Migration Letters

Volume: 19, No: S2 (2022), pp. 898-906

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Caffeine Intake Among Healthcare Professionals And Its Impact On Their Work Energy In KSA: A Systematic Review

Sameeha A Fallatah[1], Shaykhah Maashi Alanazi[2], Hoda Jehad Abousada[3], Abdulmajed Abdulrahman Albader[4], Sultan Mohammad Alanazi[5], Inad Humod Aloseami[6], Shuruq Mohammed Aldossary[7], Maryam Khalaf Almatrafi[8], Salma Mohammed Al-Dousari[9], Yaser Awad Alanazi[9], Abdullah Zayed Alenazi[9], Bander Hussein Almutery[9], Hanan Akash Almatrafi[9] , Alia Muhammad Al-Yami[10], Nafla dalsh Alanzi[10] and Sanaa Nagi Alsagri[10]

Abstract

Background: *Caffeine is the most commonly used psychostimulant compound with a long history of worldwide consumption. Consuming low to moderate doses of caffeine is generally safe and quite beneficial; however, several clinical studies show that high doses could be toxic. Additionally, caffeine users can become dependent on the drug and find themselves unable to reduce consumption despite impending and recurrent health problem[1]s associated with continued use. This systematic review investigates the relationship between caffeine intake among healthcare professionals in the Kingdom of Saudi Arabia (KSA) and its impact on their work energy.*

Methods: *A comprehensive search strategy was employed, utilizing electronic databases and manual searches of relevant literature sources. Randomized controlled trials, observational studies, cross-sectional studies, and qualitative studies were included. Two independent reviewers screened studies for relevance and conducted data extraction.*

Results: *The initial search identified 117 studies, with 13 full-text articles reviewed and five studies eligible for inclusion. Among the included studies, two focused on healthcare providers and medical students. It wans found a high prevalence of caffeine consumption among healthcare providers, with significant rates of dependence and addiction. In addition, it was observed high levels of caffeine consumption among university students, with coffee being the most frequently consumed product. Both articles indicated that caffeine intake positively affected work energy, however, it had a negative impact on sleep quality.*

[1] Family Medicine Consultant, MOH, KAMCJ, KSA
[2] Dermatologist assistant consultant, Prince Mohammed Bin Abdulaziz Hospital, Riyadh, KSA
[3] Obstetric & Gynecology, KFSH, Jeddah , KSA
[4] Clinical Nutrition Specialist, Hotat Sudair Hospital, Riyadh, KSA
[5] Pharmacist, Alyamama Hospital, Riyadh, KSA
[6] Pharmacy technician, Prince Mohammad bin Abdulaziz Hospital, Second Cluster. Riyadh KSA
[7] Technician-Dental Assistant, Imam Abdul Rahman Al-Faisal Hospital, Riyadh,KSA
[8] Nursing Senior specialist, General Directorate of Health Affairs, Riyadh ,KSA
[9] Nursing Technician, Riyadh, KSA
[10] X- Ray Technician, Riyadh, KSA

Conclusion: *Both studies underscored the importance of understanding caffeine consumption habits and their potential health implications in their respective populations. Further research is needed to explore the long-term consequences of caffeine consumption among healthcare professionals and university students in KSA.*

Introduction

Many plants, seeds, fruits, nuts, and leaves contain caffeine, which is scientifically known as 1,3,7-trimethyl xanthine. You can find it in coffee, tea, soft drinks, energy drinks, and even chocolate, but at different amounts. The xanthine family, which includes caffeine, theophylline, and theobromine, is present in all of these goods [1]. Nearly 80% of the global population drinks some kind of caffeinated beverage every day, while the percentage varies greatly by demographic and drink type [2]. Sugary coffee and energy drinks are common sources of caffeine for teenagers, and a 12-ounce portion of these beverages usually contains 70–130 milligrams of caffeine. This has about 80 milligrams of caffeine, which is roughly the same as a regular coffee cup. On the other hand, the caffeine levels in certain energy drink bottles are much higher than those in regular caffeinated soft drinks, and in some cases, they are even poisonous [3,4]. Several factors, including brand, preparation technique, and kind of coffee, may greatly affect the caffeine content of a product. Hot Arabian coffee is a staple at all Arab social events and parties, served boiled and enjoyed by everybody. Traditional preparation calls for no added sugar, little cups, and dates or other treats to accompany the coffee.

