The Differences of Sugar-sweetened Consumption Averages according to Some Factors among Students of SMAN 48 East Jakarta 2016

Indana Bintan Dzakiyyah, Universitas Indonesia, Indonesia
Asih Setiarini, Universitas Indonesia, Indonesia

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Abstract
Sugar-sweetened beverages are certain types of calorie drinks which are ready to drink when it purchased. This research aims to get information about the differences of sugar-sweetened beverages consumption averages among students of SMAN 48 East Jakarta according to sex, mass media exposure, accessibility, availability, family influence, peer influence, nutritional knowledge, attitude, physical activity, the habit of bringing mineral water, and pocket money. This quantitative study (cross sectional) is conducted to 168 samples (quota sampling method). Self-administered Questionnaire and various sized bottles are used as the instruments of this research. The result showed that the average of sugar-sweetened beverages consumption in general was 245,7 mL/day. The averages of sugar-sweetened beverages consumption based on its categories were tea/coffee (152,7 mL/day), fruit-flavored drinks (77,1 mL/day), flavored drinks (without fruit juice) (65,7 mL/day), sports drinks (56,9 mL/day), caloric carbonated drinks (42,2 mL/day), and energy drinks (10,0 mL/day). Bivariate analysis (t-independent test) showed that there was a significant difference on the average of sugar-sweetened beverages consumption according to sex, mass media exposure, availability, peer influence, and attitude. Support from various authorities related to sugar-sweetened beverages sales policy and free mineral water supply in public places, especially school, are needed to reduce sugar-sweetened beverages consumption.

Keywords: sugar-sweetened beverages, sex, mass media exposure, availability, peer influence, attitude

Introduction

Sugar-sweetened beverages (SSBs) are certain drinks which contain about >50 calories per 1 serving (1 serving = 8 oz = 236,59 mL) (Singh, *et al.*, 2015a; Singh, *et al.*, 2015b). High consumption of sugar-sweetened beverages has been linked with overweight and obesity among children and adults (Ludwig*, et al.*, 2001; Schulze MB, *et al.*, 2004; Malik, *et al.*, 2006; Vartanian, *et al.*, 2007; Malik, *et al.*, 2010; Ezendama, *et al.*, 2010; Hafekost, *et al.* 2011; Ebbeling, *et al.*, 2012; Malik, *et al.*, 2013; Gase, *et al.,* 2014; Yon & Johnson, 2014). Consumption of caloric carbonated drinks has correlation with higher energy intake, lower milk consumption, and other nutrients (Vartanian, *et al.*, 2007). Although overweight and obesity occur in various subpopulation, most of them have been found among children and adolescents (Reedy & Krebs-Smith, 2010).

Global average intake of SSBs were 0.58 servings/day (137.2 mL/day) (Singh, *et al.*, 2015a; Singh, *et al.*, 2015b). In East and Southeast Asia, intake of SSBs were 0.6 servings/day (142.0 mL/day) (Singh, *et al.*, 2015a; Singh, *et al.*, 2015b). In Indonesia, the proportion of people aged ≥10 years old who consume sweet foods/drinks ≥1 time/day was 53.1% (Depkes RI, 2013). In Jakarta, the capital of Indonesia, the proportion of people aged ≥10 years old who consume sweet foods/drinks ≥1 time/day was 61.4%, which ranked eighth place from 33 provinces in Indonesia (Depkes RI, 2013). In East Jakarta, 40.3% of respondents from high school students was categorized as high level consumption of carbonated drinks (Fauzia, 2012). Various SSBs that are sold everywhere in Indonesia make everyone can find SSBs easily. Moreover, the negative effects of overconsume SSBs make this reseach become important.

This research aims to get information about the differences of SSBs consumption averages among students of SMAN 48 East Jakarta acording to sex, mass media exposure, accessibility, availability, family influence, peer influence, nutritional knowledge, attitude, physical activity, the habit of bringing drinkng water, and pocket money.

