

## ORIGINAL ARTICLE

# A Cross-sectional Study on Knowledge, Attitude and Practice of Bubble Tea Consumption Among Students in University of Cyberjaya (UOC)

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## ABSTRACT

**Introduction:** Bubble tea was first introduced in Taiwan during 1980' and became popular across Asia in 1990'. Previous studies reported that less knowledge on sugar and calorie content in sugar sweetened beverages resulted in higher consumption. The aim of this study was to determine the knowledge, attitude, and practice of bubble tea consumption among University of Cyberjaya students. **Methods:** Cross-sectional study was conducted in University of Cyberjaya among undergraduate students between 18 to 32 years old. 212 respondents who were recruited through a convenience sampling method, were given a link to fill out a self-administered questionnaire which measures the bubble tea consumption and awareness of sugar and calorie content in bubble tea. **Results:** Overall, there was 80.2% (n = 170) participants that consumed bubble tea. However, only 30.7% and 13.2% were aware about the sugar and calorie content in bubble tea respectively. Among the respondents, 56.4% who were aware about sugar content in bubble tea and 41.0% who were aware of the calorie content still have high consumption. Statistically, there was no association between awareness of sugar and calorie content in bubble tea with its consumption ( $p > 0.05$ ). **Conclusion:** The knowledge of the students on high sugar and calorie content in bubble tea were not convincing. However, their attitude and practice towards bubble tea consumption were high regardless of the awareness of the students. High sugar and calorie content in bubble tea may contribute to obesity and diabetes mellitus. Thus, specific education programs and guidelines on healthy diet are needed.

**Keywords:** Bubble tea, Sugar content, Calorie content, Awareness, University students

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## INTRODUCTION

Bubble tea was first introduced in Taiwan during 1980' and became popular across Asia in 1990'. Bubble tea is made of four main ingredients which are flavors in form of powder, syrup, fruit purees and also fresh fruit, creamer, sweeteners; sugar, simple sugar syrup, fructose or honey, sugar free sweeteners; aspartame, stevia and sucralose liquid, liquid; water, tea or milk and tapioca pearls (1).

Amy Toffelmire recorded in her report that the content of calories in a plain bubble milk tea reaches 160 calories per serving and it can increase up to 300 more calories depending on the added condiments or jelly in

the drinks (2). 160 calories are equal to 20g of sugar, which also equals to 8 teaspoons of sugar. MyHealth Malaysia has written that every unused 140 calories in one's body can change into 20 grams of fats (3). Consumption of high levels of sugar will increase the risk of a person developing various medical conditions such as obesity and diabetes mellitus (4). According to NHMS 2015, diabetes mellitus prevalence among adults of 18 years of age and above in Malaysia is 17.5% and the prevalence of obesity is 30.6% according to the classification of Malaysian Clinical Practice Guidelines of Obesity 2004 (5).

A South Australian Health Omnibus Survey (SAHOS) done in 2014 showed that there was a significant relationship with a slightly greater odds of consuming bubble tea among those who underestimate the sugar level in sugar-sweetened beverages (OR = 1.2) (6). Another study that has been done in King Faisal University in Al Ahsa, Saudi Arabia

gives the result that low knowledge of the kilocalories content in sugar sweetened beverages was predicted of greater sugar sweetened beverages consumption (OR=1.66) (7).

Therefore, it is important for this study to be conducted in order to assess the awareness of the sugar level and calories of bubble tea among the students as they are the most vulnerable population to have a high consumption of bubble tea. There is no study and data available on the status of bubble tea consumption among University of Cyberjaya students. Thus, the purpose of this study is to determine the knowledge, attitude, and practice of bubble tea consumption among University of Cyberjaya students.

## MATERIALS AND METHODS

A cross-sectional study using a convenience sampling method was done in University of Cyberjaya. Under this university, the undergraduate programs consist of foundation, diploma and bachelor courses with 16 different programs. There are 1911 male students and 1163 female students giving a total of 3074 undergraduate students. Any students who fulfilled the inclusion criteria (undergraduate students from University of Cyberjaya between age 18 to 32 years old only), readily available and convenient were eligible to answer the online questionnaires. Otherwise, the exclusion criteria are postgraduate students.

