Smartphone usage and dietary habits associated with sugar-sweetened beverages preferences among Indonesian female university students

by Ridhwan Fauzi

Smartphone usage and dietary habits associated with sugar-sweetened beverages preferences among Indonesian female university students

Nurnaningsih Herya Ulfah,[1] Pokkate Wongsasuluk,[2,3] Ridhwan Fauzi,[4] Lucky Radita Alma,[1] Septa Katmawanti,[1] Dhian Kartikasari[1,5]

[1]Public Health Department, Faculty of Sport Science, Universitas Negeri Malang, Indonesia; [2]College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand; [3]Health and Social Sciences and Addiction Research Unit, Bangkok, Thailand; [4]Faculty of Public Health, Universitas Muhammadiyah Jakarta, Banten, Indonesia; [5]Faculty of Medicine, Universitas Brawijaya, Malang, Indonesia

Abstract

High sugary beverages have recently gained popularity among young adults. This research aimed to determine the association between smartphone usage and dietary consumption of Sugar-Sweetened Beverages among young female adults in Indonesia. This cross-sectional study conducted an online survey in Malang City. There were 217 female university students aged 18-25 years old who were eligible as participants. The dependent variable was a preference for SSBs consumption, while the independent variables included sociodemographics, BMI, food allergies, smartphone usage, and dietary habits. Chi-square and binary logistics were used to analyse the association between independent variables and SSBs. The results showed that 62.2% of respondents preferred to consume SSBs, and 12.9% of participants were classified as overnutrition (BMI>25). More than half of the respondents had breakfast every day, and a majority of them like to consume high carbohydrates (96.8%) and high-sugar snacks (55.3%). The binary logistic regression showed an association between BMI status, breakfast consumption, watching movies, and eating frequency with high sugar beverage consumption preference (p<0.05). Reducing sugar beverages consumption intervention should consider using media accessible with smartphone.

Introduction

In today's society, consuming sugar-sweetened beverages such as milk tea, chocolate ice, and coffee frappe is popular, especially among young adults. These beverages give a refreshing and pleasurable taste. However, it has adverse consequences on health.[1] Indonesia is the third-highest sweet drink in Southeast Asia, with a total of 20.23 litre/person/year.[2] Consuming sugary drinks increased the risk of early death from non-communicable diseases such as heart attacks and some types of cancer.[3] In Indonesia, it showed a significant increasing prevalence of childhood obesity from 4.2% in 1990 to 9.1% in 2020, and non-communicable diseases such as diabetes and cardiovascular disease prevalence.[4]

Some factors contribute to young adults' consuming sugar beverage trend.[2,3] One of the factors was the advertisement in social media.[5] The young adults were the generation that put their mobile phones as the most important things after wallet. The sweet beverage industry used this trend to promote their product to attract those ages. Based on data from one of the online transportation services noted that the number of orders for boba milk tea through the application experienced a vast growth in 2018, which is 3000% in Southeast Asia and Indonesia ranked first in the development of sales of the drink with a figure of >8500%. It is also obtained that in one month, every Southeast Asian population consumes an average of 4 glasses, and Indonesians consume an average of 3 cups of boba milk tea through the online transportation food delivery service.[6]

Regarding the Covid 19 situation, the government suddenly decided to shift the learning process from school to home.[7] This change affects mobile phone usage, especially in young adults. They spend their whole day with gadgets, especially for study and entertain them. The more mobile phone usage in young adults, the more they received the advertisement about fashion and food, especially sugar-sweetened beverages. Few studies concern mobile phone usage and consuming high sugar drinks. While many studies focus on dietary consumption, such as having breakfast and meals frequency, especially in this pandemic, mobile phone usage has an essential role in young adult daily activities. Hence, this study determined the association between smartphone usage and dietary consumption with Sugar-Sweetened Beverages (SSBs).

