ORIGINAL ARTICLE

Unveiling Knowledge, Attitude and Practice on Carbonated Drinks Intake Among Male and Female Young Adults in Pekan, Pahang

Nurfarzana Mohamad Zailani[1], Aliza Haslinda Hamirudin[1,2*]

[1]Department of Nutrition Sciences, Kulliyyah of Allied Health Sciences, International Islamic University Malaysia, Pahang, Malaysia
[2]Food Security and Public Health Nutrition Research Group (FOSTER), Kulliyyah of Allied Health Sciences, International Islamic University Malaysia, Pahang, Malaysia

Keywords: carbonated drinks; knowledge; attitude; practice; young adults

ABSTRACT

Background: Consumption of carbonated soft drinks has increased over the years, contributing to health issues such as obesity and non-communicable diseases (NCDs) particularly diabetes. Various factors influencing young adults to consume carbonated drinks, but research remains limited. This study aimed at assessing knowledge, attitude and practice (KAP) on carbonated drinks consumption among young adults in Pekan, Pahang specifically comparison between males and females. **Methods:** A cross-sectional study was conducted among a total of 94 respondents (n=47 males, n=47 females) aged 18 to 35 years old. The KAP questionnaires were distributed across residential areas in Pekan, Pahang. Statistically significance was set at $p<0.05$. **Results:** No significant difference was detected in knowledge score between males and females ($p=0.831$) indicating there was no difference among males and females related to knowledge and understanding level on carbonated drinks. Meanwhile, significant differences were identified for both attitude ($p=0.049$) and practice ($p=0.032$) scores in percentage between males and females. Males exhibited greater attitude on consumption and higher practice on carbonated drinks intake compared to females. **Conclusion:** Findings indicate similar level of knowledge between genders. Males had negative attitude and greater practice on carbonated drinks intake than females. Thus, it is imperative for targeted strategies according to genders in nutrition education and health promotion strategies. Enhancing awareness on adverse health effects related to carbonated drinks intake could improve knowledge and further prevent rising rate of NCDs.

INTRODUCTION

Findings from the Malaysian Adult Nutrition Survey (MANS) conducted in October 2002 and December 2003 on dietary consumption patterns showed that the majority of the population drank plain water at least six times daily; with plain water identified as the most frequently consumed beverage (Norimah et al., 2008). Similarly, the National Health and Morbidity Survey (NHMS) in 2012 also stated that most of the estimated population (59.2%) consumes five or more times plain water daily. Although soft drinks were not reported as the most frequent beverage daily, this does not imply that the population limits their consumption. Over the years, the beverage intake patterns have changed drastically compared to those reported more than a decade ago. The recently conducted NHMS 2023 revealed that 1 in 5 adults did not drink adequate plain water daily (Institute for Public Health, 2024).

* *Corresponding author.*
E-mail address: aliza@iium.edu.my

Globally, there is a shift from the consumption of water to sugar-containing beverages such as soft drinks and fruit juices (Muckelbauer et al., 2013, Popkin, 2011). This clearly demonstrates that carbonated drink is one of the preferred choices of drink. There are many types of sugar sweetened beverages such as carbonated drinks available in the market. In particular, young adults' population have the tendency to consume this type of beverages. This phenomenon is a concern that needs to be addressed accordingly to prevent non-communicable disease occurrence. Lack of nutritional knowledge on beverages intake also encourages people to drink more carbonated drinks (Miller et al., 2020). High sugar content and calories in carbonated drinks contribute to high energy intake which could lead to weight gain (Vartanian et al., 2007). High carbonated drinks intake is mostly driven by the sweet taste, with influence from family and friends also contributing to this problem (Dinkhoff, 2009). Young adults commonly observe the type of beverages their family and friends usually drink, and they will also mirror the intake to be socially accepted. The affordability of these beverages is also another factor contributing to high intake of carbonated drinks among young adults. This trend can lead to increased risk of non-communicable disease such as diabetes. Ministry of Health (2020) reported that Pahang has the third-highest diabetes prevalence in Malaysia, at 25.7%. Given the limited

research on consumption of carbonated drinks in Pekan, Pahang, this study is therefore warranted in this region. To raise awareness in the community, it is important to identify on what people know about certain things, how they feel and how they behave. Based on Ajzen's Theory of Planned Behaviour, it stated that an individual will expect to conduct a behaviour when they see it positively, believe what other people want them to do and perceive it to be under their own control (Ajzen, 1989). Thus, this study aimed to assess knowledge, attitude and practice on carbonated drinks intake among young adults, both males and females in Pekan, Pahang.

