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A cross-sectional study: caffeine consumption and their perception among pharmacy students

Abstract

Background: The consumption of caffeine is highly prevalent among university students. Previous research studies have significantly shown that university students have a different perception of caffeine's effect on their mental and physical health. These perceptions can influence caffeine consumption, which can result in addiction and serious public health consequences. Nevertheless, there is a scarcity of studies that explored better knowledge concerning the consumption and perception of caffeine among undergraduate pharmacy students.

Aim: This study aimed to determine the frequency of caffeine consumption and their perception focusing on (1) specific reasons for consuming caffeine (2) the association between the sociodemographic and overall caffeine intake.

Method: A validated online questionnaire that was adopted from a previous study was conducted at three different universities (UiTM Puncak Alam, KPJ Healthcare University College, and the University of Brunei Darussalam). A set of questionnaires was distributed via electronic mail (e-mail) and WhatsApp to the convenience sample of pharmacy students (n=260). Descriptive statistics and Pearson Chi-square tests analyses were conducted.

Results: Results from the study indicate that pharmacy students consume a caffeinated drink an average of one time daily. The main reason for the intake is to feel more awake (69.2%), especially during exam seasons (79%). There was a significant association between the source of income and caffeine consumption (p=0.033). In the perception category, "Mixing caffeine with alcohol is very dangerous' and "consuming too much caffeine is unhealthy" received the highest agreement (mean= 4.19 and mean=4.18 respectively).

Conclusion: Pharmacy students acquired good caffeine consumption and perception. There is no caffeine addiction issues found in this study.

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Impact of findings

a) These findings are important for the health authorities or educators in creating appropriate educational programs and awareness related to caffeine consumption or addiction in the future.

b) Moreover, the government, especially the Ministry of Health can use this finding as a guide in their initiative and effective action to create awareness about caffeine addiction and dependence among students.

c) Additionally, students should be encouraged to improve their learning abilities through stress management techniques, better sleeping and eating habits, time management, and involvement in physical activities.

Introduction

Caffeine can be found in many products such as beverages (coffee, caffeinated tea, caffeinated soft drinks, energy drinks), foods (cake, biscuits, bread, chocolate bar), and supplements. It can stimulate the central nervous system to produce a temporary energy boost, increase alertness, and improves mood by antagonizing all types of adenosine receptors: A1, A2a, A2b, and A3.[1] The recommended dosage of caffeine for a healthy adult is 200-400 mg per day.[2,3] Caffeinated drinks typically contain 70-200 mg of caffeine per 475 mL, which is significantly more than traditionally caffeinated beverages, which have only 50-100 mg.[1] Thus, if consumers are unaware of the maximum daily intake of specific caffeinated drinks, they may easily surpass the daily recommended dose of caffeine intake, resulting in caffeine overdose. According to Rakuten Insight's poll of 9340 participants, almost 50% of Malaysian respondents aged 25 to 34 years old consume energy-boosting drinks with high caffeine content.[4] Pharmacy students are one of the tough courses that have a packed schedule with assignments, exams, and socializing.[5] To be able to stay energetic throughout the day, caffeine becomes a part of the student's lives. Research by Ching and Ling (2021) has shown that 90% of students consumed caffeine and the majority of them consumed less than seven servings of caffeine weekly.[6] This shows that university students are learning to exhibit a strong habit of caffeine consumption. Most of the youth prefer to consume caffeinated beverages from soft drinks, energy drinks, and followed by coffee.[7]

Perception of caffeine may influence an individual caffeine consumption habit which contributes to a high prevalence of caffeine consumption among university students.[8] Typically, the urge to feel more alert and stay awake to complete the assignments and duties as a student makes them consume these caffeinated beverages.[6,9] Excessive intake all started from the consumption habit and perception of caffeine.[8] Overdose of caffeine consumption can be seen clearly with the symptoms like insomnia, palpitation, gastrointestinal distress, headache, and jitteriness, especially in a not habitual consumer.[2,10] Meanwhile, an overdose of caffeine in the long-term might lead to caffeine addiction and dependence as well as psychological instability such as chronic anxiety.[11] Many studies have been conducted to identify the perception and consumption of caffeine among university students in other countries but there are only a few studies that assess the consumption and perception of caffeine among pharmacy students.[2,8,12,13] This study aimed to determine the

consumption of caffeinated products in pharmacy students and their perception of caffeine with several specific objectives: 1.To identify the socio-demographic characteristics and association with caffeine consumption among pharmacy students. 2. To measure the frequency of caffeine consumption among pharmacy students. 3. To describe the reasons for pharmacy students consuming caffeine. The findings will aid to overcome the issue through awareness, and educational programs and improve the quality of life of pharmacy students.

