

## Sugar Sweetened Beverages Consumption Patterns among Medical Students from Yangon and Magway

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Sugar-sweetened beverages (SBB) consumption has risen significantly worldwide. Medical students will have their opportunity to raise the awareness of public concerning their dietary habits, including reducing sugar consumption, and preventing and managing chronic diseases. This cross-sectional study aimed to determine sugar-sweetened beverages consumption patterns among medical students from Yangon and Magway. Total 630 medical students aged between 18 to 28 years from University of Medicine 1-Yangon (UM1) and University of Medicine-Magway (UMMgy) participated in this study. Quantitative data collection method was done by using self-administered pre-tested structured questionnaire and performing anthropometric measurement. Self-administered questionnaire consists of background characteristics and the sugar sweetened beverages consumption patterns. In this study, 313 numbers of respondents (37.4% male and 62.6% female) were from the University of Medicine 1 (Yangon) and 317 numbers of respondents (55.2% male and 44.8% female) were from the University of Medicine (Magway). Regarding average daily intake, majority of the participants consumed 200-500 mL/day with 83.3% of total males and 68.9% of total females. Regarding the place favoring to take sugary drinks, more than half of the students favored to drink SSBs at university. Percentage of medical students who favored to drink SSBs when went out was significantly higher in Yangon than those in Magway ( $p<0.000$ ). Energy drink consumption was highest (59.5%) among all medical students in this study, followed by carbonated drinks (42.4%). Energy drink consumption was significantly higher among medical students from Magway than among students from Yangon ( $p<0.000$ ). This study showed that the sugar sweetened beverages consumption patterns are varied and the practice of consuming energy drinks is highly prevalent among medical students. Result from this study may be useful for implementing strategies for reduction of sugary drinks in prevention of non-communicable diseases.

*Keywords:* Sugar-sweetened beverages, medical students, Yangon, Magway

### INTRODUCTION

In recent decades, sugar sweetened beverages consumption has risen significantly worldwide with consumption, among people over 18 years of age, increased from 9.5 gallons per person in 1995 to 11.4 gallons per person in 2010.<sup>1</sup>

Sugar sweetened beverages (SSB) consist of any drinks that contain added sugars.<sup>2</sup> One regular can of SSB (12 ounce) includes up to 40 grams of added sugar depending on types

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of sugary drinks.<sup>3</sup> The World Health Organization (WHO) recommends 'total free added sugar intake should not exceed 10% of dietary energy intake' and for prevention of dental cares, it should be limited to 5%.<sup>4</sup>

Evidence showed that SSB consumption is one of the dietary factors that associated with overweight and obesity.<sup>5</sup> The study that analyzed the global data found that 1% increase in SSB consumption was associated with increasing 2.3% of obese cases, especially in developing nations.<sup>6</sup> Moreover, according to the Joint WHO/FAO Expert Consultation, a serving of soft drinks daily can rise 60 % of the obesity risk.<sup>7</sup>

Many studies indicated that there is a positive association between the risk of type 2 diabetes mellitus and metabolic syndrome with SSB consumption. High SSB consumption in adults has 26% of risk for developing diabetes mellitus and 20% of risk for metabolic syndrome.<sup>8</sup> Other drawbacks of SSB drinking comprise poor nutrition and osteoporosis, which in turn, associated with negative drawbacks in physical and mental health.<sup>9</sup> These impacts can affect high healthcare expenditure of countries.<sup>5</sup>

Young adult population (18-25 years old) was one of the highest SSB consumption groups.<sup>10</sup> Lifestyle changes during this age group such as great dominance by peers and increased autonomy may lead to adopting this behavior.<sup>11</sup> Most of medical students are within this age group. Medical students likely have varying attitudes and practices regarding the role of SSB in healthy diets, as well as health outcomes associated with their consumption. Furthermore, there may have a discrepancy between students' knowledge about SSB and their actual consumption practices. Moreover, medical students will have their opportunity to raise an awareness of the public concerning their dietary habits, including reducing sugar consumption, and preventing and managing chronic diseases. There is limited data concerning SSB consumption patterns and the prevalence of SSB consumption among medical students in Myanmar.

