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Emerging trends in coffee consumption among university students in Béjaïa, Algeria

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ABSTRACT

Background: In Algeria, coffee consumption, being restricted to the morning and afternoon, is commonly associated with enhancing daily activities and maintaining health. However, the specific patterns of coffee consumption and related health implications within the university environment remain underexplored. **Aims**: This study aimed to investigate coffee consumption patterns, including frequency, preferred preparation methods, and perceived health benefits, among university students in Algeria. **Participants and Methods:** A cross-sectional survey was conducted among 254 university students aged 18 to 50. Data was collected through self-administered questionnaires distributed during lectures. **Results**: The results revealed that 90.9% of the surveyed students consumed coffee regularly. Among regular coffee drinkers (81.8%), 18.2% were classified as high consumers, consuming an average of three cups per day. The majority of students (79.9%) added sugar to their coffee, with 34.6% adding two spoons and 22% adding more than two spoons. **Conclusion**: Statistical analysis indicated a positive correlation between age, educational level, and coffee consumption frequency. As individuals age and advance in their education, their reliance on coffee tends to increase. These findings highlight the significance of coffee consumption within the university environment and underline the need for further research to explore the potential health impacts of excessive coffee intake.

Keywords: Coffee consumption pattern, eating behavior, university students, Bejaia province.

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1 Introduction

Over the past decade, dietary behavior has gained increasing attention from researchers worldwide, driven by its significant impact on health outcomes and its role in addressing rising chronic disease rates globally (Chammearc et al., 2023, Jappelli et al., 2010; Yildirim & Karaca, 2022).

Similar to Algeria, disruptions in individuals' daily routines due to COVID-19, particularly during lockdown periods, have been observed in various regions across the globe, leading to changes in consumption practices. Consequently, the behavior of Algerian consumers has also shifted, and new consumption patterns have emerged (Castellana et al., 2021; Haller et al., 2013).

In Algeria, coffee, traditionally consumed in the morning and afternoon, has now become one of the most widely consumed beverages at any time of day. However, new practices and shifts in consumer behavior, particularly the excessive consumption of coffee as a psychotropic product, have emerged. Several researchers and experts have already classified coffee as a psychotropic substance due to its stimulant properties and its role as a legal drug that helps individuals kick start their day (Bosso et al., 2023; Farah & DePaula Lima, 2019; Nehling, 2016; Nieber, 2017).

According to the World Health Organization (WHO), coffee made from the fruits of plants belonging to the *Coffea* genus is the second most consumed beverage globally after

water, with over 400 billion cups consumed annually. Approximately two out of three people on the planet drink coffee. In Africa, coffee consumption has surpassed global trends. As a result, global demand for coffee increased by 2.4% in the 2021/2022 period (World Health Organization [WHO], 2021).

Coffee comprises a complex array of thousands of molecules, among which specific compounds and molecular families have been identified by scientists as actively contributing to its pharmacological effects on human organism. Some of these compounds are associated with potential protective benefits against certain types of cancer, positioning coffee as an ongoing subject of research in the fields of health and disease prevention (Cämmerer & Kroh, 2006; Perszke & Egierska, 2022; Janda et al., 2020; Simon et al., 2022; Vignoli et al., 2011).

The harmful effects of excessive coffee consumption remain a topic of considerable debate among researchers. Consequently, the scientific community has directed its efforts not only toward analyzing the nutrient and contaminant composition of coffee – tracing its journey from plant to seed and considering its geographical origin, as demonstrated by several studies (Bryla, 2017; Cämmerer & Kroh, 2006; Dybkowska et al., 2017; Nuhu, 2014; Rao & Fuller, 2018; Vignoli et al., 2011; Varady et al., 2020) – but also toward examining its effects on the immune system and the overall health of consumers (Bosso et al., 2023; Cory et al., 2018; Farah & DePaula Lima, 2019; Janda et al., 2020; Tran et al., 2019; Yang et al., 2023).