Methods

A descriptive cross-sectional study was conducted during a period of six months, from April 2022 to June 2022 after taking approval from the Research Ethics Committee (REC) of the Universiti Teknologi Mara (UiTM). The data was collected from the students of three universities from the UiTM Selangor Branch. KPJ Healthcare University College, and the University of Brunei Darussalam. Using Raosoft calculator with a margin error of ± 5% and 95% of confidence interval from a population of approximately 800 undergraduate pharmacy students from all three universities, the required sample was 260. Non-probability convenience sampling technique was adopted. A link to the questionnaire in an English language Google Form format was distributed via electronic mail (e-mail). Following the email, link to the questionnaire also being distributed via WhatsApp chat groups of undergraduate pharmacy students in three universities. The follow-up request to answer the survey were carried out every week for 4 months. The link to the questionnaire were set to allow only one-time response to prevent duplication of data. Undergraduate pharmacy students of the age group 18-29 years (both male and female) were

included in the study. The analysis of reasons and perceptions was solely restricted to those pharmacy students who consume caffeine. The online questionnaire was adopted from a study on caffeine consumption habits and perception among the University of New Hampshire Students. 2 A written informed consent was sought and obtained via an online platform before answering the questionnaire. Of a total of 308 respondents that took the survey, 260 students consume caffeine which was equal to 85%. The questionnaire consisted of 30 questions comprised of (1) socio-demographic information, (2) purpose of caffeine consumption, and (4) perception of caffeine. All collected data were kept anonymous by using data identifier and researcher kept the data in a password encrypted document to maintain the confidentiality. The collected data were analyzed through SPSS version 24. The descriptive analysis includes the demographic data of students, frequency, perception of caffeinated beverages, and reason of pharmacy students consume caffeine were analyzed using frequencies, percentages, mean, and standard deviation (where appropriate). The data were analyzed by using the Chi-square test and a p-value of ≤0.05 was considered significant.

Results

Of the 309 respondents from three universities that answered the questionnaire, 260 were found to consume caffeinated beverages while 49 respondents were not consumed caffeine and thus were excluded from this study. On average, most of the students consumed caffeine only once daily (66.5%), 23.5% of students consumed 2-3 serving daily while there were only 0.8% consumed 3-5 serving in a day (Figure 1). The socio-demographic characteristics of the respondents showed in Table 1. Out of the total 260 respondents, 64 (24.6%) were males and 196 (75.4%) were females. Caffeine consumption was more in females (75.4%) than in males (24.6%). The majority of the respondents who consume caffeine had educational loans as their source of income (44.2%). The p-value (0.033) calculated through the chi-square test showed that source of income gender was associated with caffeine intake and pharmacy students who received educational loans were significantly higher than those who self-sponsored and received scholarships. While no significant difference was found between other selected sociodemographic profiles with caffeine intake. The majority of pharmacy students consuming caffeinated drinks live in a suburban area (42.3%), in year three (30.4%) with a CGPA of more than 3.0 (86.1%).

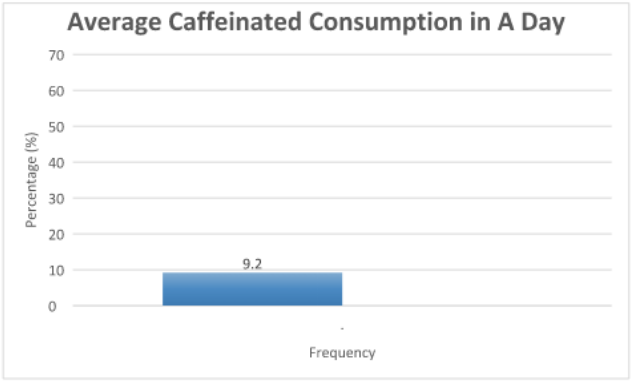

Figure 1 Frequency of caffeine consumption in a typical day.