Total of six medical universities in Myanmar are situated in different geographic locations. Among them, one medical university is situated in the downtown area in Yangon, commercial city of Myanmar, and one medical university is situated in Magway Region at the non-metropolitan area. Many studies highlighted that there are great disparities exist between sugary drink consumption patterns of those living in Metropolitan areas and those in outskirt areas; and results are controversial.<sup>11</sup> Therefore, this study aimed to determine SSB consumption patterns among medical students from Yangon and Magway.

## MATERIALS AND METHODS

This cross-sectional study was conducted at University of Medicine 1, Yangon (UM1) which is situated at the downtown area of Yangon City and at the University of Medicine (Magway) which is situated at the outskirt area of Magway City in the central region of Myanmar (UMMgy). This study was conducted in two different settings in order to examine whether there might be disparities in consumption patterns in these two Universities. Medical students from second year, third year and final part I (the age of 18 years and above) were involved. Final part II students were excluded because of difficult recruitment due to bed-site postings. Students with pregnancy were also excluded. There are 700 participants involved in this study (350 students from each university).

In this study, SSB were defined as any drinks that contained added sugars such as soft drinks, cordials (sweet fruit-flavored drinks), sport drinks, flavored mineral water, energy drinks, and fruit and vegetable drinks.<sup>2</sup> Added sugars were sugars and sugary syrups added in foods at the time of preparation or processing, or put at the table.<sup>12</sup> SSB consumers meant respondents who had taken any consumption (regardless of amount, frequency and types of SSBs) over the last thirty days (modified from French, *et al.* 2013).<sup>13</sup> Light SSB consumption was defined

as either drinking <200 ml/day. Moderate SSB consumption was defined as either drinking 200-500 ml/day. High SSB consumption was defined as either drinking >500 ml/day.<sup>14, 15</sup>

Self-administered pre-tested structured questionnaire consisted of two parts: socio-demographic characteristics and SSB consumption patterns by determining consumption frequency per week, amount and types of SSB. Height and weight of participants was measured by using the weight and height machine by standard anthropometric measurement procedure for Body Mass Index calculation.

### Ethical consideration

Ethical approval was obtained from the Ethics Review Committee of Department of Medical Research (Ethics /DMR /2018 /091). A pilot study was carried out to determine appropriateness, ease of understanding and to improve on response time.

### Data analysis

It was performed by using SPSS version 20. Categorical data were described by frequency and percentage, and mean and standard deviation for continuous data. Comparison between SSB consumption patterns of students in Yangon and Magway was done by using Chi-square test. A p<0.05 was considered statistically significant.

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## RESULTS

Among 700 participants, 70 participants were excluded due to the missing data. Therefore, data were analysed for 630 (age 18-28 years) in this study. Among 630 respondents, 313 numbers (37.4% male and 62.6% female) were from UM1, and 317 numbers (55.2% male and 44.8% female) were from UMMgy. Percentage of students aged ≤20 years was 84% from UM1 and 83.6% from UMMgy. Percentage of students from 2<sup>nd</sup> MB was 44.1% from UM1 and 47.9% from UMMgy; 3<sup>rd</sup> MB students was 26.2% from UM1 and 28.1% from UMMgy; Final Part I students was 29.7% from UM1 and 24% from UMMgy, respectively. It was found that 6.4% of students from UM1 stayed in hostels and 95% of students from UMMgy stayed in hostels. Mean BMI was 20.8±3.6 kg/m<sup>2</sup>.

Table 1 shows sugary drink intake among medical students from UM1 and UMMgy. Regarding average daily intake, majority of the participants consumed 200-500 ml/day with 83.6% of total males and 68.9% of total females.