The Algerian scientific community has likewise focused its research efforts on exploring the bioactive compounds in imported coffee, as well as examining its biological and epidemiological effects (Bedar-Belkhiri et al., 2018; Djeziri et al., 2023; Merzouk, 2022).

Given the limited availability of detailed studies on university students' field of study, and social backgrounds, this survey aimed to evaluate coffee consumption patterns, addictive behaviors associated with coffee, and students' perceptions of its taste quality, with regard to product specifications and the expectations of Algerian consumers. The target population included all attending students, without age or sex restrictions. A principal objective was to assess the knowledge, attitudes, and behaviors of this population regarding food safety.

2 Material and Methods

2.1 Study survey

This research utilized a descriptive survey method. The study population included all students who expressed a willingness to participate selected through purposive sampling. The survey targeted students enrolled at Abderrahmane Mira University in Bejaia province, Algeria, specifically within the Faculty of Nature and Life Sciences. Participants were stratified by their education level (Bachelor, Master, and PhD) without distinctions regarding their areas of specialization or fields of study. Selection was conducted randomly, with no additional criteria imposed on study volunteers.

2.2 Study design and survey methodology approach

A descriptive cross-sectional survey design was employed using a questionnaire distributed over a three-month period (March, April, and May) in 2022. The survey consisted of a three-page questionnaire comprising open-ended questions intended to investigate four principal domains: the socio-demographic characteristics of the students, their coffee consumption habits (Table 1), perceptions of coffee quality, and awareness of potential health impacts and risks associated with coffee consumption.

The questions were developed with reference to previous studies, including Herpin's (2001) research on evolving consumption behaviors. The survey was administered in multiple university settings, such as lecture halls, classrooms, and cafeterias, where participants were selected randomly. No specific criteria were imposed on the study sample, thereby facilitating the participation of a broad and diverse student demographic.

Data analysis involved categorizing consumers by age and education level, while acknowledging that several questions permitted multiple answers. Therefore, data comparisons were based on the total number of responses rather than individual participants. To capture a comprehensive representation of coffee consumption patterns, interviews were conducted at different times of day, including morning, afternoon, and evening coffee consumers.

Table 1. Determinants of coffee consumption status

N°	Characteristics
1	Socio-professional status
2	Information on coffee consumption
3	Nutritional information
4	Information on coffee quality

2.3 Statistical analysis

The results underwent descriptive statistical analysis, with the general characteristics of the subjects represented as frequencies and percentages for categorical variables. Data processing and analysis were performed using XLSTAT software version 2014.5.03. Associations between various

parameters were evaluated using the Chi-square test, and the probability threshold was determined based on the strength of the associations observed.

3 Results

3.1 Description of the surveyed population

Out of the 350 questionnaires distributed across 20 classrooms, the library, and the university cafeteria, a total of 302 responses were received. Of these, 254 questionnaires met the survey criteria, based on the completeness of responses to all items (Table 2).

In the analysis of the socio-demographic data (Table 2), the ages of the surveyed students ranged from 18 to 50 years, with a sex ratio (M/F) of 1.024. The majority of the surveyed population was under 40 years of age (90.1%), and 83.1% were single. The sample represented various educational levels, with 48.4% of participants pursuing a master's degree, 31.9% enrolled in bachelor's programs, and 19.7% undertaking doctoral studies. Among these students, 49.2% resided in rural areas, while 50.8% were from urban settings.

Table 2. Demographic characteristics of the university students

Respondents' profile	Number (n)	Percentage (%)
Age (years)		
18 – 30	200	78.7 [a]
30 – 40	29	11.4 [b]
40 – 50	25	9.8 [b]
Gender		
Women	126	49.6 [a]
Men	128	50.4 [a]
Family situation		
Single	211	83.1 [a]
Married	43	16.9 [b]
Occupancy		
Doctorate	50	19.7 [c]
Master	123	48.4 [a]
Bachelor	81	31.9 [b]
Living environment		
Rural	125	49.2 [a]
Urban	129	50.8 [a]

The percentages of categories within each parameter that have different letters are significantly different ($p < 0.05$, where a > b > c).

