

Original Research Article

Assessment of knowledge, attitude and practice towards caffeinated products consumption

ABSTRACT

Caffeinated product consumption is the world most widely consumed psychoactive drug. The consumption of caffeinated product is highly prevalent among Asian countries. This study aimed to assess knowledge attitude and practice towards caffeinated product consumption. A cross sectional descriptive study was conducted through online. Questionnaire was circulated different social media platform. We assessed demographics characteristics and intake of caffeine from different products like tea, coffee, energy drinks and soft drinks. We included both genders, participant willing to participate in the study and above 18 years old and repeated data from same participants, incomplete data submission were excluded from the study. A total of 273 participants were replied to the survey. Out of 273 participants 148 (54.22%) were female, 125 (45.78%) were male, among them 241 (88.30%) participants were under the age group of 18-28 years. Most of the participants admit that consuming caffeinated products (95.60%). Multiple choice procedure was carried out to assess the different products, most preferred products is 156 (59.77%) consuming coffee, 146 (55.93%) consuming tea, 106 (40.99%) consuming chocolate, 47 (18.00%) consuming carbonated drink, 26 (9.96%) consuming energy drinks and 7 (2.68%) consuming caffeine from other products. The major reason for intake caffeinated products for refreshment 163 (62.45%) and most of the participants intake while studying 115 (44.06%). Most common symptoms occurred due to excessive consumption of caffeine is vomiting (11.49%), the study participants faced difficulties faced missing regular intake of caffeine is headache (27.20%). Out of 273 participants, majority of the participants has lack of knowledge and positive attitude towards caffeine consumption. Majority of the study participants believes merits of caffeinated product consumption outweigh its demerits. It was found that side effect due to the usage of caffeine raising exceedingly it is essential to educate the consumption product in a recommended limit in their daily life style. This study result will give an idea for upcoming research on consumption of caffeinated products.

Keywords: caffeinated products, Caffeine, coffee, Physcoactive stimulant, caffeinated side effects

1. INTRODUCTION

Background:

Caffeine is a central nervous system stimulant (CNS), a psychoactive substance it is attained from natural plants, one of the worlds major ingredients consumed every day in daily life for several reasons^[1]. Caffeine can be consumed by caffeinated products like coffee, tea, chocolates, soft drinks and energy drinks. Extracted or synthesized caffeine from natural plants is frequently added to food and beverages to boost their stimulant properties^[1, 2]. The most widely used products are coffee, tea, energy drinks and soft drinks^[2, 3]. Among these tea and coffee have become the most popular beverages in the world, and are used on a regular basis by the majority of people followed by other products^[4]. Caffeine is mostly absorbed in the small and found in intestine about 99% of caffeine is absorbed in the intestine within 45 minutes all body fluids, it crosses the cellular membrane and also crosses through Placenta^[5]. Caffeine promotes alertness and

wakefulness by blocking adenosine receptors ^[6]. People consume caffeine for a number of reasons which include increased alertness and attention, improved job performance, greater focus, postpone sleep ^[7]. Surgeons use caffeinated products **to attentiveness** and reduce tiredness ^[8], sportspersons use a caffeinated product for physical performance ^[9], young people to boost their energy levels, for the flavour, or as part of social events ^[10].

The Problem:

According to the Food and Drug Administration (FDA) **daily intake of caffeine within the limit of 400mg ^[11], European Food Safety Authority (EFSA) and the American Institute of Medicine have controlled the caffeine intake in pregnant women 200mg/ day ^[12,13] higher intake of caffeine during pregnancy may lead to miscarriage evidence remains inconclusive ^[14]**. caffeine it has both positive and negative effect, many studies show that decreases the risk of type 2 diabetes mellitus(DM), liver cancer, uterine or prostate cancer, and basal cell carcinoma ^[15]. Caffeinated product consumption **which also leads** to sleep disorder and also increased risk for obesity, most common side effects are sleeplessness, repeated urination, anxiety, and headaches ^[16]. When caffeine intake increases more than 3 mg/kg/day side effects may occurs. Acute clinical toxicity occurs when daily doses reach 1 g. Doses of 5 g and 10 g can be fatal ^[17]. **Consumption patterns, as well as information about caffeine, are not efficiently handled among people that knowledge needs,**

The Proposed Solution:

Most of the populations were oblivious about the amount of caffeine intake and its chemical constituents in the market. Hence, it is important to create awareness about it. Our study aimed to evaluate knowledge, attitude and practice towards caffeinated product consumption. We assessed various and commonly consumed caffeinated products, intake patterns, factors influencing caffeinated product intake and knowledge, attitude and practice about caffeine.

