

## ORIGINAL ARTICLE

# Knowledge, Attitude, and Practice of Sugar-Sweetened Beverage (SSB) Among University Students in Klang Valley, Malaysia

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## ABSTRACT

**Introduction:** Excessive sugar consumption is a major global health concerns as it plays a significant role in the development of non-communicable diseases. Sugar-sweetened beverages (SSB) are a major source of added sugar in daily life that can lead to many health concerns. Understanding of the knowledge, attitudes, and practices (KAP) related to SSB intake is a key component of healthy beverage intake. Therefore, this study aimed to determine the prevalence of SSBs intake and the level of knowledge, attitude, and practice (KAP) of university students during the recovery phase of COVID-19 in 2022. **Methods:** This cross-sectional study involved 176 young adults aged 18-26 years old who completed a self-administered questionnaire. The questionnaire consisted of demographic and KAP data related to SSBs. Descriptive statistics were outlined, and a chi-square test was conducted to compare categorical variables. **Results:** Based on the frequency of beverage intake, sugar-sweetened coffee, or tea (39.8%) was the most frequently consumed SSB daily (at least once daily) while regular soft drink (52.3%) was the most consumed SSB among the participants on a weekly basis ( $\leq 6$  times per week). Overall, the majority of university students had a positive attitude towards SSB intake (90.6%) but poor knowledge (51.7%) and poor practice (80.7%) levels. Gender and weight status were significantly related to the attitude and knowledge scores ( $p < 0.05$ ). **Conclusion:** The prevalence of SSB intake among young adults should be addressed. Comprehensive education and intervention are vital to improving the knowledge and practice about proper SSB intake as part of healthy eating lifestyles.

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## INTRODUCTION

On the first of July 2019, the Malaysian government introduced the sugar tax whereby an excise tax of RM 0.40 per liter was levied on sugar-sweetened beverages (SSB) with total sugar content that exceeds 5g per 100ml. This tax also applies to fruit juices and vegetable juices that contain sugar exceeding 12g per 100ml (1). The sugar tax implementation highlighted the government's concerns about the SSB intake on the health of the population. Following the recommendation of the World Health Organization (WHO), the Malaysian Ministry of Health (MOH) has also recommended that sugar intake should not be more than 10% of the energy requirement or 50 grams per day for individuals with a 2000 kcal energy requirement (2) as an approach to reduce the health burden.

The increasing trend of SSB intake is alarming (3), as it is recognized that SSB is a major source of added sugars in daily diet, thus predisposing many to the risk of poor health outcomes (4). High consumption of SSB was associated with weight gain (4), poor oral health (5) and less healthy behavior (6). In addition, it is well-established in the literature that a habitual intake of SSB increases the risk of chronic diseases such as type 2 diabetes, cardiovascular diseases, and certain cancers as a result of weight gain (4, 7-8) making it a major public health concern. In Malaysia, the National Health and Morbidity Survey (NHMS) reported that 30.4% and 19.7% of adults were overweight and obese (9). On a similar note, the Malaysian Adults Nutrition Survey (MANS) 2014 reported that more than half (55.9%) of Malaysian adults consumed sugar every day (10). These scenarios suggest the necessity to further examine the trend and impact of SSB intake among adults in Malaysia. Globally, the prevalence of daily SSB consumption in developing countries ranged between 53.6% and 89.3% (11-12), almost comparable with developed countries such as the United States (59-68%) (13). The SSB market commonly targets a young population.

Thus, it is not surprising that young adults aged between 18-39 are the major SSB consumers (4), subsequently predisposing them to negative health impacts. University students also fall under the young adult's category. Nevertheless, the awareness and practice towards healthy SSB consumption remain poor among young adults based on the results of previous studies that were conducted among adolescents after the implementation of the sugar tax (14-15) as well as during the COVID-19 pandemic (16). There is a lack of studies conducted in Malaysia among university students to understand their knowledge, attitudes, and practices (KAP) related to making healthy beverage choices, particularly after the COVID-19 pandemic.

According to the principle, a Knowledge, Attitude, and Practice (KAP) survey is an effective tool in assessing health-related behavior changes and the impact of public health intervention (17). Understanding the KAP related to health behaviors such as beverage choices among young adults is crucial, as it can have a significant impact on their health outcomes in the future. Therefore, this study aimed to determine the prevalence of beverage intake as well as to assess the KAP toward SSB intake among young adults, specifically university students. The findings of this study will serve as baseline information to promote awareness regarding healthy beverage intake among young adults.