Caffeine may not be completely innocuous, even at modest dosages (≤400 mg per day), since it may induce serious toxicity and perhaps deadly side effects at greater levels [5]. Due to its antioxidant properties, coffee is able to stave against a number of long-term diseases and conditions, such as diabetes, cancer, and cardiovascular disease [6]. Furthermore, caffeine is a stimulant to the central nervous system that may improve mental function, performance, alertness, and reduce fatigue [7,8]. On the other hand, issues with sleep duration and quality are the most often reported side effects of caffeine use at larger dosages (>500 mg daily). Also, some people experience uneasiness, restlessness, and stomach discomfort after consuming too much coffee [9,10]. Individual variables, including gender, height, weight, physiological state, and dosage, determine the impact of coffee and other caffeinated drinks [11]. But no research has shown any positive or negative impacts on healthcare professionals.

Advertising agencies in the Kingdom of Saudi Arabia promote caffeinated soft drinks, energy drinks, and other caffeinated beverages heavily, leading to high consumption rates throughout society and among healthcare professionals in particular.

Methods

Review Question

The primary aim of this systematic review was to investigate the relationship between caffeine intake among healthcare professionals in the Kingdom of Saudi Arabia (KSA) and its impact on their work energy. Specifically, we aimed to analyze existing literature to determine the extent to which caffeine consumption affected various aspects of work energy, including alertness, concentration, and overall productivity among healthcare professionals in KSA.

Search Strategy

The search strategy involved a comprehensive search of electronic databases such as PubMed, Embase, PsycINFO, and CINAHL. Additionally, a manual search of reference lists from included studies and relevant reviews was conducted to identify additional relevant studies. Grey literature sources, including conference abstracts and theses, were also searched. The search strategy utilized Boolean operators and medical subject headings (MeSH) terms in combination with keywords related to caffeine intake, healthcare professionals, work energy, and KSA.

Types of Studies Included

This systematic review included randomized controlled trials, observational studies (cohort studies, case-control studies), cross-sectional studies, and qualitative studies reporting on caffeine intake among healthcare professionals and its impact on work energy in KSA.

Participants

The participants of interest were healthcare professionals working in various healthcare settings within the Kingdom of Saudi Arabia. This included but was not limited to physicians, nurses, pharmacists, and allied health professionals.

Search Keywords

The search keywords included terms such as "Caffeine intake," "Caffeine consumption," "Healthcare professionals," "Work energy," "Saudi Arabia," and "KSA."

Study Selection Process

Two independent reviewers screened titles and abstracts for relevance based on predetermined inclusion criteria. Full texts of potentially relevant studies were then retrieved and assessed for eligibility. Any discrepancies were resolved through discussion or consultation with a third reviewer if necessary.

Outcomes

The outcomes of interest included:

- Caffeine intake patterns among healthcare professionals in KSA.
- Perceived impact of caffeine intake on work energy, including factors such as alertness, concentration, and productivity.
- Adverse effects associated with caffeine consumption in the workplace.

Data Extraction and Coding

Data extraction was conducted independently by two reviewers using a standardized form. Extracted data included study characteristics (author, year, study design), participant characteristics, caffeine intake measures, outcomes, and key findings. Any discrepancies were resolved through discussion or consultation with a third reviewer.

Data Management

Data was managed using reference management software to organize and remove duplicates. Microsoft Excel or similar software was used for data extraction and synthesis. Data was stored securely and accessible only to authorized reviewers.