Literature Review

Sugar-sweetened beverages (SSBs) is defined as drinks which contain about >50 calories per 1 serving (1 serving = 8 oz = 236,59 mL), including caloric carbonated drinks, fruit-flavored drinks, energy/sport drinks, tea, and homemade drinks (Singh, *et al.*, 2015a; Singh, *et al.*, 2015b). According to Harris, *et al.* (2014), any products that contain 1 gram added sugar per 8 oz serving is already categorized as SSBs. Others define SSBs as sweet drinks which contain any sweetener that can add calories to it (U.S. Department of Agriculture and U.S Department of Health and Human Services, 2010; Boston Public Health Commission (BPHC), 2011). Carbonated drinks, fruit-flavored drinks, sport drinks, and energy drinks are also categorized as SSBs, but it doesn't only limit to those kind of drinks (U.S. Department of Agriculture and U.S Department of Health and Human Services, 2010; Singh, *et al.*, 2015a; Singh*, et al.*, 2015b). In general, SSBs contain calories without give any nutritional benefits (Boston Public Health Commission (BPHC), 2011).

There are some kind of drinks which excluded from SSBs category. Fruit drinks which contain 100% juice without any added ingredients in it are categorized as non SSBs (Singh*, et al*., 2015a; Singh, *et al.*, 2015b). Carbonated drinks which contain 0 calorie and flavored-dairy products are also categorized as non SSBs (Keihner AJ, *et al.*, 2012). According to Harris *et al.* (2014), there are 3 kinds of drinks which are categorized as non SSBs. There are drinks which contain juice diluted with water with 0 calorie sweetener without added sugar (light fruit juices); drinks which contain 0 calorie and 0 gram added sugar (diet drinks); and any drinks which do not contain added sugar, including plain bottled water, 100% fruit juice/vegetables (other drink categories) (Harris, *et al.*, 2014).

Drink Categories	Definitions
Caloric carbonated drinks	Carbonated soft drinks which contain ≥ 2 gram added sugar per 8 oz serving.
Energy drinks	Caffeinated beverage products labeled by manufacturer as "energy drink" or "energy supplement". This category includes carbonated.
Fruit-flavor drinks	Fruit-flavored drinks with added sugar which contain no more than 50% fruit juice.
Tea/coffee	Include ready-to-serve drinks that are described as "iced tea" or "coffee beverage" and typically served cold.
Sport drinks	Drinks which marketed as intended to support physical activity.
Flavored drinks (without fruit juice)	Non-carbonated drinks described as "water beverage" on the product packaging.

Source: modification from Harris, *et al.* (2014)

Table 1: SSBs Categories.

According to Local Regulation of BPOM RI No. 1 2015 about food categories, "fruit juice" which defined as 100% juice without added sugar and can be diluted with water has different definition with "fruit-flavored drinks". In that regulation, fruit-flavored drinks are divided into 3, there are drinks which contain ≥35% fruit juice; 10-35% fruit juice; and <10% fruit juice.

According to Local Regulation of Health Minister No. 41 2014 about balanced nutrition, the amount of maximum added sugar consumption is 4 spoons sugar per day (Depkes RI, 2014). Other Local Regulation of Health Minister No. 30 2013 about products labeling showed that consumption sugar >50 gram (4 spoons), sodium >2000 mg (1 teaspoon), and fat >67 gram (5 spoons) per day will increase the risk of hypertension, stroke, diabetes mellitus, and heart attack (Depkes RI, 2014). High consumption of sugar causes weight gain and can also ended as diabetes mellitus type 2 (Depkes RI, 2014).

Methodology and methods

This quantitative study used cross sectional design. The research located at East Jakarta in a high school named SMA Negeri 48 which started from January until May 2016. The selection of the research location is based on high exposures to SSBs sales. Beside its canteen, there are so many convenient store, cafe, even supermarket around the building. Inclusion criteria in this research was all of 1st and 2nd year students (class X and XI) who are willing to participate as respondents. Exclusion criteria were 1st and 2nd year students who are not attending class at the time of collecting data and 1st and 2nd year students who has bad health condition at the time of collecting data which does not enable her/him to fill the questionnaire.