## **MATERIALS AND METHODS**

### **Study design**

This was a cross-sectional study conducted during March and April 2022 to assess the KAP of SSB intake among university students. The self-administered questionnaire was distributed using the Google online survey platform. Ethics approval was obtained from Universiti Tunku Abdul Rahman (UTAR) Research Ethics Committee (U/SERC/302/2021).

### **Study participants and sample size determination**

Participants were recruited via a purposive sampling approach among the targeted universities in Malaysia. The inclusion criteria were university students aged between 18 and 26 years old, able to understand English, and residing in Malaysia. Participants who came from a nutrition/dietetics background, with chronic illness, on medications, on pregnancy, did not provide their consent, or did not complete the questionnaire were excluded. Sample size calculation was estimated using Cochran's formula (18) for a cross-sectional study with the consideration of a 20% drop-out. The expected proportion of 89.3% was based on a previous study (12). A total of 176 participants' responses from eight different universities were recorded for this study through an online platform.

### **Study procedures**

An online self-administered questionnaire was designed

using Google Forms. A pilot study was performed on 30 students from Universiti Tunku Abdul Rahman (UTAR) before data collection. The link to the online survey was distributed through university social media such as Facebook, Instagram, Microsoft Teams, and WhatsApp. By using purposive sampling, the questionnaire was distributed to the Klang Valley university students from Universiti Tunku Abdul Rahman (UTAR) Sungai Long campus, Sunway University, INTI International University (IIU), Monash University Malaysia, Universiti Malaya (UM), International Medical University (IMU), Tunku Abdul Rahman University College, and The University of Nottingham Malaysia Campus. The purpose of the study, the scope of questions being asked, confidentiality, anonymity, and the researchers' contact information were provided at the beginning of the online survey. The participants were asked to provide the consent before proceeding to the online survey. They were allowed to withdraw from the study at any time. All participants were allowed to submit their responses only once.

### **Study Instrument**

The online self-administered questionnaire used in this study consisted of three parts. Section A focused on the socio-demographic data, including age, gender, area of the university, family monthly income, as well as self-reported body weight and height. Body mass index (BMI) was calculated by dividing the weight in kilograms by the square of height in meters and classified into underweight (< 18.5 kg/m<sup>2</sup>), normal weight (18.5–24.9 kg/m<sup>2</sup>), overweight (25.0–29.9 kg/m<sup>2</sup>), or obesity (>30.0 kg/m<sup>2</sup>) according to WHO classifications (19).

Section B was the KAP Questionnaire related to SSB. The questions were adapted from previous literature (15). It included 20 dichotomous questions, of which ten questions were on knowledge and five questions on attitude and practice, respectively. A correct answer was given one mark whereas an incorrect answer received zero marks. For the attitude and practice part, a multiple-choice scale (agree or disagree) was used to indicate their level of agreement with the statements. The maximum score for each domain was equal to the total number of items. The total score of each domain was subsequently converted into a percentage and participants who scored more than 70% for each domain were classified as having good knowledge, attitude, and practice on SSB intake based on the scoring by Bakaman et al (1996) as outlined in Table 1 (20).

In section C, the Beverage Intake Questionnaire (BEVQ) was adopted to estimate the weekly consumption of plain water and SSBs by frequency (21). A total of ten types of different beverages were listed, i.e. plain water, sweetened juice beverages, 100% fruit juice, milk (e.g., skimmed milk, low-fat milk, full-cream milk), sweetened coffee, sweetened tea, energy and sports drinks, soft drinks, and alcoholic beverage. The participants were

**Table I: Scoring system for KAP**

| Score (%) | Knowledge | Attitude | Practice   | KAP (Total) |
|-----------|-----------|----------|------------|-------------|
| <60       | Poor      | Negative | Inadequate | Poor        |
| 60-70     | Fair      | Neutral  | Adequate   | Fair        |
| >70       | Good      | Positive | Good       | Good        |

required to recall “how often” they drank the SSBs in the past month, ranging from “never or less than once per week” to “more than two times per day”. Nevertheless, we simplified the categorisation into three categories, namely “never or less than once per week”, “six times per week”, and “daily (once or more per day)” in this study.

### Statistical analysis

Data entry and analysis were performed using the Statistical Package for the Social Science (SPSS) Version 26.0 (Chicago IL). A descriptive analysis was performed. Data normality was checked using a histogram and the Shapiro-Wilk test. The Chi-square test was used to examine the association between the subgroups of BMI and sociodemographic characteristics with the KAP levels of the participants. Given the low frequencies observed in specific categories, such as the ‘BMI category’ variable, regrouping was undertaken to enhance the reliability of the analysis. As part of this process, the original categories ‘Overweight’ and ‘Obese’ were consolidated into a single category named ‘Overweight/Obese’. A p-value of <0.05 was indicated as statistically significant.

