
Association between caffeine use disorder and socio-demographic characteristics (sex, employment and smoking status) of Quezon City residents: An analytical cross-sectional study

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Abstract

Introduction Caffeine use disorder (CUD), a problematic caffeine use pattern, is yet to be recognized under DSM-5 and is under consideration for further research. This study aimed to determine if the sex, employment status, and smoking status of Quezon City residents aged 18 years old and above are associated with CUD, and to determine the mean daily caffeine consumption (MDCC) of caffeinated products and the proportion of individuals meeting the CUD criteria.

Methods A total of 334 respondents accomplished the online survey that collected socio-demographic information and evaluated CUD using an 8-point Caffeine Consumption Questionnaire (CCQ).

Results The study population was mostly composed of females, unemployed, and non-smokers. Results showed that 17% of respondents have CUD, that brewed coffee was most consumed daily, the MDCC of the study population was 158.31 mg; and females were at an increased risk for CUD, while nonsmokers and unemployed individuals were at reduced risk.

Conclusion The proportion of Quezon city residents that have CUD is at 17%, consuming an average of 158.31 mg of coffee daily, with brewed coffee being consumed most. Female residents are at an increased risk of having CUD, while nonsmokers and unemployed individuals are at a decreased risk.

Key words: Caffeine, coffee, Quezon city, cross-sectional studies, diagnostic and statistical manual of mental disorders

Caffeine is one of the most consumed psychoactive substances and is used by more than 80% of the world's population.¹ In 2019, there has been a rise in the long-term increase in coffee consumption over the years in the country.² The widespread consumption of caffeine was significantly linked to increased alertness,

increased endurance, enhanced long-term memory, and increased mental concentration.³⁻⁴ Excessive consumption of caffeine can lead to dependency, dangerous intoxication and side effects, and the abrupt cessation of the intake of caffeine may prompt symptoms of withdrawal.⁵

Caffeine use disorder (CUD) refers to a destructive, problematic caffeine use pattern that results in severe clinical disability or anxiety. However, the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) does not consider it as a psychiatric disorder due to lack of evidence on the prevalence and psychiatric importance of caffeine use disorder in

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general population samples.⁶ Currently, there are no studies regarding the association between CUD and socio-demographic characteristics in the Philippines. The average caffeine consumption is not commonly recorded which makes the proportion of individuals at risk for caffeine use disorder unknown. Moreover, to bridge the knowledge gap, previous researchers have recommended conducting additional analytical cross-sectional studies to enhance the comprehension of Cannabis Use Disorder (CUD), particularly identifying the socio-demographic groups that may be most affected.

This study aimed to investigate the association of caffeine use disorder and socio-demographic characteristics (sex, employment and smoking status) among Quezon City residents aged 18 years old and above in an analytical cross-sectional study. Specifically, it aimed to determine the proportion of Quezon City residents who fulfill the criteria of having Caffeine Use Disorder using the 3-item Caffeine Use Disorder Questionnaire (CUDQ) and to determine the mean daily caffeine consumption (MDCC) of Quezon City residents with five caffeinated products (brewed coffee, instant coffee, tea, energy drinks, soda) using an 8-point Caffeine Consumption Questionnaire (CCQ) Likert Scale.

Methods

This study has been given ethical approval by the UERM Ethics Review Committee. An analytical cross-sectional study was conducted. The surveys used in the study were administered online via Google Forms from August to October 2021. The target population for this study were adult residents currently living in Quezon City from May 2021 to October 2021, who could read in English or Tagalog language and have consumed caffeine for the past 12 months. The selected sample was recruited using social media advertisements (Facebook, Twitter, Instagram) over a two-month period. The sample size is 325 participants based on a similar study conducted in New Zealand that also determined the association between CUD and socio-demographic characteristics of a select population.⁷