Figure 1 shows the consumption frequency of SSBs among the respondents in Yangon and Magway. It was found that daily drinking was common among male respondents (14.5%), age >20 years (13%) and students from Magway (12.2%). Table 2 shows responses of students concerning SSB consumption patterns. Among all responds,

Table 1. Sugar sweetened beverages intake of the participants

Variable	Yangon (n=313)		Magway (n=317)		Total (n=630)	
	Number (%)		Number (%)		Number (%)	
	Male (n=117)	Female (n=196)	Male (n=175)	Female (n=142)	Male (n=292)	Female (n=338)
<i>Average daily SSB intake</i>						
<200 ml	14 (11.9)	81 (41.3)	26 (14.9)	22 (15.5)	40 (13.7)	103 (30.5)
200-500 ml	98 (83.8)	114 (58.2)	146 (83.4)	119 (83.8)	244 (83.6)	233 (68.9)
>500 ml	5 (4.3)	1 (0.5)	3 (1.7)	1 (0.7)	8 (2.7)	2 (0.6)
<i>SSB intake (the day before the study)</i>						
None	13 (11.2)	47 (24)	79 (45.1)	94 (66.2)	92 (31.5)	141 (41.7)
<200 mL	26 (22.2)	81 (41.3)	21 (12)	15 (10.6)	47 (16.1)	96 (28.4)
200- 500ml	72 (61.5)	65 (33.2)	72 (41.2)	33 (23.2)	144 (49.3)	98 (29)
>500 ml	6 (5.1)	3 (1.5)	3 (1.7)	0	9 (3.1)	3 (0.9)

SSB = Sugar sweetened beverages

the majority of students chose sugary drinks because of the taste which was significantly higher among medical students in Magway than those in Yangon ( $p<0.04$ ). The percentage of medical students in Yangon chose sugary drinks because of easy availability was significantly higher than those in Magway ( $p<0.01$ ).

Regarding specific activities favoring to take sugary drinks, nearly half of medical students consumed sugary drinks while studying which was significantly higher in Magway than those in Yangon ( $p<0.000$ ). Percentage of medical students in Yangon who consumed sugary drinks during having meals and during social activities was significantly higher than those in Magway ( $p<0.000$  and  $p<0.001$ ).

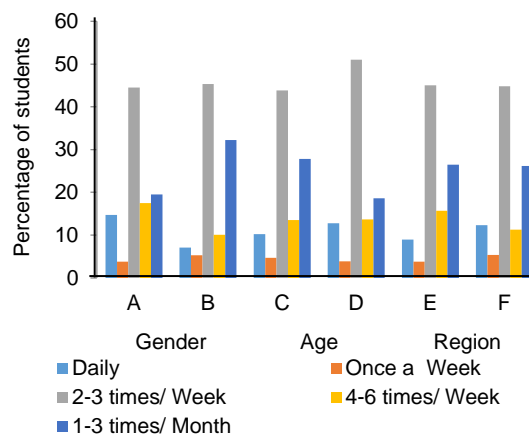


Fig. 1. Consumption frequency of sugar sweetened beverages among respondents

Table 2. Responses of students concerning SSB consumption patterns

Variable	Total number	UM1 number (n=313) (%)	UMMgy number (n=317) (%)	P value
<i>Choice of sugary drinks</i>				
Media advertisement	13	9 (69.2)	4 (30.8)	0.08
Easy availability	79	49 (62)	30 (38)	0.01*
Color	11	4 (36.4)	7 (63.6)	0.19
Taste	489	234 (47.9)	255 (52.1)	0.04*
Peers	13	8 (61.5)	5 (38.5)	0.2
Others	25	9 (36)	16 (64)	0.08
<i>Specific activities favoring to drink</i>				
While studying	300	117 (39)	183 (61)	0.000*
During social activities	123	76 (61.8)	47 (38.2)	0.001*
While playing sports	48	24 (50)	24 (50)	0.5
During having meals	140	87 (62.1)	53 (37.9)	0.000*
Others	19	9 (47.4)	10 (52.6)	0.4
<i>Reasons to drink</i>				
Feeling thirsty	87	60 (69)	27 (31)	0.000*
Refreshment	301	140 (46.5)	161 (53.5)	0.06
Feel energize	61	27 (44.3)	34 (55.7)	0.2
Pleasure	74	38 (51.4)	36 (48.6)	0.4
To concentrate	24	3 (12.5)	21 (87.5)	0.000*
For appetite	69	38 (55.1)	31 (44.9)	0.2
Others	14	7 (50)	7(50)	0.5
<i>Place favoring to drink</i>				
At home	247	129 (52.2)	118 (47.8)	0.18
When go out	248	157 (63.3)	91 (36.7)	0.000*
At university	327	175 (53.5)	152 (46.5)	0.96
At restaurant	208	110 (52.9)	98 (47.1)	0.154