## RESULTS

Table II displays the sociodemographic and anthropometric data of the participants. The majority of the participants were females (69.3%), Chinese (86.9%), Bachelor’s Degree holders (80.7%), and aged between 21-23 years old (83.0%). The prevalence of being overweight and obese was low at 4.0%, with the majority of them (83.0%) having normal BMI.

Table III shows the KAP scores by the category of the participants. For attitude and practice, none of them scored a fair level. Instead, more than half of them had poor knowledge (51.7%) and poor practice (80.7%) toward the SSB intake. However, as high as 90.9% of them recorded a positive attitude toward SSB. Based on the overall scores, the participants showed the highest level for attitude (89.6%), followed by knowledge (64.6%) and practice (48.0%). Overall, the participants reported a moderate KAP score for SSB consumption, with a mean percentage score of  $66.7 \pm 10.2$ .

The frequency of beverage intake by the participants is shown in Table IV. Plain water (98.9%), sugar-sweetened coffee or tea (39.8%), and low-fat milk (15.9%) were the top three beverages consumed daily. On weekly basis,

**Table II: Sociodemographic and BMI of the participants**

| Characteristics              | Total (n=176) | Percentage (%) |
|------------------------------|---------------|----------------|
| <b>Gender</b>                |               |                |
| Male                         | 54            | 30.7           |
| Female                       | 122           | 69.3           |
| <b>Age</b>                   |               |                |
| 18-20 years old              | 28            | 15.9           |
| 21-23 years old              | 146           | 83.0           |
| 24-26 years old              | 2             | 1.1            |
| <b>Ethnicity</b>             |               |                |
| Malay                        | 12            | 6.8            |
| Chinese                      | 153           | 86.9           |
| Indian                       | 11            | 6.3            |
| <b>Monthly pocket money</b>  |               |                |
| <RM 500                      | 23            | 13.1           |
| RM 501 - RM 1000             | 100           | 56.8           |
| RM 1001 – RM 2000            | 45            | 25.6           |
| RM 2001 - RM 3000            | 4             | 2.3            |
| >RM 3000                     | 4             | 2.3            |
| <b>Education level</b>       |               |                |
| Foundation                   | 16            | 9.1            |
| Diploma                      | 15            | 8.5            |
| Bachelor’s Degree            | 142           | 80.7           |
| Master’s Degree              | 2             | 1.1            |
| Ph. D                        | 1             | 0.6            |
| <b>Body Mass Index (BMI)</b> |               |                |
| Underweight                  | 23            | 13.1           |
| Normal                       | 146           | 83.0           |
| Overweight                   | 4             | 2.3            |
| Obesity                      | 3             | 1.7            |

**Table III: KAP scores of sugar-sweetened beverages (SSB)**

|               | Mean % Score (mean±SD) | Category      | Total (n=176) | Percentage (%) |
|---------------|------------------------|---------------|---------------|----------------|
| Knowledge (K) | $64.6 \pm 12.4$        | <60% (Poor)   | 91            | 51.7           |
|               |                        | 60-70% (Fair) | 51            | 29.0           |
|               |                        | >70% (Good)   | 34            | 19.3           |
| Attitude (A)  | $89.7 \pm 14.5$        | <60% (Poor)   | 16            | 9.1            |
|               |                        | 60-70% (Fair) | -             | -              |
|               |                        | >70% (Good)   | 160           | 90.9           |
| Practice (P)  | $48.0 \pm 25.7$        | <60% (Poor)   | 142           | 80.7           |
|               |                        | 60-70% (Fair) | -             | -              |
|               |                        | >70% (Good)   | 34            | 19.3           |
| Overall KAP   | $66.7 \pm 10.2$        | <60% (Poor)   | 61            | 34.7           |
|               |                        | 60-70% (Fair) | 68            | 38.6           |
|               |                        | >70% (Good)   | 47            | 26.7           |

regular soft drinks (52.3%) were the most consumed, followed by 100% fruit juice (46%) and tea or coffee with sugar (45.5%). Alcoholic drinks and energy/sports drinks were the least frequently consumed with 84.1% and 83.5% of the participants consuming them either once a week or none at all.