MATERIALS AND METHODS

Study Design and Sampling Strategy

A cross-sectional study was conducted whereby the relationship between outcome and other variables of interest was examined. Convenience sampling was applied in this study and the respondents were recruited from various residential areas in Pekan, Pahang.

Source of Population

Samples consist of young adults aged 18 to 35 years old in line with the age range of young adults in a Malaysian study by Zulfakar et al., (2023), both males and females. Inclusion criteria for the population was young adults and residents of Pekan, Pahang. Exclusion criteria were children, adults aged ≥36 years old, people who lived in other regions, people who had been diagnosed with diabetes and diseases which require fluid restriction.

Sample Size Calculation

Two means formula was used for sample size calculation:

$$n = \frac{2\,\sigma^2}{\Delta^2}\,(Z_{\alpha/2} + Z_{\beta})^2$$

Where, $Z_{\alpha/2}$ = 1.96 (for 95 % confidence interval)

Z_{β} = 0.84 (for 80 % power)

Δ = detectable difference

σ = standard deviation in population (based on literature)

σ = ¼ (max score - min score)

= ¼ [(12.7 + 3.3) – (12.7 – 3.3)] (Pacific & Hoefkins, 2014)

= ¼ (16 – 9.4)

= 1.65

$$n = \frac{2\,(1.65)^2}{1^2}\,(1.96 + 0.84)^2$$

$$= \frac{5.445}{1}\,(7.84)$$

= 5.445 (7.84)

= 42.69

≈ 43 samples for one group

10% attrition rate for dropout and refusal to participate were included.

= 43 + 10%

= 43 + 4.3

= 47.3

≈ 47 samples for one group

In this study, two groups were needed to compare between males and females. Total samples needed were 94 subjects (n=47 males, n=47 females).

Data Collection

A structured questionnaire was used to collect data which was adopted from a previous study (Kharde et al., 2013). Before implementing the research, a pilot study was performed among 10% of required sample size to test the face validity of questions in the questionnaires. A total of 10 respondents consists of 5 males and 5 females answered the questionnaires for the pilot study. Most of them responded that they understand all questions.

For data collection, potential respondents were approached and explanations about the study were provided. An informed consent was completed by each respondent prior to their participation. The respondents filled in the questionnaires under the supervision of the researcher to ensure all the respondents responded to the study questions. Ethics approval obtained from IIUM Research Ethical Committee (IREC) (ID No: IREC 2019-070). The details in the questionnaires were divided into 4 parts consist of sociodemographic data, knowledge on carbonated drinks intake, attitude on carbonated drinks intake and practice on carbonated drinks intake.

Questions on knowledge regarding carbonated drinks

The questions were in objective format where the subjects needed to select the answer according to their level of understanding. Knowledge was measured with 10 statements focusing on caloric value of carbonated drinks, sugar contents in carbonated drinks, components of carbonated drinks (sweetener, flavouring, colouring, preservatives and additives) and health effects of carbonated drinks (obesity, tooth erosion and bone fractures). The subjects need to choose answers based on the questions either true or false which gave them 10 score points as total score. One mark was given for the correct answer and 0 for wrong answer. The score point was then converted into percentage.

Questions on attitude regarding carbonated drinks

The questions consist of 5 questions in which the respondents need to tick one of the answers given which is either 'Yes' or 'No'. A numerical score was assigned to each choice. One score was given if the respondents choose 'Yes' which indicated that they had negative attitude toward consumption of carbonated drinks. For question 3, one score was given if the respondents choose 'No' indicating a negative attitude in consumption of carbonated drinks. Then, total score point was calculated and converted into percentage (%). The highest score obtained showed that respondents had negative or higher attitude toward consumption of carbonated drinks. Meanwhile, lowest score point showed that they had positive attitude which means that they were not enjoying and not addicted to consume carbonated drinks.