2. MATERIAL AND METHODS

The study designed as a cross-sectional web-based survey was conducted at kumarapalayam, Tamil Nadu during August and September 2020. For this study, **we have developed** a questionnaire based on previously published questionnaires (Bhojaraja VS et al., ^[18], Jahrami H et al., ^[19], Alaa Hammami et al., ^[20]). Data were collected through google forms. The questionnaire **contains** 4 sections **sociodemographic details, practice, and attitude about caffeinated product consumption**. The questionnaire was sent via different social media platforms, with the subject being able to read and answer the questions by clicking on the link, each participant's permission was obtained before the start of the survey and the final page included a confidentiality statement, the questions were based on multiple choice. **It was administered only in the English language**. Ethical approval for this study was obtained from the Institutional Ethics Committee (Ref: JKKNCP/ETHICS_PRACTICE/020PDS07). Participants with an age 18 years and above, both genders and both caffeinated product consumers and non-consumers were included in the study. Participants below 18 years, repeated data from the same participants and incomplete data were excluded from the study. Data were managed and analysed using Microsoft Excel by using simple descriptive statistics.

3. RESULTS AND DISCUSSION

A questionnaire link was circulated through social media like WhatsApp, Facebook, and e-mail, A total of 273 participants completed the questionnaire, Among these 261 (95.60%) **participants consuming caffeinated** products and 12 (4.40%) did not consume caffeinated products as represented in (Table 1).

In our study demographic report shows that 148 (54.22%) were **female**, 125 (45.78%) were **male**, among them 241 (88.30%) participants were under the age group between 18-28 years followed by 20 (7.32%), 9 (3.29%) and 3 (1.09%) participants were under the age group of 29-39 years, 40-50 years and 51-61 years respectively. The Education and occupation of the study participants were illustrated in (Table 1). **In the study conducted by Al Ghali et al., caffeinated products consumed by students and adults were increased it is contrasted with our study.** ^[21, 22]

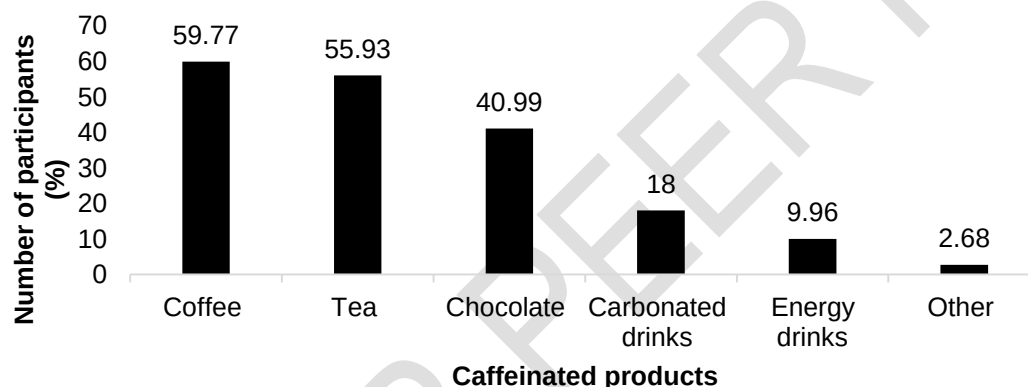
Table 1: Socio demographic details of the study participants.