The variables that were asked in the socio-demographic characteristics survey tool are sex, smoking status, and employment status. An 8-point likert scale was used to measure caffeine consumption

per participant, where each response corresponds to the following:

- 0 - never
- 1 - less than or equal to one portion a week
- 2 = two to six portions a week
- 3 = one portion per day
- 4 = two portions per day
- 5 = three portions per day
- 6 = four portions per day
- 7 = five or more times a day

wherein the standard serving size for one portion of each beverage was also indicated in the questionnaire (e.g. 1 portion of instant coffee = 237 mL or 1 cup; 1 portion of energy drink = one 250 mL can). This was used for the following products: brewed coffee, instant coffee, tea, energy drink(s), soda and others.^{7,8}

The proponents of the study then converted the servings of each beverage into milligrams of caffeine for analysis and study comparison. The following estimates were used to calculate caffeine consumption: 1 cup (8 oz./237 mL) of brewed coffee = 100 mg, 1 cup (8 oz./237 mL) of instant coffee = 60 mg, 1 cup (8 oz./237 mL) of tea = 45 mg, 1 can (250 mL) of energy drink = 75 mg, 1 can (250 mL) of soda = 30 mg.^{7,8} Products consumed less than daily were not included in the computation. The lower limit for daily consumption is 1 portion per day and the upper limit is 5 portions, in accordance with the caffeine consumption questionnaire. To compute the daily caffeine consumption, the number of portions consumed per day was multiplied by the amount of caffeine in 1 portion of the product.^{7,8} For other caffeine products, participants were asked to specify which products, and the researchers used the packaging information to measure the amount of caffeine.

The respondents were asked to answer the Caffeine Use Disorder Questionnaire (CUDQ). The CUDQ has high internal consistency reliability (3 items; $\alpha = 0.82$) and was used to determine if the participants meet the proposed DSM-5 criteria for CUD.⁷ These questionnaires were adapted from previous studies regarding caffeine use disorder.^{7,8,9} In this 3-item questionnaire, the respondents answered yes/no questions, depending on the scenario being asked, if it is applicable to them or not. The questions were designed to measure dependence on caffeine and any experienced adverse effects when consuming caffeine.

The average caffeine consumption for each drink and the mean total caffeine consumption were computed. The proportion of participants with reported caffeine use disorder was also calculated.

The association between CUD and socio-demographic characteristics was assessed by computing the Prevalence Rate Ratio (PRR) using 2x2 tables. A chi square test of independence was then performed to compute for significance where a p-value less than 0.05 indicates a statistically significant association between the socio-demographic variable being assessed and CUD.

Results

Respondent Characteristics

Three hundred thirty four respondents (n = 334) answered the survey questionnaires. There were more female participants (n = 235) than male participants (n = 99), more unemployed participants (n = 210) than employed participants (n = 124), and more non-smokers (n = 300) than smokers (n = 34) that were included in the study.

Caffeine Consumption by Product

An 8-point CCQ likert scale was used to determine the mean daily caffeine consumption (MDCC) of different caffeinated products which was determined to be 158.31mg per day (SD = 228.471). Brewed coffee had a daily caffeine intake of 66.17 mg (SD = 108.604) and was the most consumed product (37.43%), followed by instant coffee (32.63%), and tea (14.97%). A greater proportion of females, unemployed individuals, and nonsmokers were able to fulfill the criteria for CUD as summarized in Table 1. Females were determined to be at an increased risk of having CUD compared to males. On the other hand, nonsmokers and unemployed individuals are at a decreased risk for CUD as opposed to smokers and employed individuals, respectively, as shown in Table 2.

Discussion

Caffeine use disorder is characterized as a problematic caffeine use pattern that can lead to clinically significant distress or impairment. It is caused by increased tolerance and physical withdrawal symptoms

Table 1. Proportion of respondents with CUD according to socio-demographic characteristics and their level of caffeine consumption.