A Pearson’s chi-square test was used to evaluate whether the sociodemographic characteristic was associated with the KAP of SSB. Table V shows that BMI was significantly associated with the KAP and overall scores ( $p < 0.05$ ). Furthermore, there was a significant relationship between gender and attitude scores with the overall KAP score ( $p < 0.05$ ).

**Table IV: The frequency of beverages intake (n= 176)**

| Types of Beverages            | Never or ≤once per week<br>n (%) | ≤6 times per week<br>n (%) | Daily (at least once daily)<br>n (%) |
|-------------------------------|----------------------------------|----------------------------|--------------------------------------|
| <b>SSB</b>                    |                                  |                            |                                      |
| Sweetened fruit beverage      | 118 (67)                         | 56 (31.8)                  | 2 (1.1)                              |
| Regular soft drinks           | 78 (44.3)                        | 92 (52.3)                  | 6 (3.4)                              |
| Sugar-sweetened coffee or tea | 26 (14.8)                        | 80 (45.5)                  | 70 (39.8)                            |
| Energy and sports drinks      | 147 (83.5)                       | 22 (12.5)                  | 7 (4.0)                              |
| Alcoholic drinks              | 148 (84.1)                       | 27 (15.3)                  | 1 (0.6)                              |
| <b>Non-SSB</b>                |                                  |                            |                                      |
| Plain water                   | -                                | 2 (1.1)                    | 174 (98.9)                           |
| Full cream milk               | 104 (59.1)                       | 48 (27.3)                  | 24 (13.6)                            |
| Low-fat milk (2%)             | 84 (47.7)                        | 64 (36.4)                  | 28 (15.9)                            |
| Skimmed milk                  | 162 (92)                         | 13 (7.4)                   | 1 (0.6)                              |
| 100% fruit juice              | 68 (38.6)                        | 81 (46.0)                  | 27 (15.3)                            |

SSB: Sugar-sweetened beverages

**Table V: Association of KAP levels of sociodemographic characteristics and BMI among participants (n= 176)**

| Characteristics             | Knowledge (K)        | Attitude (A)                    | Practice (P)                   | Overall KAP          |
|-----------------------------|----------------------|---------------------------------|--------------------------------|----------------------|
|                             | Poor<br>Fair<br>Good | Negative<br>Neutral<br>Positive | Inadequate<br>Adequate<br>Good | Poor<br>Fair<br>Good |
|                             | <i>p</i> -value      | <i>p</i> -value                 | <i>p</i> -value                | <i>p</i> -value      |
| <b>Gender</b>               | 0.049*               | 0.001*                          | 0.067                          | 0.002*               |
| Male                        |                      |                                 |                                |                      |
| Female                      |                      |                                 |                                |                      |
| <b>Age</b>                  | 0.624                | 0.830                           | 0.584                          | 0.447                |
| <21 years old               |                      |                                 |                                |                      |
| >21 years old               |                      |                                 |                                |                      |
| <b>Ethnicity</b>            | 0.873                | 0.496                           | 0.186                          | 0.269                |
| Malay                       |                      |                                 |                                |                      |
| Chinese                     |                      |                                 |                                |                      |
| Indian                      |                      |                                 |                                |                      |
| <b>Education level</b>      | 0.500                | 0.398                           | 0.946                          | 0.187                |
| Foundation                  |                      |                                 |                                |                      |
| Diploma                     |                      |                                 |                                |                      |
| Bachelor's Degree & above   |                      |                                 |                                |                      |
| <b>Monthly pocket money</b> | 0.329                | 0.088                           | 0.827                          | 0.566                |
| <RM 500                     |                      |                                 |                                |                      |
| RM 501- RM 1000             |                      |                                 |                                |                      |
| > RM 1000                   |                      |                                 |                                |                      |
| <b>BMI</b>                  | 0.001*               | 0.029*                          | 0.417                          | 0.001*               |
| Underweight                 |                      |                                 |                                |                      |
| Normal                      |                      |                                 |                                |                      |
| Overweight/Obese            |                      |                                 |                                |                      |

Chi-square test; \**p*-value is significant at *p*<0.05.

## DISCUSSION

This study explored the KAP towards SSB among university students and its association with sociodemographic characteristics. Based on the results, university students showed a fair to poor knowledge level and poor practice toward SSB intake. However, the majority of the participants had a positive attitude that indicated their willingness to control the intake of SSB. The findings of this study were in line with previous local studies (15-16) which indicated a positive attitude and moderate knowledge of SSB. The low knowledge level regarding SSB among our study participants highlighted the knowledge gap among university students and

the need to provide more comprehensive nutrition-related knowledge to them. The nutrition knowledge contributes significantly towards eating habits, poor nutrition knowledge may increase the tendency to consume SSB which might affect the weight status (22-23). Therefore, it is necessary to provide university students with essential knowledge regarding the SSB intake, as increased nutrition knowledge improves dietary practices of an individual (24-25).