Characteristics		Number of participants (n=273)	Percentage (%)
Gender	Female	148	54.22
	Male	125	45.78

Age in years	18-28	241	88.30
	29-39	20	7.32
	40-50	9	3.29
	51-61	3	1.09
Education	Under graduate	162	59.34
	Post graduate	87	31.86
	Doctorate school	20	7.34
		4	1.46
Occupation	Student	206	75.45
	Employed	55	20.14
	Un employed	12	4.40
Intake caffeinated products	Yes	261	95.60
	No	12	4.40

From the caffeinated product consumers, A multiple-choice procedure was carried out. Most of the participants 156 (59.77%) consuming coffee, 146 (55.93%) consuming tea, 106 (40.99%) consuming chocolate, 47 (18.00%) consuming carbonated drink, 26 (9.96%) consuming energy drinks, and 7 (2.68%) consuming caffeine other products as shown in (Figure 1). This was similar to the study done by (Fitt E, Pell D, Cole D 2013, Fulgoni VL 3rd, Keast DR, Lieberman HR 2015 and Yamada M *et al.*, 2010.,).^[23,24,25]

Figure 1: Participants preferring caffeinated products.



In our study caffeine consuming participants, intake of caffeinated products are associated with various reasons, frequency, and activities as showed in (Table 2). Most of the study participants 163 (62.45%) intake caffeinated products for refreshment followed by 106 (40.61%), 102 (39.08%), 39 (14.94%), 38 (14.55%) for taste and flavor, relief stress, headache, and for energy, respectively. Our result contrast with the study conducted by (M. Khalil, J. Antoun 2020, Mahoney R C *et al.*).^[11, 26] Majority of the participants 190 (72.79%) intake caffeinated products 1 to 3 times per day showed in (Table 2). The study conducted by (Jahrami *et al.*, 2020) coincides with our study at least consumes 1 time daily.^[19] Major activities associated with regular consumption of caffeinated products are 115 (44.06%) while reading or studying 92 (35.24%) while outing with friends and reasons for caffeinated product consumptions are illustrated in (Table 2). Our result contrast with the study conducted by (M. Khalil & J. Antoun 2020, Malinauskas *et al.*, and Mahoney R C *et al.*).^[11, 27, 26]

Table 2: Reason, Frequency and Activities associated with caffeinated product intake.

		Number of participants (n= 261)	Percentage (%)
Reason	Refreshment	163	62.45
	Taste and flavour	106	40.61
	Stress relief	102	39.08
	For headache	39	14.94

	For energy	38	14.55
Frequency	1-3 times per day	190	72.79
	3-5 times per day	17	6.51
	occasional	48	2.30
	More than 5 times per day	6	18.40
Activities	While reading or studying	115	44.06
	Outing with friends	92	35.24
	Working	70	26.81
	Long drive	46	17.62
	Watching television	41	15.70
	Other reasons	40	15.32

Caffeinated product-consuming participants experienced symptoms when consuming high doses of caffeinated products. Several selection procedures were performed to assess symptoms and difficulties, 30 (11.49%) vomiting, 24 (9.19%) nausea, 22 (8.42%) gastrointestinal upset, 17 (6.51%) increased heart rate and 14 (5.36%) restlessness, 11 (4.21%) had confusion and 8 (3.06%) had difficulty breathing are shown in (Table 3) contrasts with the study conducted by (Jahrami H *et al.*, 2020)^[19]. In our study were faced difficulties while missing regular caffeinated products. 71 (27.20%) headache, 30 (11.49%) difficult in concentration, 21 (8.04%) drowsiness, 19 (7.27%) anxiety, 18 (6.89%) fatigue, 17 (6.5%) irritability and 1 (0.38%) hallucination showed in (Table 3). The study conducted by (Nowak D *et al.*, 2015) contrast with our study.^[28] The study conducted by (Juliano M *et al.*, 2012) reported weakness/sleepiness, low attentiveness/difficulty concentrating, mood disturbances, loss of focus in work, flu-like feelings, and headache it is similar to our study^[29].