Materials and Methods

This research used cross-sectional methods and an online questionnaire as the instrument for collecting the data. The advertisements of the online survey were shared using social media, like Instagram, Facebook, and WhatsApp group. Informed consent was obtained on the first page (checklist) when the respondents decided to continue the next page. The online questionnaire consisted of five components listed below:

sociodemographic: age, length of stay in the study area, living with parents

BMI: it was conducted from self-administered weight and height data

food-allergic: allergic that caused by some food components such as seafood, beans and others smartphone usage: consisted of how long they used the mobile phone, shopping online activity, watching movies, playing game frequency, and study activity in mobile phone. This question was part of the questionnaire that was validated and reliable at a young age.[8] This version has 5 item questions to ask.

dietary habits. It was included five items such as 1) eating frequency questions about meals and snack frequency; 2) having breakfast; 3) high carbohydrate consumption. High carbohydrate consumption consisted of respondent's favourite consumption (fried rice, fried noodle, *soto* (rice with green chicken soup), *nasi pecel* (rice with vegetables and peanut sauce), chicken porridge, chicken noodle, *nasi rames)*; 4) high sugar snack consumption. This item related to participants' consumption in biscuit pastry, chocolate bar, chocolate snack, and filling pastries; 5) high sugar consumption consisted from respondent's consumption of milk tea, soda, chocolate ice, milk ice (with or without topping). We used the Indonesian calories list from the Indonesian Health Ministry and the condiment food observation.[9]

The questionnaire received validation >0.8 from 3 experts under Chulalongkorn University and Universitas Negeri Malang as well. The total response received was 230. However, the answer that was eligible with the inclusion criteria included your adults (18-25 years old), female, did not consume any medication for chronic and mental diseases, and completed to answer the question-naire was 217 responses. This research got ethical approval from the Indonesian Bhakti Wiyata committee (No:100/PP2M-KE/I/2021) and the Chulalongkorn University committee (029.1/64). All variables were depicted as the frequency with percentages. To present the association of each variable, it used chi-square analysis. Furthermore, BMI was categorized as categorical data. At the same time, age and meals frequency were numeric data, snack frequency as categorical data, and other variables (primary of study, living arrangement and living allowance, food, snack, and sweet drink menus) were nominal data.

A binary logistic regression was applied to estimate the odds for smartphone usage and dietary consumption related to high sugar beverages. This regression model admitted for controlling the variables by comparing with the reference category.

Results

Description of sociodemographic factors as explained in Table 1. This result depicted the mean age of respondents was 21.51 ± 1.37, and all participants were bachelor's degree students. In addition, more than half of respondents experienced staying in Malang City in <3.5 years (62.2%). For BMI, 12.9% of respondents experienced overnutrition (BMI>25) their mean weight was 53.14 ± 9.27 kg (44-85 kg) and mean height was 157.0 ± 6.1 cm (143-178cm). Furthermore, the majority of respondents (76.5%) did not experience any food allergies.

Table 2 explained smartphone usage and dietary consumption. In terms of smartphone using, most respondents (90.4%) used smartphones for <4 hours. In addition, most of the respondents had widespread usage in shopping activity, watching movies, playing a game, and studying activities for mobile activities. Furthermore, watching movies (p= 0.001) and playing games (p=0.043) showed that those variables had a significant association with high sugar drink consumption among female students in Indonesia. Dietary consumption included eating frequency, having breakfast, consuming high carbohydrates, and consuming high sugar snacks. For dietary habits, 87.1% of respondents did not follow the Indonesian suggestion, while 65% had breakfast every morning. In addition, the results showed that 96.8% of respondents consumed high carbohydrates, and 55.3% like to consume high sugar snacks. The chi-square analysis also showed that having breakfast (p=0.010), consuming high carbohydrate (p=0.008), and consuming high sugar snacks (=0.004) had an association with high sugar beverage consumption.

The binary logistic using forward stepwise methods showed that Nagelkerke R square was 0.29 while the Pearson chi-square in Hosmer and Lemeshow test showed p-value= 0.816 (p>α). Those results presented that this model was fit and can explain 29% of consuming high sugar drinks. Furthermore, the probability determines factors described in Table 3.

Table 3 showed there were four variables significantly associated with high consuming sugary drinks such as BMI (OR: 1.379, CI:1.214, 1.567), having breakfast (OR: 0.360, CI: 0.177, 0.734), watching movies (OR: 1.585, CI:1.157, 2.172), and eating frequency (OR: 0.361 CI:0.140, 0.934).

Table 1. Characteristics of participants.