3.2 Description of coffee consumption pattern

The estimated average coffee consumption rate among the 254 university students surveyed was 90.9% (Table 3). Some students prefer to consume coffee at home, while 60% favor consuming it during walks or brief visits to cafeterias or eateries on campus, especially as coffee consumption is permitted during classes and work periods. Preferences for coffee preparation vary, with 84.6% favoring coffee capsules, 58.3% opting for traditional home-made coffee, and 44.9% preferring press coffee. In light of this, an analysis of coffee consumption by age (Figure 1) was conducted.

The results indicate that the average age at which coffee consumption started among the respondents was 16.5 ± 5.91 years. Some participants reported initiating coffee consumption as early as age four, typically in the form of coffee-flavored sodas, with consumption gradually increasing over time. However, the majority (45.67%) reported starting regular coffee consumption between the ages of 15 and 20, likely influenced by developmental changes and social factors characteristic of adolescence (Chammearc et al., 2023).

Table 3. Percentage consumption of coffee by students at Abderrahmane Mira University in Béjaïa province (Algeria)

	Number (n)	Percentage (%)
Do not consume coffee	23	9.1 [b]
Drink coffee	200	78.7 [a]
Drink coffee occasionally	31	12.2 [b]
Total	254	100.0

The percentages of categories with different letters are significantly different ($p < 0.05$, where a > b).

3.3 Frequency of coffee consumption

This study investigated the frequency of coffee consumption among university students, applying the classification defined by Simon et al. (2022), which categorizes consumption levels into three groups: zero consumption, light to moderate (0.5 to three cups per day), and high consumption (more than three cups per day). Results indicated that the university environment is predominantly composed of two groups: the light to moderate group (81.8%) and the high consumption group (18.2%), with a minority of 8.1% of respondents belonging to the zero-consumption group.

In terms of coffee preferences, respondents reported consumption patterns of regular coffee (43.7%), strong coffee (25.2%), and light coffee (19.7%). However, they did not provide insights regarding the quality requirements for green coffee beans or their influence on overall coffee quality. According to the International Organization for Standardization

(ISO), "normal coffee" refers to a beverage that fulfills consumer expectations, meaning it satisfies the consumer based on an acceptance rating detailed in the defect reference chart (WHO, 2021).

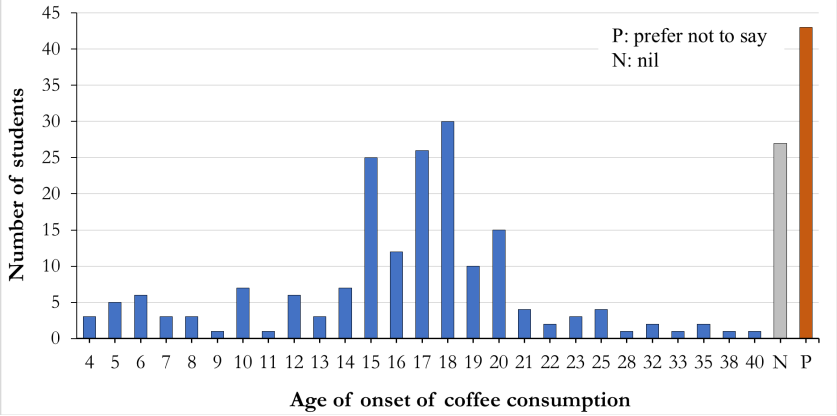

Figure 1. Age of onset of coffee consumption

Within this framework, the study sought to analyze factors contributing to consumer satisfaction by examining the motivations behind coffee consumption (Figure 2).

The results indicate that 70% of respondents consume coffee out of habit, while 61.4% drink it driven by curiosity and the desire for discovery. Additionally, a substantial portion of students reported consuming coffee as a means to alleviate stress, enhance concentration, extend wakefulness, and relieve headaches.