The questionnaire was adopted and modified from previous study and pre-test was done prior to the data collection (7). There are 22 questions in the questionnaire which were close-ended and several multiple-choice questions. This questionnaire consisted of three sections; Section A: Socio demographic (ten questions - mainly about the personal background of the respondents), Section B: Bubble tea consumption (seven questions), Section C: Awareness of sugar and calories content in bubble tea (five questions). The data were collected until it reached the number of samples needed (207 respondents) between the date February 2020 until February 2021.

Data collected were analyzed using SPSS version 23. Descriptive analysis; frequency and percentage were used to describe the categorical data. Pearson chi-square test was done to assess the association between the awareness of sugar and calorie content in bubble tea with the consumption of bubble tea. Results were considered significant for p-values less than 0.05.

## ETHICAL APPROVAL

University of Cyberjaya Research Ethics Review Committee (CRERC) has approved this study to be

conducted with CRERC Reference Number: UOC/CRERC/ER/242.

## RESULTS

212 students from University of Cyberjaya have participated in this study and this give rise to 102.42% response rate. Majority (80.2%, n = 170) of the students in the University of Cyberjaya consume bubble tea.

Table I show the prevalence of bubble tea consumption according to the sociodemographic factors among students in University of Cyberjaya. All age groups in University of Cyberjaya have higher prevalence in consuming bubble tea. There is a higher prevalence of bubble tea consumption among female (83.0%), Malaysians (81.2%), Malay (85.9%), Christianity (88.9%), current education in foundation (100.0%) and monthly allowance of RM301-RM600 (84.2%). Majority of students from different faculties and programs consumed bubble tea except for students from Diploma in Business (66.7% of them did not consume bubble tea).

According to Table II, the highest prevalence for frequency of bubble tea consumption among students in University of Cyberjaya was less than once per month (52.4%), which is defined as low consumption. Almost half (47.6%) of the students in University of Cyberjaya are considered to have high consumption of bubble tea.

The most common reason for consuming bubble tea among students in University of Cyberjaya was because of its good taste (52.4%), followed by refreshment (30.6%), stress (10.0%), cravings (4.1%), following the trend (1.8%) and able to satisfy thirst (1.2%).

Table III shows that more than half of the students in University of Cyberjaya estimated the sugar content in bubble tea correctly (54.7%). Most of the students in University of Cyberjaya estimated the calorie content in bubble tea correctly (40.1%) and 17.5% of them did not know the calorie content (Table IV).

Respondents who self-report that they know the sugar and calorie content in bubble tea and who can identify the sugar and calorie content correctly (sugar content: 8-20 teaspoons, calorie content: 160-400 calories) are considered as aware. Only 30.7% of the students were aware of the sugar content in bubble tea and 69.7% were unaware of it while most of the students were unaware of the calorie content in bubble tea (86.6%).

Table V shows that among the respondents, 56.4% were aware of the sugar content in bubble tea and

**Table 1 : Prevalence<sup>1</sup> of Bubble Tea Consumption among Students in University of Cyberjaya according to Sociodemographic Descriptions**