Variables	Total participants, n (%)	Sweet beverage consumption		p-value
		Yes (n=135, %)	No (n=82, %)	
Age	21.51 ± 1.37			0.695
<22 years old	162 (74.6)	102 (75.6)	60 (73.2)	
>22 years old	55 (25.4)	33 (24.4)	22 (26.8)	
Length of stay in Malang City				0.246
< 3.5 years	135 (62.2)	88 (65.2)	47 (57.3)	
> 3.5 years	82 (37.8)	47 (34.8)	35 (42.7)	
Living with Parents				0.586
Yes	106 (48.8)	64 (47.4)	42 (51.2)	
No	111 (51.2)	71 (52.6)	40 (48.8)	
BMI				0.000*
Underweight	47 (21.7)	17 (12.6)	30 (36.6)	
Normal	142 (65.4)	90 (66.7)	52 (63.4)	
Overnutrition	28 (12.9)	28 (20.7)	0 (0)	
Food Allergic				0.118
Have Allergic	51 (23.5)	27 (20.0)	24 (29.3)	
Don't have allergic	166 (76.5)	108 (80.0)	58 (70.7)	

*Significant based on Chi-square test (α=0.05).

Table 2. Smartphone usage and dietary consumption of participants.

Variables	Total participants, n (%)	High Sweet Beverage Consumption Yes (n=135, %)	No (n=82, %)	p-value
Smartphone Using				0.209
<4 hours usage	21 (9.7)	11 (8.1)	10 (12.2)	
4-9 hours usage	98 (45.2)	57 (42.2)	41 (50.0)	
>9 hours usage	98 (45.2)	67 (49.6)	31 (37.8)	
Shopping activity				0.194
< 4 times per month	68 (31.3)	38 (28.1)	30 (36.6)	
>4 times per month	149 (68.7)	97 (71.9)	52 (63.4)	
Watching movies				0.001*
<7 times per week	82 (37.8)	40 (29.6)	42 (51.2)	
>7 times per week	135 (62.2)	95 (70.4)	40 (48.8)	
Playing Games				0.043*
Never	66 (30.4)	33 (24.4)	33 (40.2)	
<7 times per week	91 (41.9)	60 (44.4)	31 (37.8)	
>7 times per week	60 (27.6)	42 (31.1)	18 (22.0)	
Studying activity				0.274
<7 times per week	80 (36.9)	46 (34.1)	34 (41.5)	
>7 times per week	137 (63.1)	89 (65.9)	48 (58.5)	
Dietary Habits				
Eating frequency				0.509
Appropriate with Indonesian suggestion eating frequency (3 meals and 2 times snack per day)	28 (12.9)	19 (14.1)	9 (11.0)	
Less or more than Indonesian suggestion pattern	189 (87.1)	116 (85.9)	73 (89.0)	
Having breakfast				0.010*
Yes	141 (65.0)	79 (58.5)	62 (75.6)	
No	76 (35.0)	56 (41.5)	20 (24.4)	
Preference to consume high carbohydrate				0.008*
Yes	210 (96.8)	134 (99.3)	76 (92.7)	
No	7 (3.2)	1 (0.7)	6 (7.3)	
Preference to consume high sugar snack				0.004*
Yes	120 (55.3)	85 (63.0)	35 (42.7)	
No	97 (44.7)	50 (37.0)	47 (57.3)	

*Significant based on Chi-square test (α=0.05).

Discussion

Recently, consuming high sugar beverages among youth ages is a trend.[10] There are determining factors that influenced this trend. One of the essential factors was an advertisement in social media.[2] This study showed that 62.21% of respondents like to consume high sugar beverages while 20% are overnutrition. In addition, it showed that BMI had a significant association with SSBs consumption (OR=1.379, p=0.000). These results supported a study in the U.S. among children and adolescents, which showed that children who frequently drink soda were more likely to be overweight or obese (OR=1.13, p=0.007).[11] In addition, the high consumption of sweet drinks has been associated with lower consumption of fruits, vegetables, and water. These changes will possibly raise the risk of diabetes, hypertension, and weight gain.[12]

Furthermore, this study showed that some activities in smartphones affected their preference for sugary beverage consumption. Watching movies (OR=1.585, p=0.004) was proven to have a significant

Table 3. Binary logistic model results using SSBs consumption as a response.