Results

The initial search identified a total of 117 studies from PubMed, Embase, Cochrane Library, and CINAHL. There were no duplicates and 121 studies were screened based on their titles and abstracts. Of these, 13 full-text articles were reviewed, and only five studies were eligible for inclusion in this systematic review (Figure 1).

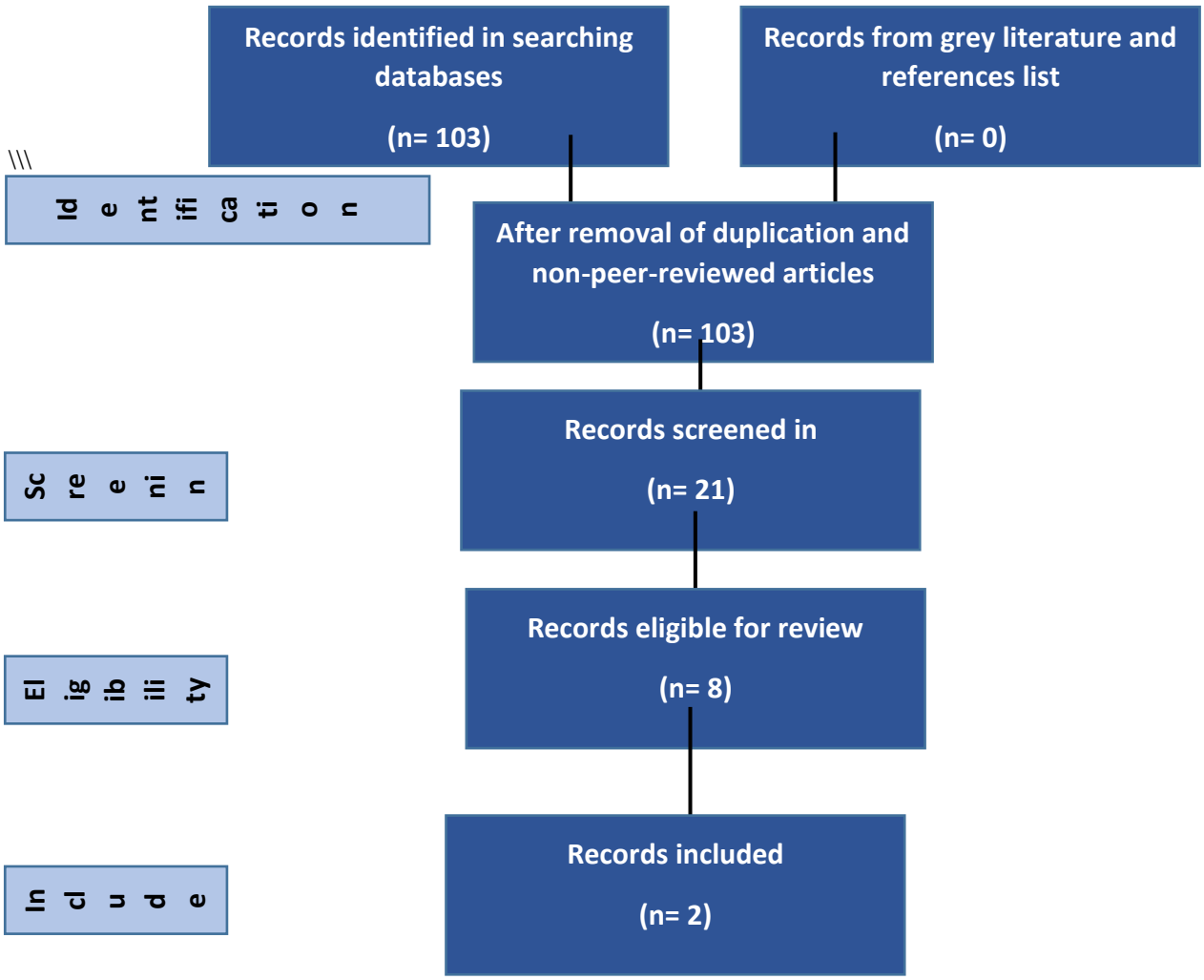

Figure 1: Flow chart of selection process

The two included studies were conducted among healthcare providers [12] and medical students [13]. Amer et al. [12] utilized a cross-sectional study design to explore caffeine consumption among governmental healthcare providers (HCPs) in the Kingdom of Saudi Arabia (KSA). A sample of 600 HCPs was randomly selected from all regions of KSA. Data collection was conducted through a self-administered, online-validated questionnaire composed of three main parts, including diagnostic criteria from the DSM-IV to identify caffeine dependence and probable addiction [12]. In contrast, Alfaifi et al. [13] employed a

similar cross-sectional design to assess caffeine consumption habits among Jazan University students in the south of Saudi Arabia. The sample consisted of 964 students recruited using multistage sampling. Data collection was also through a self-administered questionnaire, focusing on demographics, frequency of consuming caffeine-containing foods, portion sizes, and patterns of consumption during different times of the day [13].

In Amer et al. [12], the prevalence of caffeine consumption among HCPs in KSA was found to be 94.3%, with 47.7% diagnosed with caffeine dependence and 60.9% as addicts according to DSM-IV criteria. Coffee, tea, and chocolate were the most commonly consumed caffeine-containing substances. Adverse effects reported included sleep disturbances, stomach problems, and cardiac symptoms, while positive effects included feeling active, alert, confident, and happy [12]. On the other hand, Alfaifi et al. [13] found that 20% of university students exceeded the recommended daily caffeine consumption (>400 mg/day), with coffee being the most frequently consumed product. The study also noted an association between caffeine consumption and the year of study, suggesting that students in earlier years were more likely to exceed recommended intake levels [13].

Both articles highlighted the prevalence of caffeine consumption among their respective populations and identified potential adverse effects. Amer et al. [12] emphasized the common occurrence of caffeine dependence and addiction among government HCPs in KSA, calling for further research to understand the long-term consequences of caffeine consumption in this population [12]. In contrast, Alfaifi et al. [13] focused on the need to raise awareness among university students about the harmful impacts of exceeding recommended daily caffeine intake levels [13]. Both articles indicated that caffeine intake positively affected work energy, however, it had a negative impact on sleep quality.