4 Discussion

The Chi-square test applied in the analysis revealed a significant relationship between coffee consumption rates and variables such as age groups, family status, and professional standing, though no significant correlation was found with lifestyle factors. Additionally, while daily coffee consumption showed no marked influence by age or lifestyle, associations were found with sex, family status, and professional position. A growing trend towards capsule coffee consumption has emerged among university students, likely due to the significantly shorter brewing time in single-serve coffee

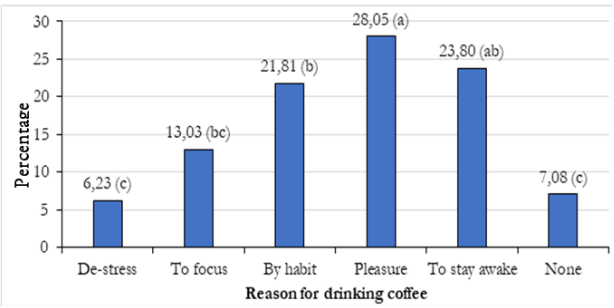

Figure 2. Consumer motivations for coffee consumption

(approximately 30 – 60 seconds compared to 8 – 12 minutes for conventional drip coffee) as noted by Wang et al., (2016), as well as shifts in food practices driven by urbanization and individualism, as discussed by Farag et al., 2022; and Yildirim & Karaka, (2022). Concurrently, a preference for traditional home-brewed coffee was also observed, underlining the role of taste and sensory attributes, as confirmed by several authors (Farag et al., 2022; Pereira et al., 2022; Varady et al., 2020).

The number of cups of coffee consumed daily represents an emerging trend in coffee consumption among university students, especially when compared to traditional dietary habits in Algeria. Research on the recommended daily coffee intake has gained prominence in recent studies, suggesting that consuming 3 – 4 cups per day is generally safe and falls within moderate range (Pimentel et al., 2009; Ungvari & Kunutsor, 2024). According to Nehlig (2016), a daily intake of around five cups can enhance alertness, improve concentration, elevate mood and help reduce depression, moreover some studies report a significant protective effect against type 2 diabetes for individuals consuming more than six cups daily (Pimentel et al., 2009; Van Dam & Hu, 2005). However, despite these positive findings, researchers such as Legrand & Scheen (2007) and Shahinfar et al., (2021), indicate that the protective role of coffee has yet to be conclusively established. Additionally, they highlight the need for further research, particularly regarding the type of coffee and the quantity of sugar added, to elucidate the long-term effects of coffee consumption on type 2 diabetes risk.

Simon et al. (2022) identified the consumption of up to three cups of coffee per day as associated with favorable cardiovascular outcomes and reduced mortality risk, while other studies have suggested a possible association between coffee consumption and a higher prevalence of hearing loss (Wu et al., 2023). Furthermore, recent reviews on the relationship between coffee consumption and cardio-metabolic outcomes have clarified that, although coffee may

cause short-term increases in blood pressure, it does not appear to elevate the risk of long-term hypertension (Ungvari & Kunutsor, 2024).

Our study on coffee consumption patterns revealed that 31.1% of respondents consume coffee daily, while 17.7% do so regularly. The remaining 39.7% consume coffee occasionally or rarely, a pattern influenced by lifestyle factors. This relatively low consumption rate may be attributed to the limited availability of coffee in in university hostels, where access to coffee may be limited. Interestingly, certain disciplines, such as sociology and psychology, tend to have a higher proportion of coffee consumers (Nehlig, 2017; Jurema-Soares et al., 2022).

We also investigated the practice of home roasting among coffee consumers. Our results show that home roasting is uncommon, with 59.1% of respondents reporting that they do not engage in this practice. Although the literature highlights several benefits associated with home roasting, such as the formation of quinones, that may help prevent depression and its associated consequences (including smoking, alcoholism, drug addiction, and suicide) (Jurema-Soares et al., 2022), this practice has not gained much popularity in Algeria.

