the above findings [18,-20,28,34]. Most of the motivational reasons in females correspond to their study habit. The other reasons which were gender independent but high among energy drink

consumers were taste (62.9%) reduce fatigue (52.1%), better performance (47.3%), socializing with friends (31.5%) and price (23.7%). Although not significant, motivational reason for energy drink consumption among males were higher for sports reason such as better performance. Other reasons for energy drink use with low proportion of respondents included weight control, quench thirst, and just try.

Health side effects of energy drinks

As mentioned earlier, many studies performed in university students and young adults [20,38] demonstrated lack of knowledge about energy drink ingredients and intake of safe caffeine amount. In addition, despite having awareness, it is not translated into healthy behavior and safe energy drink consumption. USA college student complained of headaches (22%) and heart palpitations (19%) [34].

The polish adolescent consuming energy drink reported common side effects including stomach ache (about 50%), overexcitement, heart palpitations or vomiting [33]. Students from UAE experienced side effects such as headache, irritation, fatigue, or palpitation if they don't consume their habitual intake of tea and coffee [19]. The current study reported some serious side effects among energy drink consumers. The most common problem among majority of the consumers included insomnia (45.9%), headaches (35.7%), and increased urination (30.8%). Gender dependent side effects included breathing problem, and heart palpitation higher in females (17.3 and 22.8%, respectively), while males experienced high irritability (8.7%). Some other reported side effects were, gastro-intestinal (13.6%) and trembling of hands (9.5%).

The present study demonstrated that although most of the participants were aware of caffeine content and its negative health effects (especially female), they consumed high amount of caffeinated beverages and energy drinks leading them towards serious health side effects.

Conclusion

Worryingly, in spite of having awareness about caffeine, our present study reported high consumption among students. The most preferred brand among majority of the students was red bull. The most common health side effects among students were headaches, insomnia, increased urination and heart palpitation. Various sectors such as health authorities, social media, parents, academic institutions and health physicians needs to guide young adults in reducing the intake of caffeinated products and help them to gain more knowledge and awareness in order to prevent future health problems. Health education programs, workshops and advertisements in academic institute and public areas should be established so as to educate the public on the health aspects of energy drinks. The present study has some strength as well as limitations. The strength of the present study is that, to our knowledge, this is the first study in Oman encompassing prevalence, pattern, awareness and health side effects of energy drinks among

university students. Moreover, the present study is first of its kind to demonstrate the gender difference about caffeinated beverages and energy drink consumption among Omani students. However, due to some limitations, the results cannot be generalized and implemented to all student population in Oman. Among limitations, first, the sample size does not represent the overall young adult population of Omani students. Second, the number of females in this study is considerably higher than males, which could bias the outcomes of this study. Third, a self-administered questionnaire was used. Lastly, the result demonstrating friends and family members as one of the common major source of energy drink information applies strictly to the present study participants due to factors such as hostel accommodation and university location. Students from other universities located in central and urban regions of Oman may be more dependent on other sources like social media and commercials for such type of information rather than their friends and families.

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Conflict of Interest

The author declares no conflict of interest.

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