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From Cup to Consequence: Exploring the Interconnected Impact of Caffeine on Sleep Architecture, Mental Health, and Daily Life

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Abstract

Caffeine is widely used worldwide and helps improve alertness, concentration, and daily performance. Though consumption has been regarded as harmless, the results revealed that the suggestion of caffeine consumption in human life is not as simple as thought, as it is interlinked in specific ways. A questionnaire survey of 103 members was conducted, among whom caffeine consumption patterns, both with respect to amount and timing, and also with respect to preferred sources, were studied along with sleep quality and associated mental states like anxiety and restlessness. Results revealed that many people consumed within six hours before sleep. Increase in intake of caffeine, especially in the evenings, leads to delay in sleep, reduced sleep duration and decreased sleep, in some with anxiety and restlessness, and these results correlate with physical mechanisms like blockade. While caffeine gives a quick energy boost, misusing or overusing it before or during sleep hours may lead to heightened weakness, such as restlessness, emotional instability, or mental dependencies. The study recognised the need to raise awareness of the proper, moderate, effective, and productive use of the caffeine product to maintain mental well-being.

Keywords: Caffeine Consumption, Sleep Quality, Mental Well-being, Anxiety.

1. Introduction

Caffeine is a regular part of many people's lives. It is present in coffee, tea, carbonated drinks, and energy drinks. It is generally considered safe. It helps them feel less tired, pay attention, and feel better. In schools, offices, and social life, caffeine is often linked with better work and better results. Because of this, people usually view caffeine positively. However, using caffeine too often can cause problems over time. When used carefully, caffeine can help stay aware. But when taken in too large a dose or too late in the day, it can disrupt sleep and increase stress, worry, and the formation of habits. This article uses existing research and data to study how caffeine affects sleep quality, mental health, and daily activities.

2. Background

- **Physiological Mechanisms of Caffeine:** Caffeine helps people stay awake. It works by blocking a brain chemical that makes the body feel sleepy. It also increases other chemicals that help improve mood and focus. Caffeine stays in the body for many hours. Because of this, drinking it late in the day can disturb sleep. When caffeine is used often, the body can slowly get used to it. Over time, a person may need more caffeine to feel the same effect.
- **Impact on Sleep Architecture:** Sleep is controlled by the body's natural clock and its need for rest. Caffeine can disturb this system. Because of this, people may take longer to fall asleep, sleep for fewer hours, and have poorer sleep quality. Caffeine can also reduce REM and deep sleep. Deep sleep helps the body recover, while dream sleep helps with memory. Even small amounts of caffeine taken a few hours before bedtime may still lower sleep quality.
- **Caffeine and Mental Health:** Caffeine affects people in different ways. Some people feel more awake after having caffeine. Others may feel nervous, uneasy, or restless when

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caffeine is used often, low, or irritated. This can cause mood changes and low energy. These feelings can make the person want caffeine again, and the cycle continues. Caffeine can also make the heart beat faster and increase stress in the body. People with anxiety or sleep problems may feel these effects more strongly.

- **Sociocultural and Behavioural Aspects:** Caffeine is part of many daily habits and social routines. Coffee breaks, energy drinks, and morning routines are common in both school and work settings. Many people use caffeine to help them stay active and get through the day. However, caffeine is sometimes used to hide tiredness, stress, or poor sleep. Relying on caffeine in this way can stop people from noticing deeper problems in their daily habits or mental well-being.

3. Research Objectives

This study aims to:

- Understand how caffeine affects sleep, including the time needed to fall asleep, total sleep duration, and sleep quality.
- Understand how caffeine use and sleep problems affect focus, productivity, and mental health, such as stress, mood swings, and habits.
- Find out the impact of caffeine intake and sleep issues on focus and productivity.
- Create awareness about the importance of balanced and moderate caffeine intake for better health.