Table 3: Symptoms and Difficulties faced by participants

		Number of participants (n= 261)	Percentage (%)
Excessive caffeine intake and symptoms	vomiting	30	11.49
	Nausea	24	9.19
	GI disturbance	22	8.42
	Increased heart rate	17	6.51
	Restlessness	14	5.36
	Confusion	11	4.21
	Trouble breathing	8	3.06
Difficulties faced while missing the regular caffeine intake	Headache	71	27.20
	Harder to concentrate	30	11.49
	Drowsiness	21	8.04
	Anxiety	19	7.27
	Fatigue	18	6.89
	Irritability	17	6.51
	Hallucination	1	0.38

From our current study, the knowledge regarding caffeine consumption was not in a satisfactory manner. 127 (46.52%) participants don't know the energy drinks contain caffeine, 158 (57.87%) don't believe that taking more than 400 mg of caffeine per day is harmful to your health. A majority of the study participants 194 (71.06%) do not know whether caffeine increases frequent urination. 164 (60.07%) study participants were not knowing that caffeine consumption causes an increase in heart rate. 201 (73.62%) participants were not knowing that caffeine causes bone weakness. 214 (78.38%) participants do not know that regular caffeine consumption reduces the risk of Alzheimer's disease and Parkinson's disease. 220 (80.58%) participants do not know whether caffeine is safe for pregnant women as clarified in (Table 4), contrasts the study by (Alla Hammani M *et al.*, 2018)^[20].

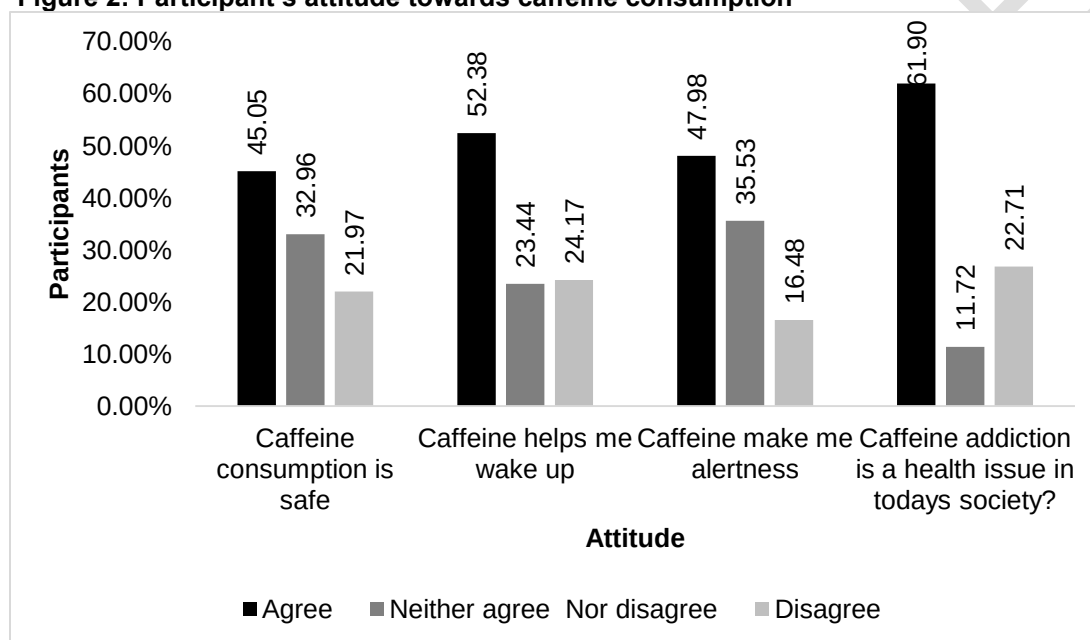
Table 4: Knowledge regarding caffeine consumption

	Yes (%)	No (%)
Do you believe that caffeine is present in energy drinks?	146 (53.47%)	127 (46.52%)
Do you believe that taking more than 400 mg of caffeine per day is harmful	115 (42.12%)	158

to your health?		(57.87%)
Do you believe that caffeine produces more urination?	79 (28.93%)	194 (71.06%)
Do you believe that consuming caffeine will cause your heart rate to rise?	109 (39.92%)	164 (60.07%)
Do you believe that caffeine increases bone thinning?	72 (26.37%)	201 (73.62%)
Do you believe that consuming caffeine on a regular basis lowers the risk of Alzheimer's and Parkinson's disease?	59 (21.61%)	214 (78.38%)
Is caffeine healthy for pregnant women to consume?	53 (19.41%)	220 (80.58%)

In our study participants, attitude towards caffeine consumption were more positive, 123 (45.05%) participants agreed caffeine consumption is safe, 90 (32.96%) participants were neither agreed nor disagreed and 60 (21.97%) disagreed. 143 (52.38%) were agreed caffeine helps me wake up, 64 (23.44%) participants were neither agreed nor disagreed and 66 (24.17%) disagreed. Followed by 131 (47.98%) were agreed caffeine intake makes me alert, 97 (35.53%) were neither agree nor disagree, and 45 (16.48%) disagreed. 169 (61.90%) participants were agreed caffeine addiction is a health issue for today's society, 32 (11.72%) neither agreed nor disagreed and 62 (22.71%) disagreed as represented in (Figure 2) has contrasted the study conducted by (Alla Hammani M *et al.*, 2018).^[20] Differences in results may owing to different data collection.