Variable	β	Odds ratio (95%CI)	p-value
BMI	0.321	1.379 (1.214, 1.567)	0.000*
Watching movies	0.461	1.585 (1.157, 2.172)	0.004*
Having breakfast	-1.021	0.360 (0.177, 0.734)	0.005*
Eating frequency	-1.019	0.361 (0.140, 0.934)	0.036*

association with consuming high sugar beverages such as soda, ice milk tea, and ice chocolate. It had ρ value= 0.001 and 0.043, respectively. Studies that supported these results stated that the duration of watching T.V. was associated with high sugar beverage and high fat fast foods consumption and BMI as well (p<0.05).[13] In addition, digital media had a positive association with the taste preference of sweet, salty, and fatty among children and adolescence.[14]

Other variables such as having breakfast and eating frequency also had a meaningful association with SSBs consumption. People who had breakfast had a 0.36 times lower chance of drinking sweet beverages than those who skipped breakfast. This funding

was supported by a study in Texas which stated that young ages who skipped breakfast consumed higher sugar beverages and fewer vegetables than those who had breakfast.[15] In addition, young females who regularly eat three times and snack two times per day had a 0.36 chance of consuming fewer SSBs than people who don't follow the suggestions eating frequency (p=0.036). This result supported a study from Central Texas that declared that a higher intake of SSBs could cause unhealthy meal frequency and infrequency of breakfast.[16] There were limitations in this study. The cross-sectional study cannot explain the cause-effect among variables, and the small sample cannot generate the results as a national survey. In addi-

tion, because this study was an online survey, it is possible to have acquiescence bias since the respondents want to report the good things.

Conclusions

There was a significant association between smartphone usage and sugar snacks with Sugar-Sweetened Beverages (SSBs) intake, such as watching movies, playing games, and dietary consumption like having breakfast and consuming high carbohydrates. In Addition, BMI, watching movies, having breakfast, and eating frequency were found strongly associated with SSBs intake among young females in Indonesia.