Discussion

The pharmacological and physiological effects of caffeine, a stimulant on the central nervous system, are multifaceted. There have been reports that it affects the respiratory and cardiovascular systems when consumed. Furthermore, caffeine has the potential to affect one's mood and cognitive function [14]. Moderate caffeine usage has been shown to have negligible effects on health, however this may vary depending on the amount consumed [15,16]. But becoming drunk and experiencing major negative effects are possible outcomes of excessive drinking [14].

A number of drinks and foods that people often drink contain caffeine. It occurs naturally in tea leaves, cacao beans, and coffee beans. Energy drinks, sodas, and soft drinks may also contain caffeine [17]. However, there has been a lot of variation in the reported concentrations of caffeine. Caffeine is more concentrated in coffee beans compared to tea leaves, for instance. In addition, different types of plants, growth circumstances, and brewing methods are thought to have different caffeine content in coffee beans [17].

There is some evidence that caffeine intake has been on the rise recently, and it seems to differ throughout demographics. The world's population is the primary driver of the observed increase in caffeine intake over the last three decades, according to a recent assessment by Quadra et al. In addition, Quadra et al. found that caffeine use is greater in certain countries compared to others [18]. This includes Brazil and Italy. Age, gender, and favorite caffeine sources are only a few of the personal demographic factors that might affect caffeine use [19].

Caffeine use is on the increase in many nations, including Saudi Arabia. There is a rising interest in the coffee business among Saudis, despite the lack of statistics on caffeine consumption patterns in the kingdom. In 2020, Saudi Arabia surpassed all other countries to become the world's 18th-largest importer of coffee, as reported by the Observatory of Economic Complexity [20]. The expansion of the café sector in recent years may help to explain this need for imported coffee [21]. Government programs, such as designating 2022 as "The Year of Saudi Coffee"[22] and the recent effort by the Saudi Public Investment Fund to establish the Saudi Coffee Company with an investment reaching 1.2 billion Saudi Arabian Riyals [23], further acknowledge the rising demand for coffee and complement private sector investments.