The minimum samples of this research was 154 respondents. This research was conducted to 168 respondents are selected by using quota sampling method. From total 16 classes of 1st and 2nd year students, 5 classes are selected randomly. Boys and girls are both included.

Self-administered Questionnaire and various sized bottles are used as the instruments of this research. The questionnaire contains of informed consent; identity of respondent; various questions about SSBs related to mass media exposure, accessibility, availability, family influence, peer influence, nutritional knowledge, attitude, physical activity, the habit of bringing drinkng water, and pocket money; and also semi-quantitative Food Frequency Questionnaire (FFQ). The various sized bottled are used to help respondents estimated the amount of SSBs they consume according to its categories and time (per day, week, month, or year) in semi-quantitative FFQ.

Data were collected by 2 enumerators per class who has trained before collecting data begin. First step, the enumerators were introduced themself and gave some explanation about the step of collecting data, and then gave the questionnaires to students. After that, 1 enumerator stood in front of class to guide students while filling the questionnaires. So, students can fill the questionnaire correctly and they finished together at the same time. The other enumerator was watching students while filling the questionnaire to see if someone got confused of the questionnaire. When students filled the semi-quantitative FFQ, various sized bottled are showed to help them estimate which size should they choose based on their habit of drinking SSBs. While students were filling the semi-quantitative FFQ, both of enumerators looked around class to check students' questionnaire one by one and make sure that there was no part filled incorrectly. After that, all of the questionnaires were collected by enumerators, and then students were given souvenirs.

Univariate analysis performed to get a global average intake of SSBs based on its categories and also frequency-distribution according to independent variables. Bivariate analysis performed used t-independent test to get information about which variables have a significant differences on the averages of SSBs consumption. Besides, there were T (t-test) value that showed which groups has higher SSBs consumption compared to the other group in one variable.

Discussion

The result showed that the average of SSBs consumption in general was 245.7 7 ± 208.4 mL/day. This average is higher compared to the global average intake of SSBs from research by Singh, *et al.* (2015a & 2015b) in 187 countries worldwide (137.2 mL/day). According to that research by Singh, *et al.* (2015a & 2015b) in region scale, the average of SSBs consumption among students of SMAN 48 (245.7 mL/day) is also higher compared to the average of SSBs consumption in East and Southeast Asian (142.0 mL/day); Sub-Saharan Africa (118.3 mL/day); North Africa and the Middle East (94.6 mL/day); and also South Asia, Australia and New Zealand, and Eurasia (47.3 mL/day). But, the average of SSBs consumption among students of SMAN 48 (245.7 mL/day) is lower compared to the average of SSBs consumption in United States-Canada and Latin America-Caribbean (260.2 mL/day).

Other studies about SSBs consumption are also found in many countries worldwide. The average of SSBs consumption among students of SMAN 48 (245.7 mL/day) is higher compared to the average of SSBs consumption in England (175.1 mL/day) among adolescents aged 16–19 years old by Lally, *et al.* (2011). Research by Loh DA, *et al.* (2016) in Malaysia showed that the average of SSBs consumption in Malaysia was 189.3 mL/day. The average of SSBs consumption among students of SMAN 48 (245.7 mL/day) is also higher compared to Malaysia. But, the average of SSBs consumption among students of SMAN 48 (245.7 mL/day) is lower compared to the average of SSBs consumption in United States (257.9 mL/day) (Shi, 2010).

SSBs Categories	Mean ± SD (mL/day)
Tea/coffee	152.7 ± 164.1
Fruit-flavored drinks	77.1 ± 129.1
Flavored drinks (without fruit juice)	65.7 ± 141.9
Sport drinks	56.9 ± 95.1
Caloric carbonated drinks	42.2 ± 63.9
Energy drinks	10.0 ± 51.3

Table 2: The Averages of SSBs Consumption Based on Its Categories (n=168).

SSBs Categories	Number of Respondents	
	Total (person)	Percentage (%)
Energy drinks	142	84.5
Flavored drinks (without fruit juice)	50	29.8
Sport drinks	32	19.0
Fruit-flavored drinks	28	16.7
Caloric carbonated drinks	20	11.9
Tea/coffee	14	8.3

Table 3: Unconsumed SSBs by Respondents Based on Its Categories (n=168).