References

1. World Health Organization. Ageing and health. 2018.
2. Ministry of Health Republic of Indonesia. Situasi lansia di Indonesia tahun 2017: Gambar struktur umur penduduk indonesia tahun 2017. Pus Data dan Inf. 2017;1--9.
3. Statistics Indonesia. Statistik Usia Lanjut Tahun 2018. Jakarta: Badan Pusat Statistik; 2019.
4. World Health Organization. Dementia [Internet]. 2020. Available from: https://www.who.int/news-room/fact-sheets/detail/dementia
5. Christina Patterson. World Alzheimer Report 2018 The state of the art of dementia research: New frontiers. Alzheimer's Disease International (ADI). London; 2018.
6. Yayasan Alzheimer Indonesia. Statistik tentang Demensia [Internet]. 2019. Available from: https://alzi.or.id/statistik-tentang-demensia/
7. Tama TD, Ulfa NH, Hapsari A. Who Spends More on Health Expenditures among Elderly? Men or Women? KnE Soc Sci. 2020;2020:154–60.
8. Al Rasyid I, Syafrita Y, Sastri S. Hubungan Faktor Risiko dengan Fungsi Kognitif pada Lanjut Usia Kecamatan Padang Panjang Timur Kota Padang Panjang. J Kesehat Andalas. 2017;6(1):49.
9. Izzah A. Hubungan Aktivitas Fisik Dengan Fungsi Kognitif Lansia Pada Lansia Usia 60-69 Tahun Di Kelurahan Purwantoro Kecamatan Blimbing Kota Malang. Saintika Med. 2017;10(2):88.
10. Gurukartick J, Dongre AR, Shah D. Social Determinants of Dementia and Caregivers' Perspectives in the Field Practice Villages of Rural Health Training Centre, Thiruvennainallur. Indian J Palliat Care [Internet]. 2016;22(1):25–32. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4768445/
11. Suriastini NW, Turana Y, Supraptilah B, Wicaksono TY, Mulyanto ED. Prevalence and risk factors of dementia and caregiver's knowledge of the early symptoms of alzheimer's disease. Aging Med Healthc. 2020;11(2):60–6.
12. Bich NN, Dung NTT, Vu T, Quy LT, Tuan NA, Binh NTT, et al. Dementia and associated factors among the elderly in Vietnam: A cross-sectional study. Int J Ment Health Syst [Internet]. 2019;13(1):1–7. Available from: https://doi.org/10.1186/s13033-019-0314-7
13. Wahyuni A, Nisa K. Pengaruh Aktivitas dan Latihan Fisik terhadap Fungsi Kognitif pada Penderita Demensia. Majority. 2016;5(4):12–6.
14. McKenzie J, Bhatti L, D'Espaignet ET. WHO Tobacco Knowledge Summaries: Tobacco and dementia [Internet]. World Health Organization. Geneva; 2014. Available from: http://apps.who.int/iris/bitstream/10665/128041/1/WHO_NMH_PND_CIC_TKS_14.1_eng.pdf
15. Tantomi AI, Baabdullah A, Omar, Sagita A. Tren Fenomena "PISIDI" (Pikun Usia Dini) Sebagai Dugaan Awal Gejala Demensia Di Kota Malang. In: Program Kreativitas Mahasiswa-Penelitian. Direktorat Penelitian dan Pengabdian Kepada Masyarakat Ditjen Dikti Kemdikbud RI; 2013.
16. Lemeshow S, Hosmer DW, Klar J, Lwanga SK. Adequacy of sample size in health studies. Geneva: World Health Organization; 1990.
17. Shigemori K, Ohgi S, Okuyama E, Shimura T, Schneider E. The factorial structure of the mini mental state examination (MMSE) in Japanese dementia patients. BMC Geriatr. 2010;10(36).
18. Kalish VB, Lerner B. Mini-Mental State Examination for the Detection of Dementia in Older Patients. Vol. 94, American family physician. 2016. 880–881 p.
19. UNESCO Institute for Statistics. International Standard Classification of Education. Montreal, Canada: UNESCO Institute for Statistics; 2012.
20. Forde C. Scoring the International Physical Activity Questionnaire (IPAQ). Trinity College Durbin, The University of Dublin; 2018.
21. Tama TD, Astutik E. Sleep Disturbance and General Health Status in Patients with Chronic Conditions. KnE Life Sci. 2021;159–70.
22. Tama TD, Astutik E. Does Loneliness Increase the Risk of Getting Health Problems Among Does Loneliness Increase the Risk of Getting Health Problems Among Disabled Person ? In: The 1st International Scientific Meeting on Public Health and Sports (ISMOPHS 2019). Atlantis Press; 2020. p. 58–63.
23. Joint National Committee on Prevention Detection Evaluation and Treatment of High Blood Pressure. JNC 7 express: the seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. US Department of Health and Human Services.; 2003.
24. Kaleta D, Makowiec-dąbrowska T, Dziankowska-zaborszczyk E, Fronczak A. Determinants of Heavy Smoking: Results from The Global Adult Tobacco Survey in Poland (2009-2010). Int J Occup Med Environtmental Heal. 2012;25(1):66–79.
25. Shaji S, Bose S, Verghese A. Prevalence of dementia in an urban population in Kerala, India. Br J Psychiatry. 2005;186(FEB.):136–40.
26. Gold EB. The Timing of the Age at Which Natural Menopause Occurs. Obstet Gynecol Clin North Am. 2011;38(3):425–40.
27. Beydoun MA, Beydoun HA, Gamaldo AA, Teel A, Zonderman AB, Wang Y. Epidemiologic studies of modifiable factors associated with cognition and dementia: Systematic review and meta-analysis. BMC Public Health. 2014;14(1):1–33.
28. Setiawan D, Bidjuni H, Karundeng M. Hubungan Tingkat Pendidikan Dengan Kejadian Demensia Pada Lansia Di Balai Penyantunan Lanjut Usia Senja Cerah Paniki Kecamatan Mapanget Manado. J Keperawatan UNSRAT. 2014;2(2):105228.
29. Zhong G, Wang Y, Zhang Y, Guo JJ, Zhao Y. Smoking is associated with an increased risk of dementia: A meta-analysis of prospective cohort studies with investigation of potential effect modifiers. PLoS One. 2015;10(3):1–23.
30. Suwarni S, Setiawan S, Syatibi MM. Hubungan Usia Demensia Dan Kemampuan Fungsional Pada Lansia. J Keterapian Fis. 2017;2(1):34–41.

Smartphone usage and dietary habits associated with sugar-sweetened beverages preferences among Indonesian female university students

PRIMARY SOURCES

1 Nurnaningsih Herya Ulfah, Pokkate Wongsasuluk. "The consumption of Indonesian local food and its relationship with body mass index among female university students", International Journal of Public Health Science (IJPHS), 2022
Publication
2%

2 www.frontiersin.org
Internet Source
2%

3 www.semanticscholar.org
Internet Source
1%

4 vufind.katalog.k.utb.cz
Internet Source
1%

5 www.scribd.com
Internet Source
1%

6 Submitted to California State University, San Bernardino
Student Paper
1%