Sociodemographic description		Bubble tea consumption		
		Consume, n (%)	Do not consume, n (%)	Total, n (%)
<b>Gender</b>	Male	33 (70.2)	14 (29.8)	47 (100.0)
	Female	137 (83.0)	28 (17.0)	165 (100.0)
<b>Age group</b>	18-20	35 (74.5)	12 (25.5)	47 (100.0)
	21-23	87 (82.9)	18 (17.1)	105 (100.0)
	24-26	45 (78.9)	12 (21.1)	57 (100.0)
	27-29	2 (100.0)	0 (0.0)	2 (100.0)
	30-32	1 (100.0)	0 (0.0)	1 (100.0)
<b>Nationality</b>	Malaysian	168 (81.2)	39 (18.8)	207 (100.0)
	Others	2 (40.0)	3 (60.0)	5 (100.0)
<b>Race</b>	Malay	146 (85.9)	24 (14.1)	170 (100.0)
	Chinese	12 (70.6)	5 (29.4)	17 (100.0)
	Indian	8 (47.1)	9 (52.9)	17 (100.0)
	Others	4 (50.0)	4 (50.0)	8 (100.0)
	<b>Religion</b>	Islam	149 (84.7)	27 (15.3)
	Hinduism	8 (50.0)	8 (50.0)	16 (100.0)
	Buddhism	5 (50.0)	5 (50.0)	10 (100.0)
	Christianity	8 (88.9)	1 (11.1)	9 (0.0)
	Others	0 (0.0)	1 (100.0)	1 (100.0)
<b>Monthly student allowance</b>	< RM301	35 (74.5)	12 (25.5)	47 (100.0)
	RM300-RM600	64 (84.2)	12 (15.8)	76 (100.0)
	> RM600	71 (79.8)	18 (20.2)	89 (100.0)
<b>Faculty</b>	FOM	120 (82.8)	25 (17.2)	145 (100.0)
	FOP	14 (77.8)	4 (22.2)	18 (100.0)
	FAS	24 (66.7)	12 (33.3)	36 (100.0)
	FOSH	4 (100.0)	0 (0.0)	4 (100.0)
	TCM	5 (100.0)	0 (0.0)	5 (100.0)
	Business & Technology	1 (50.0)	1 (50.0)	2 (100.0)
	CFS	2 (100.0)	0 (0.0)	2 (100.0)
<b>Program</b>	MBBS	120 (82.8)	25 (17.2)	145 (100.0)
	BPHARM	14 (77.8)	4 (22.2)	18 (100.0)
	BPHYSIO	19 (65.5)	10 (34.5)	29 (100.0)
	BHMS	5 (100.0)	0 (0.0)	5 (100.0)
	BOSH	2 (100.0)	0 (0.0)	2 (100.0)
	BBET	4 (100.0)	0 (0.0)	4 (100.0)
	DOSH	2 (100.0)	0 (0.0)	2 (100.0)
	DIP BUSINESS	1 (50.0)	1 (50.0)	2 (100.0)
	DIP PSYCHO	1 (33.3)	2 (66.7)	3 (100.0)
	FIS	2 (100.0)	0 (0.0)	2 (100.0)
<b>Current education level</b>	Foundation	2 (100.0)	0 (0.0)	2 (100.0)
	Diploma	4 (57.1)	3 (42.9)	7 (100.0)
	Degree	164 (80.8)	39 (19.2)	203 (100.0)

<sup>1</sup>All age groups in University of Cyberjaya have higher prevalence in consuming bubble tea. There is a higher prevalence of bubble tea consumption among female (83.0%), Malaysians (81.2%), Malay (85.9%), Christianity (88.9%), current education in foundation (100.0%) and monthly allowance of RM301-RM600 (84.2%). Majority of students from different faculties and programs consumed bubble tea except for students from Diploma in Business (66.7% of them did not consume bubble tea).

**Table II : Frequency<sup>1</sup> of Bubble Tea Consumption among Students in University of Cyberjaya**

Bubble Tea Consumption	Frequency (n)	Percentage (%)
1-2 times per week	9	5.3
3-5 times per week	3	1.7
1-3 times per month	69	40.6
Less than once per month	89	52.4
<b>Total</b>	<b>170</b>	<b>100.0</b>

<sup>1</sup>The highest prevalence for frequency of bubble tea consumption among students in University of Cyberjaya was less than once per month (52.4%).

**Table III : Estimation of Sugar Content<sup>1</sup> in Bubble Tea Consumption among Students in University of Cyberjaya**

Sugar Content in Bubble Tea	Frequency (n)	Percentage (%)
Underestimate	8	3.8
Correct	116	54.6
Overestimate	58	27.4
Do not know	30	14.2
<b>Total</b>	<b>212</b>	<b>100.0</b>

<sup>1</sup>Most of the students in University of Cyberjaya estimated the sugar content in bubble tea correctly (54.7%).

**Table IV : Estimation of Calorie Content<sup>1</sup> in Bubble Tea Consumption among Students in University of Cyberjaya**

Calorie Content in Bubble Tea	Frequency (n)	Percentage (%)
Underestimate	6	2.8
Correct	86	40.1
Overestimate	84	39.6
Do not know	37	17.5
<b>Total</b>	<b>212</b>	<b>100.0</b>

<sup>1</sup>Most of the students in University of Cyberjaya estimated the calorie content in bubble tea correctly (40.1%) and 17.5% of the, did not know about the calorie content.