Predictor Variables	Total Sample	Population Proportion that met the criteria for CUD
Sex		
Male	99	10 (17.54%)
Female	235	47 (82.46%)
Employment Status		
Unemployed	210	49 (85.96%)
Employed	124	8 (14.04%)
Smoking Status		
Non-smoker	300	32 (56.14%)
Smoker	34	25 (43.86%)
Total	334	57 (17.07%)

Table 2. Computed PRR, 95% confidence interval, and p-values for each socio-demographic characteristic.

Socio-demographic Characteristics	PRR	95% Confidence Interval	p-value
Sex (Female)	1.98	0.65-0.75	0.028
Smoking Status (Non-smoker)	0.694	0.32-0.42	0.248
Employment Status (Unemployed)	0.756	0.07-0.13	0.290

from caffeine.¹⁰ Based on the proposed DSM-5 proposal criteria, a problematic pattern of caffeine use leading to clinically relevant disability or anxiety is manifested by at least the first three of the proposed criteria occurring during a 12-month span. These three conditions are: (1) A recurrent tendency or ineffective attempt to minimize or regulate the use of caffeine, (2) Caffeine use is continued in spite of awareness of having a chronic or recurring physical or psychological condition that is likely to have been triggered or aggravated by caffeine, (3) Withdrawal, as indicated by symptoms of caffeine withdrawal (e.g. headache, nausea, fatigue) and caffeine is used to alleviate or prevent signs of withdrawal.⁹

Results show that the most common product consumed daily by the respondents was brewed coffee (37.43%), followed by instant coffee (32.63%), and tea (14.97%). This differs from the most leading caffeinated products among Asia and the Pacific countries which are black and green teas and carbonated soda, which

can be attributed to social and cultural context, environmental conditions, physical, psychological, and emotional expectations, and individual knowledge and perceptions.^{10,11}

The findings of this study reveal that 17% of respondents exhibit Caffeine Use Disorder (CUD). This aligns closely with a comparable study in New Zealand, where 19.5% of the total respondents met the criteria, in contrast to the United States, where only 8% did.^{7,12}

Females are at an increased risk for CUD. Research has shown that low estradiol levels, a natural part of the menstrual cycle, can suppress the effects of caffeine in females, potentially resulting in increased intake to enhance its effects. Caffeine is also more potent on males and thus, they only need to consume a lesser amount to be able to feel its effects.^{13,14} Consequently, the adverse effects of caffeine such as increased anxiety are also more prevalent in males, which deter them from further consumption.¹⁵

Nonsmokers are at a decreased risk of having CUD compared to smokers, due to the effect of cigarette consumption which accelerates caffeine metabolism. As a result, this diminishes the drug effect of caffeine in smokers, prompting an increase in their caffeine consumption.¹⁶

Unemployed individuals are at a decreased risk of having CUD compared to employed individuals as the latter rely on caffeine to maintain physical and cognitive performance in times of sleep deprivation.¹⁷ This is in contrast to other studies, wherein unemployment was shown to have an increased risk of CUD due to higher stress levels and therefore the need for caffeine consumption.¹⁸ An explanation why unemployed individuals are at a decreased risk of having CUD can be attributed to the shift from working in offices to work-at-home setups since the pandemic started. Employees who work remotely report longer work hours and an inability to disengage from work, regardless of whether or not these extended work hours are expected by their companies.¹⁹ This may cause employees to drink more caffeinated beverages to remain stimulated while working at home.

In conclusion, 17% of the total respondents, mostly composed of females, nonsmokers, and unemployed individuals, fulfilled the CUD criteria. The results of the study have also shown that the mean daily caffeine consumption of the Quezon City residents

was 158.31 mg per day and brewed coffee was the most consumed product followed by instant coffee and tea. Females were found to have an increased risk of having CUD as compared to males, whereas nonsmokers and unemployed individuals have a reduced risk for CUD as opposed to smokers and employed individuals, respectively.

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