4. Methods

- **Overview of the Research Problem:** Many people use caffeine to feel more awake and focused. Most of the time, they do not think about what can happen if they use it too much or too late in the day. Consuming too much caffeine, especially in the evening, can affect sleep, mood, and overall health. This research examines how different ways of consuming caffeine affect sleep, mental health, and daily life.
- **Study Design and Participants:** The study used a cross-sectional design, and data were collected via a structured survey distributed via Google Forms. Overall, 103 volunteers participated, including both students and employees.
- **Demographic and Consumption Baseline:** Basic details, including age group, gender, and occupation, were collected to compare lifestyle patterns. Participants were also asked about their usual daily intake of caffeinated products.
- **Caffeine Type, Timing, and Use Patterns:** Participants shared the types of caffeinated drinks that they usually consume, such as coffee, tea, and carbonated drinks. They also mentioned the times of their first and last drinks for the day. The information was then used to examine how caffeine use relates to sleep and daytime alertness.
- **Sleep Patterns and Daily Consumption:** The survey asked people about their daily caffeine use and how long they usually slept. It also asked how well they felt they slept during the past month. Participants chose a number on a five-point scale to describe their sleep. They were also asked how often they had trouble falling asleep. This information made it possible to compare people who drank caffeine often with those who drank it less often.
- **Data Collection and Analysis:** Data were collected for a period of two weeks and automatically compiled using Google Sheets. Basic descriptive statistics were used, and the data were presented with bar and pie charts to illustrate the relationships among caffeine intake, sleep quality, and mental well-being. The data were then compared with existing literature.

5. Data Extraction and Collection

[1] Average Caffeine Consumption Per Day

In fact, results of the survey showed that while 32% of participants were within the limit of consuming 2 to 3 cups of caffeinated drinks per day, 34% were within the limit of consuming 1 cup a day, and 11.7% of them consumed 4 to 5 cups a day, and 22.3% reported no daily caffeine consumption. This indicates a moderate to high level of caffeine consumption among participants. Moreover, for some participants, higher levels of caffeine consumption may increase susceptibility to caffeine intolerance, sleep problems, and dependence, as shown in Fig. 1.

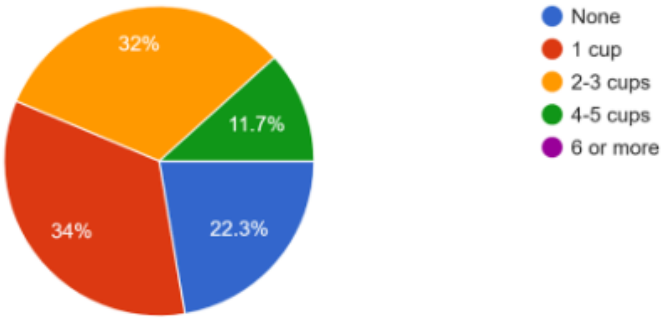

Fig 1: Average Caffeine Consumption Per Day

[2] Preferred Type of Caffeinated Beverages

The caffeinated drink was coffee. This was followed by 61.2% of participants. Tea was next at 51.5%, while energy drinks (16.5%) and soft drinks (27.2%) accounted for 8.7% and other sources for 8.7%, respectively. This corresponds with global levels of caffeine intake. While energy drink intake was found to be low, this suggests dependence on caffeinated beverages among younger people for quick stimulation, as shown in Fig. 2.