A poor dietary habit of frequently consuming SSB was demonstrated by 80.7% of the participants in this study. Similarly, previous studies among university students also reported where unfavorable dietary practices in the frequent consumption of carbonated drinks (26) and bubble tea (27). However, most of the KAP studies on SSBs targeted children and young adolescents (27-28) who were commonly associated with the poor practice of SSB consumption in their daily life. To the best of our knowledge, this was the first study to provide detailed KAP information on SSB intake among university students after the COVID-19 pandemic. More importantly, the findings reflect the urgent need for initiatives to promote a healthy intake of SSB.

In terms of the frequency of SSB intake, the most common SSB consumed by the participants was sugar-sweetened coffee or tea. About four in ten (39.8%) of them consumed it daily. This result was consistent with one local study in which tea or coffee was the most frequently consumed SSB by university students (16). Moreover, similar trends of SSB consumption were observed in studies from other countries. Sweetened coffee or tea remained the most frequently consumed SSB as compared to soft drinks (29-30). One of the reasons for the popularity of coffee or tea could be the stimulant properties that make young adults feel more awake and focused, as well as having increased energy levels (31). As one of the most widely consumed beverages, coffee is often readily available on university campuses, either through on-campus cafes, vending machines, or other

sources. This can make it more convenient for students to choose coffee over other beverages.

On a weekly basis, the three most consumed SSB were regular soft drinks (52.3%), sugar-sweetened coffee or tea (45.5%), and sweetened fruit juice (31.8%). A small proportion of university students reported drinking energy drinks (12.5%) and alcoholic beverages (15.3%) on a regular weekly basis. Consuming such beverages are considered to be “energy dense” and contribute substantially to the daily energy intake. In turn, the consumption will increase the risk of obesity (30) and its associated complications and morbidities. In particular, habitual consumption of alcohol could increase the risk of cancer, liver disease, and cardiovascular diseases (32-33). Our results highlight the need for vigilant monitoring of various types of SSB consumption among young adults to prevent adverse health consequences.

Furthermore, this study revealed that gender was associated with the SSB attitude score while weight status was related to both knowledge and attitude scores. Females were observed to have a more positive attitude toward healthy SSB intake compared to males. Compelling evidence in the literature indicated that females tend to gravitate toward healthy nutrition (34-35). Apart from that, underweight participants in this study showed a better knowledge and attitude toward SSB intake. We postulated that underweight individuals could be more concerned about health-related issues including SSB intake. In contrast, a study in India found that underweight people showed suboptimal knowledge levels and unhealthy behaviors regarding SSB consumption (36). The different attitudes towards SSB may be attributed to socio-environmental and cultural factors in each country.

This study was strengthened by the fact that several universities were included. A validated questionnaire was used. Furthermore, the response rate was high since it was conducted via online channels. Therefore, the results can be generalized to a broader context. This study adopted a self-administrated survey which may introduce reporting bias and recall errors among participants especially when it comes to reporting their body weight and height. A slightly higher percentage of individuals falling under the overweight/obesity category (ranging from 6.3% to 19.6%) was observed when weighing scales were used (37,38). Nevertheless, the prevalence of BMI in this study demonstrated a similar trend to previous studies that either relied on self-reported body weight (16) or utilized weighing scales (37,38) for data collection. In addition, due to purposive sampling, the participants were not equal in terms of ethnicity and gender, thus possibly causing some bias in the study. Future studies should expand the scope to assess environmental, social, and psychological factors related to SSB consumption. In addition, intervention studies should be conducted to determine the most

effective methods to boost the knowledge and behavior related to SSB consumption.

## CONCLUSION

SSB consumption is a modifiable factor in the practice of healthy eating, therefore, it is necessary to intervene unhealthy SSB intake among university students. While they have a positive attitude towards SSB intake, it is vital to improve SSB-related knowledge to ensure that that positive attitude can translate into good practice in the future. Our study findings highlighted that gender and individual’s weight status have a significant impact on SSB intake in terms of knowledge and attitude. Future health promotion programs should be gender-specific and customized based on the weight status of the target population to ensure more effective interventions and promotions for healthier SSB intake.

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