Questions on practice regarding carbonated drinks

The questions consist of 4 questions. "A 4-point scale was used to assess the frequency of carbonated drink consumption and the average quantity (in glasses) consumed at a time. Meanwhile, one mark was given when the respondents choose 'No' regarding practice on reading the ingredients list of carbonated drinks. Similarly, one score point was given for each response regarding factors influencing to consume carbonated drinks. Then, total score point was calculated and converted into percentage (%). The highest score obtained showed that respondents had higher practice toward consumption of carbonated drinks meanwhile lowest score point showed that they had lower practice which means that they were not consuming carbonated drinks frequently.

Statistical Analysis

Data was analysed using SPSS version 12.0.1. Descriptive statistics was used to analyse sociodemographic data. To compare knowledge, attitude and practice between males and females of young adults regarding carbonated drinks , independent-t test was used for normally distributed data. Meanwhile, Mann-Whitney U test was used for non-parametric test. *P-value* was set at $p < 0.05$ as statistically significant.

RESULTS

Sociodemographic Characteristics

A total of 94 respondents of young adults both males and females in Pekan, Pahang had participated in this study. The distribution of respondents based on sociodemographic characteristics is presented in Table 1.

There were 47 male respondents (50%) and 47 female respondents (50%). Most of the respondents were unmarried (74.5%) compared to respondents that already married (25.5%). For the educational level, 31 respondents (33%) only studied until PMR or SPM level, 56 respondents (59.6%) were Diploma or Degree holders and 7 respondents (7.4%) stated other education level. Among 94 respondents, there were 28 (29.8%) full-time employees, 5 (5.3%) part-time employees, 9 (9.6%) self-employed, 13 (13.8%) unemployed and 39 (41.5%) students. Next, 40 respondents (42.6%) have no income per month. The number of respondents with income less than RM 1000 per month and range between RM 1000 to RM 3000 were same which is 24 respondents (25.5%). The number of respondents for income per month from RM 3001 to RM 5000 and more than RM 5000 were 4 (4.3%) and 2 (2.1%), respectively. Lastly, most of the respondents (95.7%) stated that they are free from disease and did not have any problems with their health status. There were only 4 respondents (4.3%) stated that they had other diseases such as cholesterol problem, sinusitis, vertigo and G6PD.

Table 1: Sociodemographic characteristics of young adults (n = 94)

Variables	Number of respondents (N)	Percentage (%)
GENDER		
Male	47	50
Female	47	50
MARITAL STATUS		
Single	70	74.5
Married	24	25.5
EDUCATION LEVEL		
PMR/SPM	31	33
Diploma/Degree	56	59.6
Others	7	7.4
EMPLOYMENT STATUS		
Full Time	28	29.8
Part Time	5	5.3
Self-employment	9	9.6
Unemployment	13	13.8
Student	39	41.5
INCOME PER MONTH		
<RM1000	24	25.5
RM 1000-3000	24	25.5

RM 3001 – 5000	4	4.3
>RM5000	2	2.1
None	39	42.6
HEALTH PROBLEM		
No	90	95.7
Others	4	4.3

Knowledge on Carbonated Drinks Intake between Males and Females

Table 2 presents the knowledge of respondents on carbonated drinks. The lowest score obtained among 94 respondents was 30% meanwhile the highest score was 100%. There were 5 males and 6 females score 100% which showed that they got all correct answers and indicated that they know and aware about calorie content, sugar content, ingredients and long term health effects regarding carbonated drinks. Most of the respondents had an average knowledge as the majority of them score from 60% and above.

The mean percentage scores for males and females were 67.87±20.21 and 68.72±18.37, respectively. There was no significant difference in knowledge scores between males and females (p=0.831), indicating similar level of knowledge between genders.

Attitude on Carbonated Drinks Intake between Males and Females

Table 3 shows results related to attitude on carbonated drinks intake. Sixty percent was the highest score and 0 percent was the lowest score obtained among 94 respondents for attitude on carbonated drinks intake. Zero percent indicated that the respondents had low or positive attitude toward consumption of carbonated drinks which means that they are not really enjoying or dislike to consume carbonated drinks. Meanwhile, 60% showed that the respondents had high and negative attitude toward carbonated drinks intake which means that they enjoyed and preferred to consume carbonated beverages. The highest number of respondents that got the highest mark was males with 5 respondents compared to females with 1 respondent. Thus, the higher the score obtained by respondents, the more negative the attitude is.