**Table V : Association between Awareness of Sugar Content<sup>1</sup> in Bubble Tea and Bubble Tea Consumption among Students in University of Cyberjaya**

Awareness of Sugar Content in Bubble Tea	Bubble Tea Consumption		Total, n (%)	Chi Square Value	P-value
	Low, n (%)	High, n (%)			
Aware	24 (43.6)	31 (56.4)	55 (100.0)	2.476	0.140
Not aware	65 (56.5)	50 (43.5)	115 (100.0)		
<b>Total, n (%)</b>	<b>89 (52.4)</b>	<b>81 (47.6)</b>	<b>170 (100)</b>		

<sup>1</sup> Among the respondents, 56.4% were aware of the sugar content in bubble tea and 43.5% of the respondents were unaware and both groups have high consumption of bubble tea. Statistically, there was no significant association between awareness of sugar content in bubble tea and bubble tea consumption among students in University of Cyberjaya (p>0.05).

**Table VI : Association between Awareness of Calorie Content<sup>1</sup> in Bubble Tea and Bubble Tea Consumption among Students in University of Cyberjaya**

Awareness of Calorie Content in Bubble Tea	Bubble Tea Consumption		Total, n (%)	Chi Square Value	P-value
	Low, n (%)	High, n (%)			
Aware	13 (59.0)	9 (41.0)	22 (100.0)	0.460	0.648
Not aware	76 (51.4)	72 (48.6)	148 (100.0)		
<b>Total, n (%)</b>	89 (52.4)	81 (47.6)	170 (100)		

<sup>1</sup> 59.0% of the students were aware of the amount of calorie content in bubble tea and 51.4% were unaware of it. However, both groups have low consumption of bubble tea. The result showed that there was no significant association between awareness of calorie content in bubble tea and bubble tea consumption among students in University of Cyberjaya ( $p>0.05$ ).

43.5% of the respondents were unaware and both groups have high consumption of bubble tea. Statistically, there was no significant association between awareness of sugar content in bubble tea and bubble tea consumption among students in University of Cyberjaya ( $p>0.05$ ).

Based on Table VI, 59.0% of the students were aware of the amount of calorie content in bubble tea and 51.4% were unaware of it. However, both groups have low consumption of bubble tea. The result showed that there was no significant association between awareness of calorie content in bubble tea and bubble tea consumption among students in University of Cyberjaya ( $p>0.05$ ).

## DISCUSSION

Based on a study done by Min, Green and Kim, a single serving of bubble tea consists of 16-ounce (473mL) milk tea and 60g tapioca which is equivalent to 38g of sugar with 299kcal content. The milk tea contains of 35.4kcal (262.6 Cal/mL), 0.03g melezitose (1.93 mg/mL), 0.23g sucrose (1.25 mg/mL), 0.16g glucose (13.95 mg/mL), 0.13g fructose (20.79 mg/mL) while the tapioca itself contains 0.7kcal (77.9 Cal/mL), 0.05g sucrose (1.19 mg/mL), 0.04g glucose (1.93 mg/mL), 0.07g fructose (3.41 mg/mL) (8). The bubble tea can be considered as one of the sugar-sweetened beverages (SSBs) as it fits the definition of sugar-sweetened beverages (SSBs) by National Health & Morbidity Survey Malaysia that it contains free sugar, and it is flavored water (9). Hence, it is acceptable to compare this study with other studies related to sugar-sweetened beverages as for now there were really limited studies related to bubble tea.

Based on the study, majority of the respondents consume bubble tea (80.2%) with only 19.8% of the students being non-consumers of bubble tea. This correlates with a study done in Anglia Ruskin University, Cambridge, UK that recorded a total of 73% of the university students consumed SSBs (10). A study done in 2017 among university

students in Bangladesh also reported the same data which majority of them (95.4%) prefer to drink sugar-sweetened beverages (11). Rudd Center for Food Policy & Obesity at the University of Connecticut, Sugary Drinks FACTS 2020, reported that two-thirds from advertising spending for all refreshment beverages are used to advertise the sugary drinks in which approximately over \$1 billion are spent by the beverage companies. The main channel for advertisement is TV advertising (48%) and the main target of audience are teens (12). Hence, most of the students are prone and eager to try new drinks promoted by each brand of bubble tea.

The same study also reported that majority of the students from both genders consumed sugar sweetened beverages, but male students (97.6%) have a higher prevalence in consuming sugar sweetened beverages compared to female students (87.5%) (11). Another study done among US adults also reported that the prevalence of consumers was higher in male students (69.5%) compared to female students (57.9%) (13). These go against our finding as a higher prevalence of bubble tea consumption can be seen among female students (83.0%) compared to male students (70.2%). This might be due to female students who are more easily attracted in following the hype and trend of consuming bubble tea compared to other sugar-sweetened beverages. However, from the result mentioned, it can be concluded that both genders have high consumption in drinking bubble tea.