Table 1 Sociodemographic characteristics of the respondents

Overall	Overall caffeinated beverage		p-value
	n	%	
	260	100	
Gender			
Male	64	24.6	0.092
Female	196	75.4	
Income for Yourself			
Self-sponsored	60	23.1	
Scholarship	85	32.7	0.033
Educational loan	115	44.2	
Area of Living			
City	105	40.4	
Suburban	110	42.3	0.579
Village	45	17.3	
Current Study Year			
Year 1	53	20.4	
Year 2	75	28.8	0.7
Year 3	79	30.4	
Year 4	53	20.4	
Latest CGPA			
3.0 or below	36	13.8	0.883
Above 3.0	224	86.1	

*Significant value at p <0.05.

The frequency and percentage of the purpose of caffeine consumption are listed in Table 2. To feel more awake was predominant in this survey with 69.2%, followed by satisfying a craving with 58.1% as well as staying up late which accounted for 55.0%.

Perceptions of caffeine were asked from the consumers of caffeine showed in Table 3. Pharmacy students agreed that consuming too much caffeine is unhealthy and mix caffeine with alcohol is very dangerous. Most of the students agreed with the statements (1) "You always consume the same type of caffeine", (2) "Price is the most important factor for you in caffeine product choice" and (3) "Promotions and discounts are important to you when choosing a caffeinated beverage".

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Table 2 Purpose of caffeine consumption among pharmacy students

Purpose of Caffeine Consumption	Total Responses		Percent of Cases
	n	%	
To feel more awake	180	17.4	69.2
For increased energy throughout the day	122	11.8	46.9
To stay up late	143	13.8	55
To be more social	38	3.7	14.6
To enhance the effects of alcohol	1	0.1	0.4
To lessen the effects of a hangover	5	0.5	1.9
To cure a headache	18	1.7	6.9
To satisfy a craving	151	14.6	58.1
For increased physical performance	29	2.8	11.2
To be more alert	102	9.8	39.2
To be more productive	79	7.6	30.4
To fit in with peers	19	1.8	7.3
To help with concentration or focus	94	9.1	36.2
Other	4	0.4	1.5
I don't consume caffeine for a specific purpose	51	4.9	19.6

Table 3 Means of pharmacy students' perception towards caffeine

Measurement Items	Total Mean
You always consume the same type of caffeine.	3.82
Price is the most important factor for you in caffeine product choice.	3.78
You consider yourself brand loyal to specific caffeinated beverages.	3.54
You are addicted to caffeine.	2.62
You always go to the same store to get caffeinated products.	3.17
Promotions and discounts are important to you when choosing a caffeinated beverage.	3.68
You buy products with caffeine strictly for the effects of caffeine.	3.02
You need caffeine to function throughout the day.	2.65
Your peers influence which types of caffeine you consume	2.87
You will go out of your way to purchase your favorite brand of caffeinated product.	3.13
The media and celebrity endorsers influence which type of caffeine you prefer.	2.59
TV advertisements are effective in persuading you to buy certain caffeinated products.	2.91
Consuming too much caffeine is unhealthy.	4.18
The benefits of consuming caffeine outweigh the risks.	3.28
You drink caffeinated products mostly late at night.	2.98
You don't pay attention to how much caffeine is in the drinks you consume.	3.42
Mixing caffeine with alcohol is very dangerous.	4.19
If you need caffeine, you will buy a caffeinated product at any price.	3.25

*N= 260. Items were rated on a 5-point Likert scale ranging from 1("strongly disagree") to 5 ("strongly agree").