\*p value statistically significant

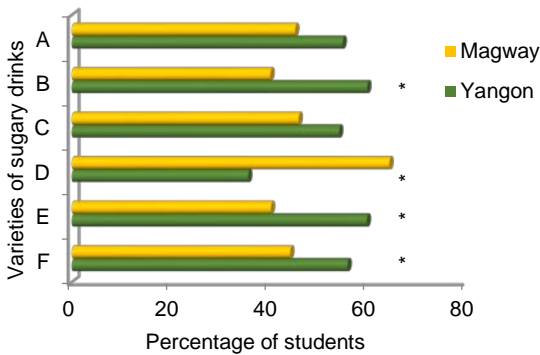
UM1=University of Medicine 1 (Yangon)

UMMgy=University of Medicine (Magway)

Regarding reasons of taking sugary drinks, nearly half of medical students from both universities drank SSBs for refreshment. Percentage of medical students drank SSBs to

be able to concentrate during studying was significantly higher in Magway than those in Yangon ( $p<0.000$ ). Percentage of medical students in Yangon who drank SSBs when

they felt thirsty was significantly higher than those in Magway ( $p < 0.000$ ). Regarding the place favoring to take sugary drinks, more than half of the students from Yangon (53.5%) and nearly half of the students from Magway (46.5%) favored to drink SSBs at University. Percentage of medical students who favored to drink SSBs when went out was significantly higher in Yangon than those in Magway ( $p < 0.000$ ).



A=Vegetable drink with added sugar  
 B=Fruit drink with added sugar  
 C=Sport drink  
 D=Energy drink  
 E=Cordials  
 F=Carbonated  
 \*p value statistically significant

Fig. 2. Varieties of sugary drinks consumed among medical students

Figure 2 represents the varieties of sugary drinks consumed among medical students. Energy drink consumption was highest (59.5%) among all medical students in this study, followed by carbonated drinks (42.4%). Energy drink consumption was significantly higher among medical students from UMMGy than among students from UM1 ( $p < 0.000$ ). Carbonated drink, fruit drink (with added sugar) and cordial consumptions were significantly higher among UM1 students than among UMMGy students ( $p < 0.005$ ,  $p < 0.003$ ,  $p < 0.000$ ).

## DISCUSSION

This study reveals SSB consumption patterns in medical students attending at two selected medical universities in Myanmar. Results indicated that 10.6% of students reported drinking SSBs daily. In Myanmar, a study done on eating pattern of third year medical students in University of Medicine (2) in 2016 found that 16.7% drunk more than 7 times per week.<sup>16</sup> In one study done in US six states, 70% reported drinking any SSB per day.<sup>17</sup> Therefore, SSB consumption in the present study was lower than the data obtained from previous study done in Myanmar and the study conducted in six states of USA.

In this study, two medical universities were selected, one from the commercial city of Myanmar where majority of medical students lived at home, and the other medical university located at the middle area of Myanmar, where the most of medical students came from different districts and stayed at hostels. The frequencies of SSB intake among medical students in two medical universities were not quite different from each other. Similar findings were reported by a study conducted in Jordan.<sup>18</sup> Moreover, in that study conducted in Jordan also observed that the estimated caloric intake from SSB consumption was not significantly different between students living in hostels and those living with families.<sup>18</sup>

In the present study, male students were more likely to drink SSB than female students. Similar findings were found in other studies where males drank higher amount of SSBs than females.<sup>19, 20</sup> Depending on the results of the previous studies, it is possible that males drank higher quantities of SSBs than females because females have more concern about their body figure compared to males.

Evidence revealed that the most consumed SSBs were soft drinks and energy drinks.