The amounts of caffeine consumed by various Saudi communities have been the subject of many cross-sectional studies. Riyadh [24–27], Jeddah [28] the northern frontiers [29] and Madinah [30] were the sites of these inquiries. Among the studies that looked at people's favorite caffeine sources, coffee came out on top [24,26,27]. Research on caffeine use has shown that the average daily dose may range from 424 mg [25] to 1599 mg [24]. The utmost amount of caffeine that people should consume daily is 400 mg, as stated by both the Canadian Department of Health and the United States Food and Drug Administration [31,32].

Results from the study by AlAteeq et al. [25] show that caffeine use was rather greater than what we found in our review. Factors like variances in portion size and the types of foods included in the caffeine consumption assessments account for some of this heterogeneity in results. Unfortunately, our study's average caffeine usage is comparable to other European and American populations' typical caffeine consumption [35]. In one study of adults in the United States, for instance, the average daily caffeine intake was found to be 169 mg [36].

Various caffeine intake levels were classified in the literature using various cutoff values. Results showed that 18% of the 727 healthcare personnel surveyed in a Bahraini research took in more than 400 mg of caffeine daily [37]. Contrarily, over one-third of 467 UAE healthcare practitioners in a related research reported daily intake of more than 400 mg [38].

Caffeine intake levels as high as 2435 mg/day were recorded in a research included 395 Egyptian medical students [39]. In addition, a different research conducted in Lebanon found that caffeine consumption varied over time. Specifically, the percentage of students who drank more than the recommended daily dose was greatest during exam times (46.6%) compared to other periods (34.9%) [40].

Findings from previous worldwide research [33,36] corroborate the observed trend of increased caffeine use in the morning. But other doctors and nurses said they drank a lot of coffee at night. People who are more naturally inclined to sleep throughout the night are more likely to use psychostimulants, such as coffee, according to a research that analyzed chronotypes and their consumption of these substances [41]. Even though we didn't check chronotypes in our study, this trend could help explain why certain Jazan University medical students drink so much coffee in the evenings. Some may contend that caffeine's negative impacts on sleep patterns and energy levels are worsened by late-night intake. The findings of a study by Drake et al., which found that taking 400 mg no more than six hours before bedtime is likely to disturb sleep patterns, lend credence to this idea [42].

Conclusion

This systematic review process identified a total of 117 studies, with 121 studies screened based on titles and abstracts, resulting in 13 full-text articles reviewed. Ultimately, five studies met the inclusion criteria for the review. The included studies focused on caffeine consumption among healthcare providers and medical students in the Kingdom of Saudi Arabia (KSA). Studies revealed a high prevalence of caffeine consumption among healthcare providers, with significant rates of dependence and addiction, while highlighted concerning levels of caffeine intake among university students. Both studies underscored the importance of understanding caffeine consumption habits and their potential health implications in their respective populations. There is a need for further research into the long-term consequences of caffeine consumption among healthcare providers, and stressing the importance of raising awareness about excessive caffeine intake among university students. Overall, these findings contribute to a better understanding of caffeine consumption patterns and its impact on health in KSA. Moreover, both studies underscored the importance of understanding caffeine consumption habits and their potential health implications in their target populations

References

1. Committee on Military Nutrition Research. Caffeine for the sustainment of mental task performance: formulations for military operations. National Academies Press; 2001 Dec 7.

2. Mitchell DC, Knight CA, Hockenberry J, Teplansky R, Hartman TJ. Beverage caffeine intakes in the US. Food and Chemical Toxicology. 2014 Jan 1;63:136-42.