According to Table 3, highest percentage of respondents who unconsumed SSBs was on energy drinks category and the lowest percentage was on tea/coffee category. That

means energy drinks was SSBs category which rarely consumed by respondents, while tea/coffee was SSBs category which often consumed by respondents.

Variables	Total (person)	Percentage (%)	The Averages of SSBs Consumption		
			Mean ± SD (mL/day)	T (t-test)	P Value
Sex					
Boys	69	41.1	308.2 ± 238.3	3.161	**0.002***
Girls	99	58.9	202.1 ± 170.1		
Mass Media Exposure					
High	95	56.5	275.3 ± 211.8	2.125	**0.035***
Low	73	43.5	207.1 ± 198.8		
Accessibility					
Easy	122	72.6	228.0 ± 206.3	-1.808	0.072
Uneasy	46	27.4	292.7 ± 209.0		
Availability					
High	67	39.9	318.0 ± 229.7	3.621	**0.000***
Low	101	60.1	197.7 ± 178.6		
Family Influence					
Influenced	126	75.0	261.6 ± 216.9	1.725	0.086
Non-influenced	42	25.0	198.0 ± 174.5		
Peer Influence					
Influenced	76	45.2	282.5 ± 215.7	2.104	**0.037***
Non-influenced	92	54.8	215.3 ± 198.3		
Nutritional Knowledge					
Good	126	75.0	230.4 ± 204.7	-1.654	0.100
Poor–Fair	42	25.0	291.5 ± 215.3		
Attitude					
Positive	70	41.7	200.3 ± 193.1	-2.418	**0.017***
Negative	98	58.3	278.1 ± 213.8		
Physical Activity					
Moderate–High	87	51.8	255.7 ± 190.7	0.644	0.521
Low	81	48.2	235.0 ± 226.7		
The Habit of Bringing Drinking Water					
Often	76	45.2	214.5 ± 171.6	-1.827	0.070
Rare	92	54.8	271.5 ± 232.3		
Pocket Money					
High	80	47.6	263.4 ± 214.1	1.048	0.296
Low	88	52.4	229.6 ± 203.0		

*P Value <0.05 = significant differences

Table 4: Results of Bivariate Analysis (n=168).

Table 4 showed that there was a significant difference on the average of sugar-sweetened beverages consumption according to sex, mass media exposure, availability, peer influence, and attitude.

Sex variable which has a significant difference and higher SSBs consumption among boys was supported by other studies. Wouters, *et al.* (2010) and Fauzia (2012) showed that there was a correlation between sex and carbonated drink consumption. Research by Wouters, *et al.* (2010) showed that there was a strong correlation between carbonated drink consumption among peer group and individual consumption among boys. Bremer, *et al.* (2010) and Miller *et al.* (2013) also showed that boys consumed more SSBs compared to girls.

Mass media exposure variable which has a significant difference and higher SSBs consumption among group with higher mass media exposure was supported by other studies. Grimm, *et al.* (2004) and Paes V *et al.* (2015) showed that there was a correlation between mass media exposure and SSBs consumption. Fauzia (2012) showed that there was a correlation between mass media exposure and carbonated drink consumption. Even Battram, *et al.* (2016) showed that drinks commercial is a dominant factor that affected drinks preference among students. Costa *et al.* (2012) showed that there was a direct correlation between commercial interest and products purchasing. Keihner AJ, *et al.* (2012) showed that adolescents with television in their room consume ¼ times more SSBs.

Availability variable which has a significant difference and higher SSBs consumption among group with higher availability was supported by other studies. Grimm, *et al.* (2004), Ezendama, *et al.* (2010), Lippevelde, *et al.* (2012), Ansem, *et al.* (2014), Watts (2014), and Bjellanda, *et al.* (2011) showed that there was a significant difference between SSBs consumption among adolescents and availability of SSBs at home. Even Bogart, *et al.* (2013) showed that availability is a dominant factor of SSBs consumption. Hebden, *et al.* (2013) showed that students who have SSBs at their home, 5 times abler to become a high consumer of SSBs.