Figure 2: Participant's attitude towards caffeine consumption



Limiation of our study was the sample was relatively small. A large population could have been included in this study. Because of the small sample size study may not be imitated on the whole population since it is mainly based on self-reported data, it relies on the honesty of the dependent respondents. We are unable to demonstrate a correlation between caffeine intake and associated symptoms reported by participants in this study.

4. CONCLUSION

The majority of the study participants consume caffeine through caffeinated products on daily basis 1 to 3 times per day. Coffee and tea are the major sources of caffeine. To increase concertation or focus while studying and other activities. Intake of caffeine at higher doses and withdrawal leads to various health risks. The majority of the student participants believes the merits of the caffeinated product outweigh its demerits. It was found out that there is a lack of knowledge in the consumption of caffeinated products. So there is indeed to improve the knowledge of population about the consumption of caffeinated products. Hence we need to create awareness and educate them through seminars, and conducting camps, etc., This study result will give an idea for the upcoming researchers about caffeinated product consumption.

ETHICAL APPROVAL

Ethical approval for this study was obtained from the institutional ethics committee (ref: jkknpc/ethics_practice/020pds07).

REFERENCES

1. Martyn D, Lau A, Richardson P, Roberts A. Temporal patterns of caffeine intake in the United States. *Food Chem Toxicol.* 2018;111:71-83.
2. Mitchell DC, Knight CA, Hockenberry J, Teplansky R, Hartman TJ. Beverage caffeine intakes in the U.S. *Food Chem Toxicol.* 2014;63:136-142.
3. Verster JC, K J. Caffeine intake and its sources: a review of national representative studies. *Crit Rev Food Sci Nutr* 2018;58(8):1250-1259.
4. Seifert SM, Schaechter JL, Hershorin ER, Lipshultz SE. Health effects of energy drinks on children, adolescents, and young adults. *Pediatrics.* 2011;127(3):511-528.
5. Temple JL. Caffeine use in children: what we know, what we have left to learn, and why we should worry. *Neurosci Biobehav Rev.* 2009;33(6):793-806.
6. Cappelletti S, Daria P, Sani G and Aromatario M. Caffeine: Cognitive and Physical Performance Enhancer or Psychoactive Drug? *Current Neuropharmacology.* 2015;13(4):71-88.
7. McLean SA, Paxton SJ, Wertheim EH. Factors associated with body dissatisfaction and disordered eating in women in midlife. *Int J Eat Disord.* 2010;43(6):527-536.
8. Franke AG, Bagusat C, McFarlane C, Tassone-Steiger T, Kneist W, Lieb K. The Use of Caffeinated Substances by Surgeons for Cognitive Enhancement. *Ann Surg.* 2015;261(6):1091-5.
9. Desbrow B, Leveritt M. Well-trained endurance athletes knowledge, insight, and experience of caffeine use. *Int J Sport Nutr Exerc Metab.* 2007;17(4):328-39.
10. Turton P, Piché L, Battram DS. Adolescent Attitudes and Beliefs Regarding Caffeine and the Consumption of Caffeinated Beverages. *J Nutr Educ Behav.* 2016 Mar;48(3):181-9.
11. Khalil, M., & Antoun, J. Knowledge and consumption of caffeinated products by university students in Beirut, Lebanon. *Clinical Nutrition ESPEN.* 2020;37:213-217.
12. EFSA Panel on Dietetic Products Nutrition and Allergies. Scientific opinion on the safety of caffeine. *EFSA J.* 2015;13(5):4102.