3. Heckman MA, Sherry K, De Mejia EG. Energy drinks: an assessment of their market size, consumer demographics, ingredient profile, functionality, and regulations in the United States. Comprehensive Reviews in food science and food safety. 2010 May;9(3):303-17.

4. Stavric B, Klassen R, Watkinson B, Karpinski K, Stapley R, Fried P. Variability in caffeine consumption from coffee and tea: possible significance for epidemiological studies. Food and chemical toxicology. 1988 Jan 1;26(2):111-8.

5. Nawrot P, Jordan S, Eastwood J, Rotstein J, Hugenholtz A, Feeley M. Effects of caffeine on human health. Food Additives & Contaminants. 2003 Jan 1;20(1):1-30.

6. Martini D, Del Bo' C, Tassotti M, Riso P, Del Rio D, Brighenti F, Porrini M. Coffee consumption and oxidative stress: a review of human intervention studies. Molecules. 2016 Jul 28;21(8):979.

7. de Mejia EG, Ramirez-Mares MV. Impact of caffeine and coffee on our health. Trends in Endocrinology & Metabolism. 2014 Oct 1;25(10):489-92.

8. Nehlig A, Daval JL, Debry G. Caffeine and the central nervous system: mechanisms of action, biochemical, metabolic and psychostimulant effects. Brain research reviews. 1992 May 1;17(2):139-70.

9. Gökcen BB, Şanlier N. Coffee consumption and disease correlations. Critical reviews in food science and nutrition. 2019 Jan 19;59(2):336-48.

10. Willson C. The clinical toxicology of caffeine: A review and case study. Toxicology reports. 2018 Jan 1;5:1140-52.

11. Domaszewski P. Gender differences in the frequency of positive and negative effects after acute caffeine consumption. Nutrients. 2023 Mar 7;15(6):1318.

12. Amer SA, Alamri FA, Alradini FA, Alenezi MA, Shah J, Fagehy AA, Shajeri GM, Abdullah DM, Zaitoun NA, Elsayed M. Caffeine addiction and determinants of caffeine consumption among health care providers: a descriptive national study. European Review for Medical & Pharmacological Sciences. 2023 Apr 15;27(8).

13. Alfaifi MH, Gosadi IM, Alfaifi SM, Alfaifi AJ, Shajeri MA, Alsam HA, Tawhari FY, Abuageelah BM. Assessment of caffeine consumption behavior among Jazan University students in the south of Saudi Arabia: A cross-sectional study. Medicine. 2022 Dec 23;101(51):e31651.

14. Institute of Medicine Committee on Military Nutrition R. Pharmacology of Caffeine. Caffeine for the Sustainment of Mental Task Performance: Formulations for Military Operations. Washington (DC): National Academies Press (US)2001.

15. Nawrot P, Jordan S, Eastwood J, et al.. Effects of caffeine on human health. Food Addit Contam. 2003;20:1–30.

16. Nieber K. The impact of coffee on health. Planta Med. 2017;83:1256–63.

17. Heckman MA, Weil J, Gonzalez de Mejia E. Caffeine (1, 3, 7-trimethylxanthine) in foods: a comprehensive review on consumption, functionality, safety, and regulatory matters. J Food Sci. 2010;75:R77–87.

18. Quadra GR, Paranaíba JR, Vilas-Boas J, et al.. A global trend of caffeine consumption over time and related-environmental impacts. Environ Pollut. 2020;256:113343.

19. 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;101:1081–7.

20. Observatory of Economic Complexity. Coffee in Saudi Arabia. 2020. Available at: https://oec.world/en/profile/bilateral-product/coffee/reporter/sau#:~:text=Saudi%20Arabia%20imports%20Coffee%20primarily,and%20Colombia%20(%245.24M [accessed 10 April, 2024].

21. Fareed S. Causing a stir: a generational shift in Saudi relationship with coffee. Arab News. 2021;23:43.

22. Saudi Ministry of Culture. The year of Saudi Coffee. 2022. Available at: https://engage.moc.gov.sa/year-of-saudi-coffee# [accessed 10 April, 2024].