Mann-Whitney U test was conducted due to data was not normally distributed. *p-value* obtained from the test was 0.049. There was a significant difference in attitude score in percentage between males and females. The mean of attitude score among males (52.59±20.41) was higher compared to females (42.41±15.5). The results demonstrated that males had higher or negative attitude toward consumption of carbonated drinks which indicated that they enjoyed and preferred to consume carbonated beverages compared to their female counterparts.

Practice on Carbonated Drinks Intake between Males and Females

Table 4 demonstrates practice on carbonated drinks among young adults. 30 percent was the highest score point and 0 percent was the lowest score point obtained among 94 respondents. 0 percent indicated that the respondents had low practice toward consumption of carbonated drinks which means that they do not consume carbonated drinks more often, meanwhile, 30 percent showed that the respondents had higher practice toward carbonated drinks intake which means that they consume carbonated beverages more often. The highest number of respondents that got the highest mark was males with 3 respondents compared to none among females. Independent sample T-test was conducted and *p-value* obtained from the test was 0.032 which is less than 0.05, so, there was a significant difference in practice score in percentage between males and females. The mean practice score among males (13.54±6.56) was higher compared to females (10.864±5.31). In short, males had higher practice toward consumption of carbonated drinks which indicated that they consume carbonated beverages more often.

Table 2: Number of respondents (%) for each score on knowledge

Gender	Score Point (%)								Mean (SD)
	30	40	50	60	70	80	90	100	
Male	4 (8.5%)	5 (10.6%)	1 (2.1%)	9 (19.2%)	9 (19.2%)	11 (23.4%)	3 (6.4%)	5 (10.6%)	67.87 (20.21)
Female	1 (2.1%)	4 (8.5%	5 (10.6%	12 (25.5%)	7 (14.9%)	10 (21.3%)	2 (4.3%)	6 (12.8%)	68.72 (18.37)

Table 3: Number of respondents (%) for each score on attitude

Gender	Score point (%)						Mean (SD)
	0	20	40	60	80	100	
Males	20 (42.6%)	14 (29.8%)	8 (17.0%)	5 (10.6%)	0	0	52.59 (20.41)
Females	28 (59.6%)	13 (27.7%)	5 (10.6%)	1 (2.1%)	0	0	42.41 (15.5)

Table 4: Number of respondents (%) for each score on practice

Gender	Score point (%)						Mean (SD)
	0-5	6-10	11-15	16-20	21-25	26-30	
Males	3 (6.4%)	12(25.5%)	17(36.1%)	6(12.8%)	6(12.8%)	3(6.4%)	13.54 (6.56)
Females	8 (17.0%)	12(25.5%)	18(38.3%)	7(14.9%)	2(4.3%)	0	10.864 (5.31)

DISCUSSION

Knowledge on Carbonated Drinks Intake among Young Adults

No significant difference in knowledge score between males and females was identified in this study. Both genders are considered to have similar level of knowledge. This finding was coherent with result of previous study by Pacific and Hoefkins (2014). Nevertheless, other studies showed contradictory findings with greater knowledge among females (O'Leary et al., 2012; Azzeh & Hamouh, 2022); due to males often underestimate the sugar and calorie content. Females have tendency to recognize healthier options to carbonated drinks in comparison to males, due to males' preference towards satisfaction and taste which dominate over their healthier options understanding (Nergiz-Unal et al., 2016; Azzeh & Hamouh, 2022).

Even though women tended to have higher levels of knowledge compared to men, the technology has changed the method on how information can be accessed (Corby, 2007). Regardless of males or females, equal access to information via internet and other sources of information may influence their knowledge. It is important for young adults to acquire a credible and reliable information about the carbonated drink due to massive amount of online information nowadays, which can lead to misinformation and misinterpretation.