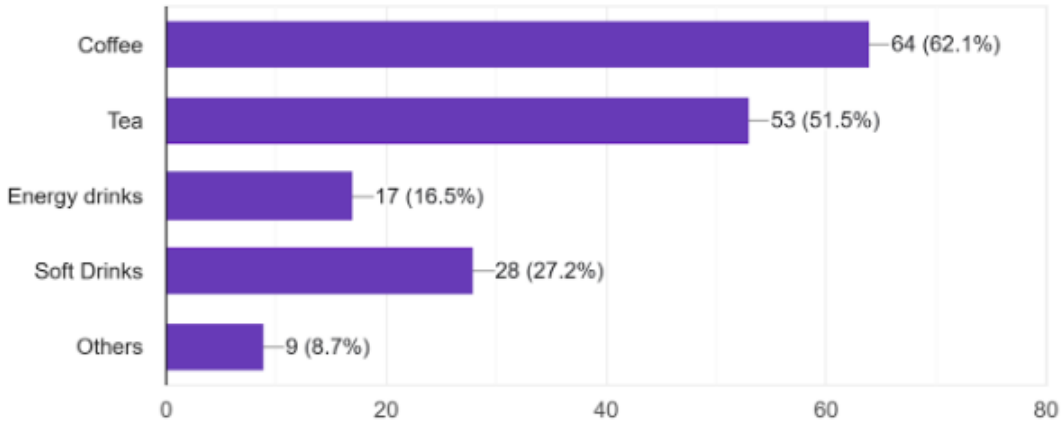

Fig 2: Preferred Type of Caffeinated Beverages

[3]Average Hours of Sleep Per Night

As for sleep time, 60.2% of participants slept 6-8 hours, whereas 19.4% slept 4-6 hours. Also, participants who slept a high percentage of the time for less than adequate hours indicate a need to examine the association between caffeine use, especially later on, and hours of sleep.

These are consistent with the previously reported stimulant- related sleep disturbance. As per Fig. 3

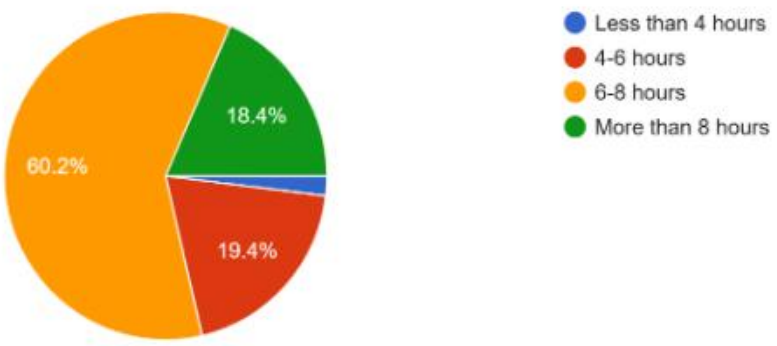

Fig 3: Average Hours of Sleep Per Night

[4] Overall Sleep Condition

Participants evaluated their sleep quality on a five-point scale. The findings showed that 33% of participants rated their sleep quality as 4, while 26.2% rated it as 3. In addition, 21.4% rated their sleep quality as 5, 10.7% as 1, and 8.7% as 2. Therefore, more than half of the participants rated their sleep as average. Caffeine's known effects on sleep may explain this trend- wave sleep and REM sleep, both of which are critical for restorative rest and emotional regulation, as per Fig.4.

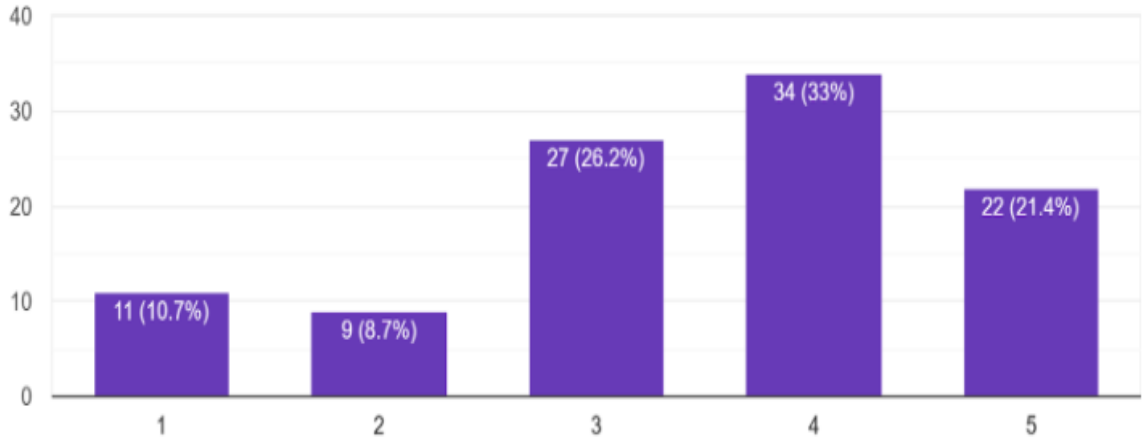

Fig 4: Overall Sleep Condition

[5] Anxiety, Jitters, and Restlessness after Caffeine Consumption

Approximately 44.7% of the participants reported that they had never experienced anxiety, jitters, or nervousness after consuming caffeine, 31.1% reported that they experienced these after using caffeine. However, only 19.4% said these happened to them sometimes, and only a small percentage said they happened often or always. This suggests that there are certainly differences in how sensitive individuals are to caffeine. More stimulation of hormones that cause stress, like cortisol and adrenaline, could be causing more anxiety in some individuals, as per Fig. 5.