23. Gazette S. PIF launches “Saudi coffee company” to invest SR1.2 billion in national industry. 2022. Available at: https://saudigazette.com.sa/article/620516 [accessed 10 April, 2024].

24. Al-Faris N. Assessment of intake of caffeine in random population in riyadh and its level in some food by HPLC. Emirates J Food Agric. 2017;21:11.

25. AlAteeq DA, Alotaibi R, Al Saqer R, et al.. Caffeine consumption, intoxication, and stress among female university students: a cross-sectional study. Middle East Curr Psychiatry. 2021;28:30.

26. Yousif A-turki, Basel A, Abdulrhman A, et al.. Caffeine habits among medical students in King Saud University. Int J Sci Res. 2016;5:11.

27. Sami AA, Alyousef SN. Assessment of the levels of caffeine consumption among Saudi Arabian university students. Int J Adv Appl Sci. 2021;8:4.

28. Sharif SM, Al-Qathmi MS, Baabdullah WM, et al.. The effect of caffeinated beverages on sleep quality in college students. Saudi J Intern Med. 2018;8:6.

29. Sultana A, Amna M. Caffeine intake among Northern border area population in Saudi Arabia. Saudi J Med Pharm Sci. 2020;6:12.

30. Katib AA, Almalki H, Surrati A, et al.. Energy drink consumption among college students in Saudi Arabia. J Food Nutr Res. 2018;6:531–6.

31. Canada Health. Caffeine in foods. 2022. Available at: https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/food-additives/caffeine-foods.html [accessed 10 April, 2024].

32. US Food and Drug Administration. Spilling the beans: how much caffeine is too much? 2018. Available at: https://www.fda.gov/consumers/consumer-updates/spilling-beans-how-much-caffeine-too-much#:~:text=For%20healthy%20adults%2C%20the%20FDA,associated%20with%20dangerous%2C%20negative%20effects [accessed 10 April, 2024].

33. Martyn D, Lau A, Richardson P, et al.. Temporal patterns of caffeine intake in the United States. Food Chem Toxicol. 2018;111:71–83.

34. Mahoney CR, Giles GE, Marriott BP, et al.. Intake of caffeine from all sources and reasons for use by college students. Clin Nutr. 2019;38:668–75.

35. Mackus M, van de Loo A, Benson S, et al.. Consumption of caffeinated beverages and the awareness of their caffeine content among Dutch students. Appetite. 2016;103:353–7.

36. Lieberman HR, Agarwal S, Fulgoni VL, 3rd. Daily patterns of caffeine intake and the association of intake with multiple sociodemographic and lifestyle factors in US adults based on the NHANES 2007-2012 surveys. J Acad Nutr Diet. 2019;119:106–14.

37. Jahrami H, Al-Mutarid M, Penson PE, et al.. Intake of caffeine and its association with physical and mental health status among university students in Bahrain. Foods (Basel, Switzerland). 2020;9:1–12.

38. Kharaba Z, Sammani N, Ashour S, et al.. Caffeine consumption among various university students in the UAE, exploring the frequencies, different sources and reporting adverse effects and withdrawal symptoms. J Nutr Metab. 2022;2022:5762299.

39. El-Nimr NA, Bassiouny SH, Tayel DI. Pattern of caffeine consumption among university students. J High Inst Public Health. 2019;49:154–61.

40. Khalil M, Antoun J. Knowledge and consumption of caffeinated products by university students in Beirut, Lebanon. Clin Nutr ESPEN. 2020;37:213–7.

41. Adan A. Chronotype and personality factors in the daily consumption of alcohol and psychostimulants. Addiction. 1994;89:455–62.

42. Drake C, Roehrs T, Shambroom J, et al.. Caffeine effects on sleep taken 0, 3, or 6 hours before going to bed. J Clin Sleep Med. 2013;9:1195–200.