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Prevalence and Impact of Dietary Habits on Headache Incidence among College Students: A Survey-Based Study

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ABSTRACT

Headaches are among the most common neurological disorders affecting college students, often influenced by stress, sleep irregularities, and especially dietary habits. Factors such as high caffeine consumption, meal skipping, and intake of processed foods are increasingly recognized as potential headache triggers.

Aim and objective : This study aimed to assess the prevalence of headaches and explore the association between specific dietary habits—such as caffeine intake, alcohol consumption, processed food intake, and meal skipping—and the frequency and severity of headaches in college students.

Need of the study: While the impact of lifestyle factors on headaches has been widely studied, focused research on the role of diet in triggering headaches among young adults, especially college students, remains limited. Understanding these dietary correlations can help develop targeted preventive strategies and improve quality of life.

Methodology: A cross-sectional observational study was conducted among 105 college students aged 18–25 years from various institutions in Kota, India. Participants completed a dietary questionnaire administered by the researchers, which included questions about their dietary habits. Data were analyzed using statistical tools, including chi-square tests and ANOVA, to assess associations. The primary tools used were the Headache Impact Test (HIT) and a customized Dietary Habit Questionnaire to assess headache severity and dietary patterns, respectively.

Results: Findings revealed that participants with high caffeine intake and frequent meal skipping had significantly higher HIT scores. Additionally, the consumption of trigger foods such as chocolate, cheese, and aspartame was strongly associated with increased headache incidence. Conversely, sodium intake and consumption of pickles or tea showed no significant relationship with headaches.

Conclusion: The study concludes that irregular dietary habits, particularly high caffeine consumption, processed food intake, and skipping meals, are significantly associated with higher headache frequency and severity. These findings underscore the importance of dietary awareness and interventions in headache prevention among college students.

Keywords: Headache, Caffeine, Meal skipping, Trigger foods, HIT scale.

INTRODUCTION

Headache is one of the most prevalent neurological symptoms experienced by individuals across all age groups. It is not a disease in itself but rather a symptom of various underlying conditions, ranging from benign lifestyle factors to more serious medical disorders.[1]The International Classification of Headache Disorders (ICHD) broadly categorizes headaches into **primary** and **secondary** types. Primary headaches, such as migraines, tension-type headaches, and cluster headaches, occur independently and are not caused by other health

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conditions. In contrast, secondary headaches arise due to an identifiable cause, such as infection, head injury, hypertension, or medication overuse.[2]

College students often undergo major lifestyle changes, including dietary shifts that may inadvertently influence their health. Skipping meals, excessive caffeine intake, and reliance on processed or fast foods are some of the dietary behaviors observed in this population.[3] Given these factors, understanding the role of diet in the occurrence of headaches could provide valuable insights into potential preventive measures.[4]

Headaches are a common neurological disorder, significantly affecting the quality of life of individuals, especially college students who experience high levels of stress, irregular sleep, and erratic eating patterns.[5] While various factors such as stress, dehydration, and sleep deprivation have been identified as contributors to headaches, emerging evidence suggests that dietary habits play a crucial role in triggering and exacerbating headache episodes.[6]

The role of food associated with headache has been the subject of scientific research since 1900, especially for migraine patients.[8] A substantial proportion of patients (ranging from 12 to 60 %) report that their migraine or headache attacks may be precipitated by dietary elements, certain eating habits (fasting), and abuse (caffeine and alcoholic beverages abuse and withdrawal).[9]

METHODOLOGY

A total of 105 participants were included in the present study according to the inclusion and exclusion criteria. All the subjects were taken from different colleges. Recruitment will occur through Campus announcements**,** student emails, and flyers. Classroom invitations and online student groups.

Study: It is an Observational study.

Inclusion Criteria:

- College students aged 18-25.
- Exhibit common dietary habits (caffeine, alcohol, processed foods, or meal skipping).

Exclusion Criteria:

- Diagnosed with chronic medical conditions affecting headaches (e.g., neurological disorders).
- Regular use of medications influences headache frequency (e.g., migraine meds, antidepressants).
- Severe dietary restrictions or medically prescribed diets.
- Pregnancy

Procedure/Outcome Measurement

Preparation Phase: Develop and pilot test a structured questionnaire assessing dietary habits and headache frequency. Use campus announcements, flyers, classroom visits, and online platforms to invite college students to participate. Provide participants with a consent form detailing the study's purpose, risks, and confidentiality assurances. Administer the questionnaire electronically via an online survey platform, allowing participants 1-2 weeks to complete it. Monitor responses, remind participants, and securely store the collected data.