Peer influence variable which has a significant difference and higher SSBs consumption among influenced group was supported by other studies. Wouters, *et al.* (2010) showed that there was a correlation between peer influence and SSBs consumption. Skriptiana (2009) and Fauzia (2012) showed that there was a correlation between peer influence and carbonated drinks consumption. This may be caused by adolescents' time that are mostly spent together with friends Brown, *et al.* (2011). Fauzia (2012) also showed that students with peer influenced has chance 4.05 times abler to become a high consumer of SSBs.

Attitude variable which has a significant difference and higher SSBs consumption among negative group was supported by other studies. Negative attitude means students has an incorrect attitude about SSBs. For example, they often choose SSBs instead of water when thirsty. Ariani (2012) showed that there was a correlation between attitude and SSBs consumption. Horst, *et al.* (2007) and Fauzia (2012) showed that there was a correlation between attitude and carbonated drinks consumption. Fauzia (2012) also showed that students who has negative attitude about SSBs, 7.39 times abler to become a high consumer of SSBs.

Table 4 also showed that there was no significant difference on the average of sugar-sweetened beverages consumption according to accessibility, family influence, nutritional knowledge, physical activity, the habit of bringing water, and pocket money.

Accessibility variables which has no significant difference may be caused by the questionnaire that has no question about school accessibility. SSBs accessibility among students at school were same. Besides, students' time are mostly spent at school. So, it has no significant effect at SSBs consumption from the questions in questionnaire about accessibility. Not really different from accessibility, family influence variable also has no significant effects at SSBs consumption because students' time are mostly spent at school.

Nutritional knowledge variable which has no significant difference may be caused by the process of collecting data. Some students still able to ask another friend while filling the questionnaire at this part. Physical activity which has no significant difference may be caused by the homogeneous activity among students. Because students' time are mostly spent at school, there was just a little difference at physical activity, especially during weekdays which take most of their time. The habit of bringing drinking water which has no significant difference may be caused by the unavailability of free drinking water at school. So, it was almost impossible for those who already bring drinking water to not purchase extra drinks during school's time. Pocket money which has no significant difference may be caused by the range of SSBs' prices. SSBs with various prices from the cheapest until the expensive one are sold everywhere, including at school's canteen.

Conclusions

Supports from various authorities related to SSBs sales policy and free drinking water supply in public places, especially school, are needed to reduce SSBs consumption. From this research, people can get information about factors related to SSBs consumption, so they can pay attention to some factors if they are willing to reduce SSBs consumption. This research has some limitations. This research still used cross sectional, also only used univariate and bivariate analysis, and sampling method used was quota sampling. The location of the research has limitation at the time of collecting data, so we could not choose respondents randomly from all 1st and 2nd year students by using systematic random sampling. So respondents selected randomly by classes.

There are some suggestions that we found from this research to encourage people reduce SSBs consumption.

For students

- ✓ Please avoid using SSBs company as events' sponsor.
- ✓ Do not be a follower in purchasing SSBs. If you are determined to reduce SSBs, be consistent.
- ✓ Bring your own drinking water. It will be better if you choose tumbler or bottle water that can be used many times, instead of choose disposable plastic bottle.
- ✓ Be selective. You should read the nutrition facts and consider the serving size if you really want to purchase SSBs.
- ✓ Only consume sport or isotonic drink when it is really needed. For examples, if you are in a competition and need rapid hydration.

For Parents

- ✓ Do not provide SSBs at home.
- ✓ Do not make sugary drink at home as habit.
- ✓ Try to make infused water, instead of sugary drink. Infused water is a drink which is made from fruit slices, vegetables, or herbs immersed in cold water and usually put in refrigerator for some hours or overnight before it is consumed.

For Schools

- ✓ Provide free drinking water supply at school.
- ✓ Limit the sales of SSBs at school's canteen.

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Contact email: indana.bintan@alumni.ui.ac.id, indana.bintan7@gmail.com