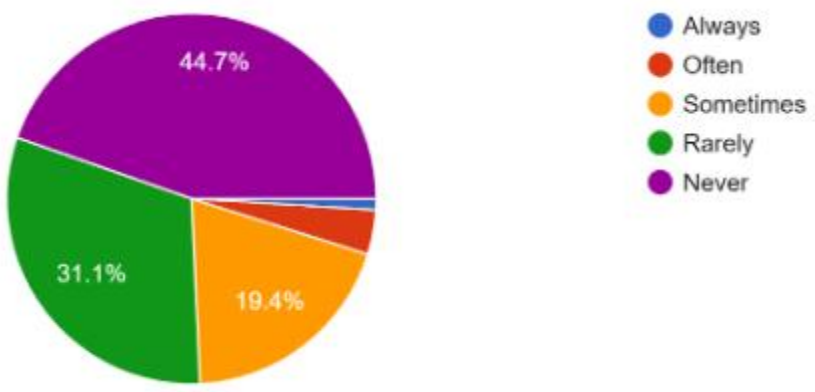

Fig 5: Anxiety, Jitters, and Restlessness after Caffeine Consumption

6. Literature Review

Table 1: Summary of relevant papers

Paper Title	Authors	Summary
Caffeine, Mental Health, and Sleep Quality in Students: A Mediation Approach [1]	Lesher, S. & Lycoming College (n.d) [1]	This study shows how the use of caffeine among students connects with sleep problems and mental health. It shows that more caffeine intake leads to anxiety and poor sleep. [1]
Coffee, Caffeine, and Sleep: A Systematic Review of Epidemiological Studies and Randomised Controlled Trials [2]	Clark, I., & Landolt, H. P. (2016) [2]	This review explains how caffeine can disturb normal sleep and reduce total sleep time. It also highlights that both the amount and timing of caffeine matter. [2]
Effects of Caffeine on Sleep Quality and Daytime Functioning [3]	(2018) [3]	The paper discusses how caffeine may lower sleep quality and affect how people feel and perform the next day, suggesting that intake should be limited. [3]
Mental Health, Sleep, and Caffeine Intake among Shift Workers in Korea [4]	Kim, G. et al. (2025) [4]	This research examines caffeine habits among shift workers and finds links between high consumption, anxiety symptoms, and poor sleep. [4]
Caffeine Intake Alters Recovery Sleep after Sleep Deprivation [5]	(2024) [5]	The study shows that caffeine can interfere with recovery sleep and reduce sleep after a person has been sleepless. [5]
Caffeine Effects on Sleep	Drake, C. et al. (2013) [6]	Findings suggest that even

Taken 0, 3, or 6 Hours before Bed [6]		caffeine consumed six hours before bedtime can negatively affect sleep length and quality. [6]
Caffeine Intake and Mental Health in College Students [7]	Bertasi, R. et al. (2021) [7]	This research tells that students who consume more caffeine tend to experience higher levels of stress and anxiety. [7]
Caffeine Consumption and Sleep Quality in Australian Adults [8]	Watson, E. et al. (2016) [8]	This study finds that people who consume more caffeine often reduce their sleep duration and experience poorer overall sleep. [8]
Stress-Related Sleep Disturbance and Polysomnographic Response to Caffeine [9]	Drake, C. L. et al. (2006) [9]	Results show that caffeine may worsen stress-related sleep problems and alter brain activity during sleep. [9]
Effect of Caffeine on Sleep: EEG Study in Late Middle-Aged People [10]	Brezinova, V. (1974) [10]	EEG results indicate that caffeine reduces total sleep time and the duration of deep sleep stages in adults. [10]
High-Caffeine Drink Consumption and Anxiety in Korean Adolescents [11]	Cho, J. A. et al. (2024) [11]	The study identifies a strong relationship between frequent high-caffeine drinks and anxiety symptoms in teenagers. [11]
Regular Caffeine Intake Delays REM Sleep Promotion and Attenuates Sleep Quality [12]	Weibel, J. et al. (2021) [12]	Long-term caffeine use was found to delay REM sleep and lower overall sleep depth in healthy people. [12]
Caffeine Consumption and Self-Assessed Stress, Anxiety, and Depression in School Children [13]	Richards, G., & Smith, A. (2015) [13]	This research shows that caffeine intake among school children is associated with higher stress and anxiety levels. [13]
The Impact of Caffeine and Coffee on Human Health [14]	Cornelis, M. C. (2019, 2019b) [14]	The review discusses both positive and negative effects of caffeine, including benefits for alertness but drawbacks for sleep. [14]
Coffee and Caffeine Consumption for Human Health [15]	Abalo, R. (2021) [15]	The paper explains how caffeine affects the body, including its role in improving alertness while sometimes increasing sleep