However, one study from Jordan reported that consumption of energy drinks was not common in Jordan.<sup>18</sup> In the present study, energy drink consumption was highest (59.5%) among all medical students in this study, followed by carbonated drinks. Energy drink consumption was significantly higher among medical students living in Magway Region than among medical students residing in Yangon, the commercial city of Myanmar. However, the proportion of energy drink consumption was lower than that reported 63.8% in USA and 73.6% in Canada.<sup>21, 22</sup>

The studies conducted in Bangladesh identified that cost effective, accessibility, taste, as the main reasons for SSB drinking by the university students.<sup>19</sup> Similarly, in this study, the main reasons for SSB consumption were: good taste and available easily and refreshing. Furthermore, most of participants answered that they preferred SSB drinking when went out with family or friends and nearly half of participants preferred SSB drinking at their universities. Similar findings were reported previously in Malaysia and Bangladesh where SSB consumption was more common at university canteen and neighborhood fast food restaurants.<sup>19, 23</sup> Therefore, regulation should be considered to limit availability of SSB in university campus and nearby shops, and replacing them with healthy drinks like drinking water.

When comparing SSB consumption patterns among medical students in Yangon and Magway, percentage of SSB intake was higher in Yangon than in Magway. Moreover, the proportion of medical students in Yangon, who chose SSB was significantly higher than those in Magway because SSB was easily available in Yangon.

However, the proportion of medical students in Magway, who chose SSB because of good taste, was significantly higher than those in Yangon. It may be due to the fact that Yangon is the commercial city in Myanmar and SSBs were easily available in the University, markets, nearby shops and also by delivery services.

Findings obtained from this study indicated that SSB consumption patterns varied among medical students from two Universities. Educating young university students to limit SSB intake and practice other healthy behaviors could significantly impact their physical and mental health. Specific dietary guidelines and effective public awareness campaigns could be initiated to address the unhealthy lifestyles of university students and to improve their health. A combined initiative from families, Universities, public health experts and the government is much needed to tackle this public health problem. University food outlets should be encouraged to provide a greater range of healthy beverages for the students.

This study has some limitations. This study was cross-sectional and did not determine the causal relationships of SSB consumption with other variables. Furthermore, this study may be limited because of using self-administered questionnaire by the students, which was subjected to portion size estimate errors and recall bias.

In conclusion, dietary SSB intake among medical students in Myanmar is lower than studies conducted in other countries. The percentage of SSB intake was higher in Yangon, the commercial city of Myanmar, than in Magway. As sugar sweetened beverages are easily available, and are likely to be important in terms of risk of obesity related non-communicable diseases. Continuous monitoring of SSB consumption should be carried out and further prospective studies examining the relationship between SSB intake and negative health impacts are necessary.