Attitude on Carbonated Drinks Intake among Young Adults

There was a significant difference in attitude score between males and females, with higher score among males compared to females. This indicates males had negative attitude toward carbonated drinks intake; with consistent findings showed by Pacific and Hoefkins (2014). Redondo et al. (2014) highlighted that beverages specific attributes also influence consumers' preferences of certain type of drinks.

Young adults can become addicted to carbonated drinks if the taste of carbonated drink meets their preference. Social acceptance plays a pivotal role of carbonated drinks intake among males than females who are more incline by healthy eating and trends with their peers (Pollard et al., 2016; Duncan et al., 2022).

Weight management and body image are of concerns among females which reflects their attitudes in sugar sweetened beverages (SSBs). Consequently, they become cautious in the intake compared to males who favour enjoyment and taste over adverse effects to health (O'Leary et al., 2012; Azzeh & Hamouh, 2022). It is worth to note that cultural attitudes between gender have a significant role in beverages intake. Some culture encourages more intake of sugary drinks among makes as it relates with masculinity, but females are expected to adopt healthier lifestyle in the society (Nergiz-Unal et al., 2016; Khan et al., 2021).

Practice on Carbonated Drinks Intake among Young Adults

Our study found a significant difference in practice score between males and females, with higher score in males compared to females which demonstrates that males had higher practice in carbonated drinks consumption than female. The finding was parallel with result reported by Dinkhoff (2009), which further showed that the percentage of males consumed soft drinks was twice compared to females.

Moreover, Zoellner et al. (2012) reported that men and younger people drink more regular soft drinks compared to females. Other studies also indicate that males are more likely to consume SSBs daily than female who are more prone to health concerns (O'Leary et al., 2012; Pollard et al., 2016). Moreover, females commonly opt for carbonated drinks intake occasionally rather than as part of their regular dietary intake (Pollard et al., 2016; Duncan et al., 2022). They are also more receptive to health campaigns aims at lowering sugary drink and promoting healthier beverages options intake than their males counterpart (Azzeh & Hamouh, 2022).

Limitation and Strength

Due to the answers provided by the respondents regarding knowledge of carbonated drinks were specific and need to choose only one answer, there were possibilities of respondents to answer the questionnaires by assumption. Meanwhile, when asking to answer the questionnaires, some of female respondents mentioned that they had not taken any carbonated drinks for a while potentially opting for a perceived favourable response. Despite that, the use of questionnaire facilitated study completion with the presence of researcher at the time of data collection is a notable strength of this study. Data collection is cost effective as only papers and pen were needed.

CONCLUSION

This study indicated that both males and females of young adults showed no significance difference in knowledge regarding carbonated drinks. Notable gender differences were identified for attitudes, and practices regarding carbonated drink intake among young adults. Males demonstrated negative attitude toward consumption of carbonated drinks compared to females; in which males prioritize taste of carbonated drinks leading to higher consumption than females. Nutrition education strategies to address the differences are warranted to promote healthier choices in young adults according to gender. Additionally, further strategies to raise awareness on effects of consuming carbonated drinks can be developed which can help reduce the incidence of non-communicable disease especially diabetes.

ACKNOWLEDGEMENT

We would like to thank the respondents for voluntarily participating in this research. This research received no funding from any grant.

REFERENCES

Ajzen, I. (1989). Attitude structure and behavior. In Pratkanis, A. R., Breckler, S. J., & Greenwald, A. G. (Eds.), *Attitude Structure and Function* (pp. 241–274). Lawrence Erlbaum.

Azzeh, F. S., & Hamouh, E. N. (2022). Predictors of sugar-sweetened carbonated beverage consumption and its effect on adiposity parameters of female Saudi students. *Medicine, 101*(1), e31983. https://doi.org/10.1097/md.0000000000031983

Corby. (2007). *Technology and Quality in Educational Scholarly Communication*. Retrieved from https://files.eric.ed.gov/fulltext/ED496629.pdf

Dinkhoff, K. (2009). *Predicting the Consumption of Young Adults concerning Sugared and Sugar-free Beverages* (Master's thesis). Retrieved from https://essay.utwente.nl/59530/1/scriptie_K_Dinkhoff.pdf

Duncan, M. J., et al. (2022). High consumption of discretionary beverages in young Australian adults aged 18–30 years: A cross-sectional study. *Dietetics, 1*(2), 11-20. https://doi.org/10.3390/dietetics1020011