		issues and anxiety. [15]
Caffeine Consumption and Depression, Anxiety, and Stress Levels among University Students in Medina [16]	Makki, N. M. et al. (2023, 2023b) [16]	The study reports a connection between high caffeine intake and increased depression and anxiety scores in students. [16]
Caffeine Intake and Anxiety: A Meta-Analysis [17]	Liu, C. et al. (2024) [17]	This meta-analysis combines many studies and confirms that higher caffeine consumption is linked with a greater risk of anxiety. [17]
Caffeine Is Negatively Associated with Depression in Patients Aged 20 and Older [18]	Bao, J. et al. (2022) [18]	The findings suggest that moderate caffeine intake may help reduce depressive symptoms in adults.[18]

7. Problem Statement

Caffeine is one of the most widely used substances affecting the brain worldwide and is commonly utilised to boost alertness, concentration, and cognition. Though caffeine may be the most popular and acceptable brain-affecting worldwide, excessive and improper consumption of caffeine may have dramatic effects on the levels of sleep, anxiety, and create a psychological level of dependency on the substance. Many people focus on the short-term benefits of caffeine on an individual, but forget the long-term impact it may have on their health. The main concern of this study, which is being addressed, is the gap between the benefits of consuming caffeine and the fact that its aftereffects have been overlooked. Even though caffeine can temporarily increase productivity, it can also affect sleep patterns and emotional stability. What is found is a vicious circle of caffeine intake to increase their wakefulness and productivity. This has caused sleep deprivation, emotional upsets, and deteriorating mental states. This has been particularly evident among students and working adults, who increase their caffeine intake to manage academic or professional pressures.

8. Solution

The proposed method is more concerned with raising awareness of moderate, well-informed use of caffeine, rather than avoiding it altogether and raising awareness of what is best, in what quantity, when, and how the human body responds to caffeine will result in healthier, more productive habits.

A. Key recommendations include:

- **Moderation:** Restriction of caffeine-containing product consumption to around 1-3 cups per day to prevent the likelihood of any hazardous consequences.
- **Timing:** Not consuming coffee or other caffeine-containing products after mid-afternoon to avoid interruptions in sleep.
- **Self- awareness:** Creating an awareness among individuals in relation to their own sensitivity to caffeine
- **Education:** Organising education programs in schools and workspaces to create awareness about the physiological implications of caffeine.

Conclusions

Generally, caffeine is considered good for maintaining alertness and concentration, and for enhancing performance. However, this study found that poor sleep, late sleep, sleep disturbance, or even a heightened anxious behavioural response could be associated with excessive or inappropriate caffeine intake. From the data collected in this study, using a sample of 103, it was found that caffeine may be associated with poor sleep behavioural patterns. On the other hand, this also highlights the dilemma between caffeine's immediate benefits and its long-term effects. While caffeine improves brain function, its effects on sleep and emotional state can exacerbate and reinforce fatigue and dependence on this stimulant. The results are consistent with earlier studies in which it is suggested that caffeine is indeed linked to mental health and the sleep patterns of a person. In conclusion, it is worth noting that caffeine, although useful, can disrupt an individual's life. It is likely possible to take advantage of caffeine's benefits while reducing the disruptions that result from its intake.

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