### **Competing interests**

The authors declare that they have no competing interests

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## REFERENCES

1. Wang YC, Bleich SN & Gortmaker SL. Increasing caloric contribution from sugar-sweetened beverages and 100% fruit juices among US children and adolescents, 1988-2004. *Pediatrics* 2008; 121: e1604-e1614.
2. Australian Bureau of Statistics. Australian health survey: nutrition first results - foods and nutrients, 2011-12, cat. no. 4364.0.55.007 [Internet]. 2014 [updated 2020 July 25; cited 2022 June 28]. Available from: <https://www.abs.gov.au/statistics/health/health-conditions-and-risks/australian-health-survey-nutrition-first-results-foods-and-nutrients/latest-release>
3. Harvard School of Public Health. Sugary Drinks, The nutrition sources [Internet]. n.d. [updated 2023 Aug; cited 2023 Sep 1]. Available from: <https://www.hsph.harvard.edu/nutritionsource/healthy-drinks/sugary-drinks/>
4. World Health Organization. *Guideline: Sugar intake for adults and children*, WHO, Geneva, 2015.
5. Rangan A, Hector D, Louie J & Gill T. Soft drinks, weight status and health: Health professionals updates. NSW Centre for Public Health Nutrition, Sydney, 2009.
6. Basu S, McKee M, Galea G & Stuckler D. Relationship of soft drink consumption to global overweight, obesity, and diabetes: A cross-national analysis of 75 countries. *American Journal of Public Health* 2013; 103(11): 2071-2077.
7. Boyko EJ, Fujimoto WY, Leonetti, Newell-Morris L. Visceral adiposity and risk of type 2 diabetes: a prospective study among Japanese Americans. *Diabetes Care* 2000; 23(4): 465-471.
8. Malik VS, Popkin BM, Bray GA, Despres JP, Willett WC & Hu FB. Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: A meta-analysis. *Diabetes Care* 2010; 33(11): 2477-2483.
9. Evidence Brief - Obesity: Sugar-sweetened beverages, obesity and health. Australian National Preventive Health Agency. The Australian Government, Canberra, 2014.
10. Nelson MC, Story M, Larson NI, Neumark-Sztainer D & Lytle LA. Emerging adulthood and college-aged youth: An overlooked age for weight-related behavior change. *Obesity* (Silver Spring) 2008; 16(10): 2205-2211.
11. Savage GS, Ball K, Worsley A & Crawford D. Food intake patterns among Australian adolescents. *Asia Pacific Journal of Clinical Nutrition* 2007; 16(4): 738-747.
12. Johnson RK, Appel LJ, Brands M, Howard BV, Lefevre M, Lustig RH, *et al.* Dietary sugars intake and cardiovascular health. A scientific statement from the American Heart Association. *Circulation* 2009; 120(11): 1011-1020.
13. French S, Rosenberg M, Wood L, Maitland C, Shilton T, Pratt IS *et al.* Soft drink consumption patterns among Western Australians. *Journal of Nutrition Education and Behavior* 2013; 45 (6): 525-532.
14. Popkin BM, Armstrong LE, Bray GM, Caballero B, Frei B & Willett WC. A new proposed guidance system for beverage consumption in the United States. *The American Journal of Clinical Nutrition* 2006; 83(3):529-542.
15. Kyungho H, Chung S, Lee H-S, Kim C, Joung H, Paik H-Y, *et al.* Association of dietary sugars and sugar-sweetened beverage intake with obesity in Korean children and adolescents. *Nutrients* 2016; 8(1): 31.
16. Oak Gar Phy. Eating pattern and nutritional status of third year medical students, University of Medicine 2: Yangon. [MPH thesis]. University of Public Health: Yangon; 2016.
17. Park S, Pan L, Sherry B & Blanck HM. Consumption of sugar-sweetened beverages among US adults in 6 states: Behavioral risk factor surveillance system, 2011. *Preventing Chronic Disease* 2014; 24(11): 130304.
18. Bawadi H, Khataybeh T, Obeidat B, Kerkadi A, Tayyem R, Banks AD *et al.* Sugar-sweetened beverages contribute significantly to college students' daily caloric intake in Jordan: Soft drinks are not the major contributor. *Nutrients* 2019; 11(5): 1058.

19. Bipasha MS, Raisa TS & Goon S. Sugar sweetened beverages consumption among University Students of Bangladesh. *International Journal of Public Health Science* 2017; 6 (2): 157-163.
20. Gómez-Martínez S, Martín A, Romeo J, Castillo M, Mesena M, Baraza JC, *et al.* Is soft drink consumption associated with body composition? A crosssectional study in Spanish adolescents. *Nutricion Hospitalaria*, 2009; 24 (1): 97-102.
21. Pettit ML & DeBarr KA. Perceived stress, energy drink consumption, and academic performance among college students. *Journal of American College Health* 2011; 59 (5): 335-341.
22. Reid JL, McCrory C, White CM, Martineau C, Vanderkooy P, Fenton N, *et al.* Consumption of caffeinated energy drinks among youth and young adults in Canada. *Preventive Medicine Reports* 2017; 5: 65-70.
23. Bakar AAA, Hussin N, Jalil AMM, & Mohamad M. Association between sugar-sweetened beverage consumption and body mass index among university students in Kuala Nerus, Terengganu, Malaysia. *Malaysian Journal of Public Health Medicine* 2020, 20(2): 19-26.