Institute for Public Health. (2012). *National Health and Morbidity Survey 2012: Volume II: Non-Communicable Diseases, Risk Factors & Other Health Problems*. Ministry of Health Malaysia. Retrieved from https://iku.moh.gov.my/nhms-2012

Institute for Public Health. (2024). National Health and Morbidity Survey (NHMS) 2023: Non-communicable Diseases and Healthcare Demand - Key Findings. Retrieved from https://iku.nih.gov.my/images/nhms2023/key-findings-nhms-2023.pdf

Khan, M. A., et al. (2021). Association of carbonated soft drink and fast food intake with stress-related sleep disturbance among adolescents: A global perspective from 64 countries. *EClinicalMedicine, 31*, 100681. https://doi.org/10.1016/j.eclinm.2020.100681

Kharde, A., Deshpande, J., & Phalke, D. (2013). Knowledge, attitude and practices (KAP) regarding carbonated drinks among students of Medical College of Western Maharashtra. *International Journal of Medical Science*

and Public Health, 2(4), 912-915.

Miller, C., Ettridge, K., Wakefield, M., Pettigrew, S., Coveney, J., Roder, D., Durkin, S., Wittert, G., Martin, J., & Dono, J. (2020). An In-Depth Exploration of Knowledge and Beliefs Associated with Soda and Diet Soda Consumption. *Nutrients*, *12*(9), 2841. https://doi.org/10.3390/nu12092841

Ministry of Health Malaysia. (2020). *National Diabetes Registry Report 2013–2019*. Retrieved from https://www.moh.gov.my/moh/resources/Penerbitan/Rujukan/NCD/Diabetes/National_Diabetes_Registry_Report_2013-2019_26082021.pdf

Muckelbauer, R., Sarganas, G., Gruneis, A., & Muller-Nordhorn, J. (2013). Association between water consumption and body weight outcomes: A systematic review. *The American Journal of Clinical Nutrition, 98*(2), 282–299. https://doi.org/10.3945/ajcn.112.055061

Nergiz-Unal, R., et al. (2016). Trends in fluid consumption and beverage choices among adults reveal preferences for ayran and black tea in central Turkey. *Nutrition & Dietetics, 73*(3), 312-318. https://doi.org/10.1111/1747-0080.12316

Norimah, A. K., Safiah, M., Jamal, K., Siti Haslinda, Zuhaida, H., Rohida, S., … Azmi, M. Y. (2008). Food consumption patterns: Findings from the Malaysian Adult Nutrition Survey (MANS). *Malaysian Journal of Nutrition, 14*(1), 25–39.

O'Leary, F., et al. (2012). Sugary drink consumption behaviours among young adults at university. *Nutrition & Dietetics, 69*(2), 119-125. https://doi.org/10.1111/j.1747-0080.2012.01583.x

Pacific, R., & Hoefkins, C. (2014). Consumption pattern, attitudes and nutrition knowledge on soft drinks among Belgian adults. *Tanzania Journal of Agricultural Sciences, 13*(1), 55-66.

Pollard, C. M., et al. (2016). Obesity, socio-demographic and attitudinal factors associated with sugar-sweetened beverage consumption: Australian evidence. *Australian and New Zealand Journal of Public Health, 40*(1), 71-77. https://doi.org/10.1111/1753-6405.12482

Popkin, B. M. (2011). Contemporary nutritional transition: Determinants of diet and its impact on body composition. *Proceedings of the Nutrition Society, 70*(1), 82–91. https://doi.org/10.1017/S0029665110003903

Redondo, N., Gómez-Martínez, S., & Marcos, A. (2014). Sensory attributes of soft drinks and their influence on consumers' preferences. *Food & Function, 5*(8), 1686-1694.

Vartanian, L. R., Schwartz, M. B., & Brownell, K. D. (2007). Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis. *American Journal of Public Health*, *97*(4), 667-675.

Zulfakar, M. H., Islahudin, F., & Punniaseelan, N. (2023). Contraceptive Awareness, Knowledge and Attitude Among Unmarried Young Adults in Malaysia. *Malaysian Journal of Pharmacy (MJP)*, *9*(1), 5-10.