According to NHMS 2020, the national prevalence of premixed drinks which was defined as instant drink products containing sugar was lowest among those between the age of 18-19 years old (16.2%) and among Indians (13.8%) (9). Our study also reported that both groups have the lowest prevalence of consumers of bubble tea with 74.5% and 47.1% respectively compared to the other age groups and races.

43.6% of university students in Puncak Alam, Malaysia consumed sugar-sweetened beverages in order to reduce thirst (14). This is contradicted with

our study as the result showed that the ability to satisfy thirst (1.2%) is the least common reason for consuming bubble tea and majority of the respondents agree that they consumed bubble tea because it tastes good (52.4%). However, another study done among college students in Massachusetts and Louisiana in 2010 reported that taste plays a significant role as the main reason a specific type of beverages to be chosen ( $p < 0.05$ ) (15). There is another study done among undergraduate students in University of British Columbia that supports this finding too. The result demonstrates that 78 students (74.3%) indicate taste as their primary motivator for SSBs consumption (16). A study done among university students in Bangladesh also reported the same thing with 80.1% of the respondents consumed the sugar-sweetened beverages because of its good taste and refreshing. 43.5% of students from Anglia Ruskin University (Cambridge Campus) also admitted that they consumed SSBs mainly because they are tasty (10). Enjoying tasty food will help in providing pleasure as it can help in stimulating the release of dopamine in reward system of the brain (17). This might be the leading factor for students to consume bubble tea.

The awareness on sugar content in bubble tea among students in University of Cyberjaya is 30.7%. While a study from Australia shows that 34% of respondents gave a correct answer on the number of teaspoons of sugar (8 to 12) in a 375 mL (12.7 oz) can of soft drink (soda) (6). In our research, 86.8% have no awareness of the calories content in the bubble tea and 40.1% have correct estimation of calories content. As compared to the study done by Otaibi, they reported 68.8% students did not know the kilocalories content and they had a lower percentage of those who estimated accurately the kilocalories content which is only one third of them (31.2%) (7). The difference in this study compared to the previous study is due to limited participants in various backgrounds of knowledge. This study was conducted mainly among University students and this has resulted a limited range of participants, thus the knowledge was usually higher in this population.

Statistically, this study shows no association between awareness on sugar and calorie content in bubble tea and the bubble tea consumption with p-value more than 0.05. These findings contradicted a previous study done by Anglia Ruskin University in Cambridge, United Kingdom that reported there was significant association between knowledge on sugar level in sugar-sweetened beverages and its consumption with p value lower than 0.001 (10).

As compared to a cross-sectional study conducted among students in King Faisal University in A-Hasa, Saudi Arabia, the association result was also

contradicted as the study reported a significant association between knowledge about the content of calorie in a can or a bottle of sugar-sweetened beverages and its consumption ( $P$  value = 0.039,  $OR = 1.66$ ) (7). While our study shows an insignificant result of association between knowledge or awareness on sugar and calorie content in bubble tea with its consumption ( $P$  value  $> 0.05$ ).

This contradiction that was stated may occur due to a small sample size of respondents recruited for our study and limited resources of previous study to be compared. As of now, only a few published literatures are available with bubble tea topic and we have to optimize the comparison by using sugar-sweetened beverages studies as bubble tea was also categorized as a sugar-sweetened beverage. Usage of specified types of sugar-sweetened beverages may result in discrepancy in the results of the study.

## CONCLUSION

The knowledge among the students in University of Cyberjaya regarding the sugar and calorie content in bubble tea was not convincing as not even one third of the students were aware of sugar and calorie content. Despite that, our finding suggested that the awareness of sugar and calorie content in bubble tea was not significantly associated with the attitude and practice towards bubble tea consumption. Most of the students who were aware of the sugar and calorie content in the bubble were known as heavy consumers of bubble tea.

This study would be useful in providing the baseline data on the prevalence of bubble tea consumption and awareness on sugar and calorie content in bubble tea among undergraduate university students. Our study showed there was a gap between knowledge and practice of bubble tea consumption among the students. Hence, it is recommended that some interventions such as specific education programs and guidelines on healthy diet be carried out to raise the knowledge and awareness on high sugar and calorie content in bubble tea and its adverse effects on health like obesity and diabetes.

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