Regarding preferred beverage to mix with coffee, 68.9% of respondents preferred mixing coffee with water, followed by milk at 2.8%, soft drinks at 2%, and energy drinks at 2.4%. Notably, while adding milk can reduce the total phenol content derived from chlorogenic acid, caffeine, and antioxidants, research indicates that milk may enhance the bioavailability of caffeic acid and caffeine (Nuhu, 2014; Jurema-Soares et al., 2022).

Despite an awareness of the risks associated with sugar consumption, a substantial majority (79.9%) of respondents preferred to add sugar to their coffee. Among them, 34.6% added two teaspoons, while 22% added more than two teaspoons, with some adding as many as six. This preference is particularly notable given that some coffee manufacturers incorporate sugar during the roasting process. Only 8% of respondents reported drinking coffee without any added sugar.

Students were asked open-ended questions about their confidence in the quality of coffee they consume. A majority (59.8%) expressed a lack of confidence in the quality of coffee available in Algeria. This sentiment aligns with the fact that 43.7% of students categorized their coffee consumption as "normal coffee," a term associated with good trade practices. According to these practices, a sound coffee lot should consist of homogeneously constituted coffee beans, free from defects and foreign matter not originating from coffee fruits (WHO, 2021).

The lack of confidence was largely attributed to insufficient information on coffee packaging, such as details regarding origin or roasting date, which are crucial for enabling consumers to make informed purchasing decisions and enhancing trust in the product. This observation is supported by Bryła (2017), who highlights the positive impact of clear quality markers on consumer confidence. Conversely, 39.4% of respondents indicated confidence in the quality of coffee they consume.

A significant proportion of respondents (44.9%) reported consuming coffee without any knowledge of its composition beyond its caffeine content. When focusing specifically on PhD students, the analysis revealed that 76.4% were unaware of the presence of acrylamides in coffee, and 64.2% were unaware that coffee contains polyphenols, underscoring a notable lack of nutritional awareness within the study population.

Although 9% of consumers reported no perceived health effects from coffee consumption, 98% noticed cardiovascular issues, and 96.9% experienced neurological symptoms such as nervousness, excitement, agitation, stress, anxiety, and tremors. Interestingly, the majority of respondents (83.1%) believed that excessive coffee consumption has no adverse effects, while 98.8% attributed undesirable effects of coffee primarily to caffeine.

While moderate or occasional coffee consumption is generally considered safe for healthy adults, excessive intake can lead to cardiovascular and neurological disorders, impaired sleep quality, reduced appetite, and gastrointestinal disturbances. Moreover, chronic coffee use may result in dependence, as confirmed by 97.2% of respondents. This observation aligns with well-documented findings from previous studies (Castellana et al., 2021; Nehlig, 2016; Ungvari & Kunutsor, 2024).

Despite awareness of the potential risks associated with coffee consumption, the majority of respondents continue to consume it, primarily to enhance concentration, maintain wakefulness, or achieve heightened alertness. In doing so, they inadvertently expose themselves to the adverse effects of excessive caffeine intake.

5 Conclusion

This study has provided an in-depth analysis of coffee consumption patterns among university students in the Bejaia region, examining their habits, preferences, and factors influencing their behavior. Analysis of data from 254 students indicates that coffee consumption increases with both age and academic level, with the highest prevalence observed among students aged 16 to 20 years. Coffee has emerged as a crucial element in in students' daily routines, aiding concentration,

promoting alertness, and alleviating fatigue. However, the prevalent excessive coffee consumption, often accompanied by high sugar intake – 57% of students reported adding 2 to 6 teaspoons of sugar – poses significant public health concerns. These findings highlight the need for effective monitoring of coffee consumption patterns and for enhancing consumer awareness regarding the benefits of moderate intake and the potential adverse effects of excessive consumption. Additionally, there is a call for initiatives promoting nutritional safety in Algeria to address these issues comprehensively.

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