13. S McGuire. Institute of Medicine. Caffeine in Food and Dietary Supplements: Examining Safety; National Academies Press: Washington, DC, USA, 2014. *adv nutr.* 2014;5(5):585-586.
14. Chen LW, Wu Y, Neelakantan N, Chong MF, Pan A, van Dam RM. Maternal caffeine intake during pregnancy and risk of pregnancy loss: a categorical and dose-response meta-analysis of prospective studies. *Public Health Nutr.* 2016;19(7):1233-44.
15. Ding M, Bhupathiraju SN, Satija A, van Dam RM, Hu FB. Long-term coffee consumption and risk of cardiovascular disease: a systematic review and a dose-response meta-analysis of prospective cohort studies. *Circulation.* 2014;129(6):643-59.
16. Błaszczyk-Bębenek E, Jagielski P, Schlegel-Zawadzka M. Caffeine Consumption in a Group of Adolescents from South East Poland-A Cross Sectional Study. *Nutrients.* 2021;13(6):2084.
17. Malinauskas BM, Aeby VG, Overton RF, Carpenter-Aeby T, Barber-Heidal K. A survey of energy drink consumption patterns among college students. *Nutr J.* 2007;6:35.
18. Bhojaraja VS, Janardhan H, Hameed NA et al., Knowledge, attitude and practices towards consumption of caffeine containing drinks among the student population of Ras al-Khaimah medical and health sciences university, UAE. *International Journal of Research in Medical Sciences.* 2016; 4(8): 3537-3541.
19. Jahrami H, Mutarid AL, Penson P et al., Intake of Caffeine and Its Association with Physical and Mental Health Status among University Students in Bahrain. *Foods.* 2020;9(4):473-484.
20. Alaa Hammami, M., Al Shaikh, Y., Hashem, A., Mukhles Adi, O., Ahmed Aal Yaseen, I., El Menawy, Z. and Elmoselhi, A. Caffeine Consumption Levels and Knowledge among Adults in the United Arab Emirates: Insights from a Nationwide Survey. *Journal of Caffeine and Adenosine Research.* 2018;8(2):71-79.
21. Frary CD, Johnson RK, Wang MQ. Food sources and intakes of caffeine in the diets of persons in the United States. *J Am Diet Assoc.* 2005;105(1):110-3.
22. M. Al Ghali, Rola; Al Shaibi, Hessa; Al Majed, Huda; and Haroun, Dalia, Caffeine Consumption among Zayed University Students in Dubai, United Arab Emirates: A Cross-Sectional Study. *Arab Journal of Nutrition and Exercise.* 2017;1(1): 131-141.

23. Fitt E, Pell D, Cole D. Assessing caffeine intake in the United Kingdom diet. *Food Chem.* 2013;140(3):421-426.
24. Yamada M, Sasaki S, Murakami K, Takahashi Y, Okubo H, Hirota N, Notsu A, Todoriki H, Miura A, Fukui M, Date C. Estimation of caffeine intake in Japanese adults using 16 d weighed diet records based on a food composition database newly developed for Japanese populations. *Public Health Nutr.* 2010;13(5):663-672.
25. Fulgoni VL 3rd, Keast DR, Lieberman HR. Trends in intake and sources of caffeine in the diets of US adults: 2001-2010. *Am J Clin Nutr.* 2015;101(5):1081-1087.
26. Mahoney CR, Brunyé TT, Giles G, Lieberman HR, Taylor HA. Caffeine-induced physiological arousal accentuates global processing biases. *Pharmacol Biochem Behav.* 2011;99(1):59-65.
27. Malinauskas, B. M., Aeby, V. G., Overton, R. F., Carpenter-Aeby, T., & Barber-Heidal, K. A survey of energy drink consumption patterns among college students. *Nutrition Journal.* 2007;6:35.
28. Nowak D, Jasionowski A. Analysis of the Consumption of Caffeinated Energy Drinks among Polish Adolescents. *Int J Environ Res Public Health.* 2015;12(7):7910-7921.
29. Juliano LM, Huntley ED, Harrell PT, Westerman AT. Development of the caffeine withdrawal symptom questionnaire: caffeine withdrawal symptoms cluster into 7 factors. *Drug Alcohol Depend.* 2012;124(3):229-234.