Discussion

This study was to determine the frequency and perception of caffeinated products and among undergraduate pharmacy students. This study found 85% of pharmacy students was caffeine user. This result is consistent with the finding of similar research which shows high consumption of coffee among university students and youngsters worldwide.[8,14,15] The high consumption of coffee may be associated with the societal dietary intake as it is considered a compulsory drink beverage during breakfast since the 1800s.[16] This study reported that the source of income was statistically significant (P=0.033) with consumption of caffeinated beverages while gender, area of living, year of study and CGPA were found not significant. These findings were distinct from the previous study which found that gender was strongly associated with caffeine intake.[17] From the study, source of income includes self-sponsored, scholarship and educational loans correlated with caffeine intake. This might be explained by the fact that students on educational loans and scholarships might have the highest tendency to buy caffeinated beverages that are costly compared to students with self-sponsored. In addition, there is a discrepancy in the gender ratio in this study with 75.4% of females and 24.6% of males. Female students contribute disproportionally to this study as females tend to answer online survey questionnaires compared to males.[18] These findings are aligned with evidence from studies in other universities that describe males commonly consumed caffeinated products.[2,6,19]

It is worth mentioning that 69.2% of the pharmacy student reported to use the caffeinated products to feel more awake. This statement was used to identify whether students consumed caffeine for its taste or for its stimulant effect. This purpose was supported by another study which concludes that caffeine enhances cognitive performance.[20] Study conducted by Caroline[13] indicated that 79% of university students consumed caffeine to make them awake especially to concentrate during class or examination week. Another purpose of consuming caffeine identified in the study revealed that more than half of the students consume caffeine to satisfy a craving (58.1%). This finding is consistent with the findings of a previous study.[21] There is evidence that students consumed caffeinated drink just to enjoy the taste. Additionally, half of the students also consuming caffeine to stay up late (55%). This finding was supported by a previous study

indicated that most students increase caffeine intake during periods of stress and when they do not have enough sleep.[12]

Caffeinated products and foods have become more widely available over the last decade. Due to this increased

availability and usage, people generally link certain perceptions with caffeine consumption. The optimal amount of caffeine usage varies in literature and depends on various factors like age, gender and presence of any disease. There has been a substantial amount of research published on the benefits and drawbacks of caffeine consumption.[2,10,11] Students seem to be aware of the effect of caffeine consuming too much caffeinated beverages. Findings from this study showed that most of them consume only once on a typical day and none of them consume more than five (5) servings a day. The average Malaysian is estimated to consume about 2.5 cups of coffee per day. Literature findings indicate that consuming a moderate dose of caffeine which is 200-400mg/day or equivalent to two to four cups of brewed coffee is considered safe for a healthy adult.[2,3,22]

The majority of pharmacy students agreed that mixing caffeine with alcohol is very dangerous. Despite the fact that a huge number of respondents do not consume alcohol, they basically know the negative effects when combining both drinks will increase the risk of alcohol-attributable harms including being sufficiently sick or injured.[23] Another perception agreed upon by pharmacy students in this survey is consuming too much caffeine is unhealthy. These findings are consistent with previous studies that identified excessive intake of caffeine can lead to various psychological problems (anxiety, insomnia, and restlessness) and physical consequences (cardiovascular and neurological).[11,24,25] According to the majority of the literature, mild to moderate caffeine consumption is relatively safe, but higher doses of caffeine consumption (>400 mg) also can lead to behavioral harm.[26] The current article addresses an important public health issue and perceptions in order to provide a better understanding of preconceptions associated with caffeine effects. The findings of this study are beneficial and could lead to changes that promote a healthier lifestyle among pharmacy students. However, future research should be planned aimed to cover all pharmacy students in the country.

Conclusion

In conclusion, the average frequency consumed among undergraduate pharmacy students in a typical day is one daily. Females had more tendencies toward caffeine consumption than males. The source of pocket money is a particularly important socio-demographic variable associated with caffeine intake. The top reasons pharmacy students are consuming caffeinated beverages are to feel more awake, to satisfy a craving and to stay up late. On health perception, students are aware of the negative effects of caffeine when consuming too much and mixing with alcohol and denied addiction to caffeine as they did not depend on caffeine to function throughout the day. It would be beneficial particularly for undergraduate students to be aware of their routine daily pattern of caffeine consumption as it has a significant impact on health and performance with either short-term or long-term effects.

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Ethics statement

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Universiti Technologi Mara (UiTM) [REC (PH)/019/2022].

Consent to participate

Informed consent was obtained from all individual participants included in the study.

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Conflicts of interest

The authors have no relevant financial or non-financial interests to disclose.

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