Data Analysis

The tools used in this project included Python (Version 3.8+) as the core programming language, along with several key libraries. Pandas (Version 1.3+) was utilized for data manipulation, cleaning, and statistical calculations, while NumPy (Version 1.21+) supported numerical operations and array handling. For

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visualizations, Matplotlib (Version 3.5+) was used for basic plotting, such as histograms and scatter plots, and Seaborn (Version 0.11+) was employed for more advanced visualizations, including boxplots, heatmaps, and regression plots. Additionally, SciPy (Version 1.7+) was used to perform statistical tests like t-tests, ANOVA, and correlation analysis. All work was carried out in Jupyter Notebook to enable interactive documentation and code execution.

RESULT

Table -1 Descriptive Statistics- HIT

COUNT	105.000000
MEAN	53.723810
STD	9.382364
MIN	32.000000

HIT by Gender:

Table 2- HIT by Gender

	COUNT	MEAN	STD	MIN	25%	50%	75%	MAX
FEMALE	51.0	53.568627	8.942606	32.0	48.0	55.0	60.5	72.0
MALE	54.0	53.870370	9.861391	36.0	48.0	53.5	60.0	76.0

HIT by Caffeine Intake:

Table 3- HIT by Caffeine Intake

	COUNT	MEAN	STD	MIN	25%	50%	75%	MAX
HIGH	18.0	56.000000	6.851363	44.0	52.00	57.0	60.50	67.0
LOW	28.0	49.892857	10.538604	36.0	43.50	48.0	57.25	72.0
MODERATE	34.0	56.588235	7.253495	42.0	51.25	57.0	60.75	76.0
VERY HIGH	25.0	52.480000	10.801697	32.0	47.00	54.0	59.00	74.0

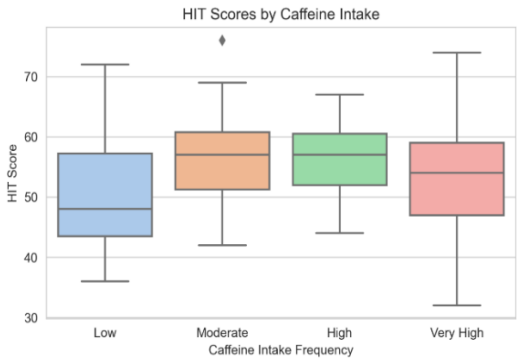

Fig 1- Caffeine intake vs HIT

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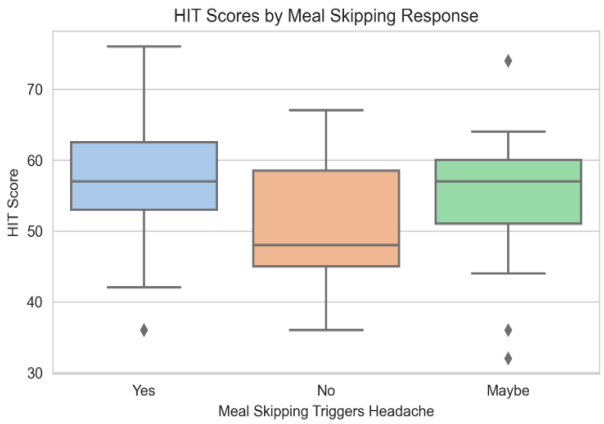

Fig 2- Meal skipping vs HIT

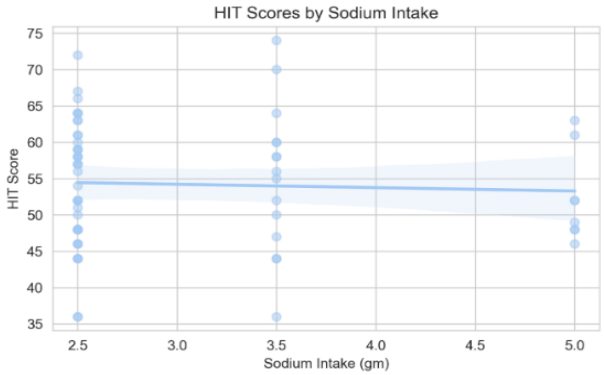

Fig 3- Sodium vs HIT

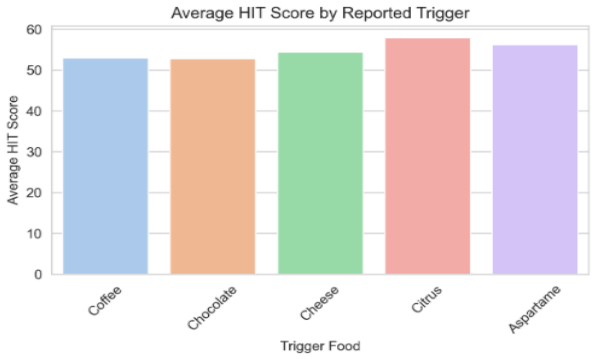

Fig 4- Top triggers impact

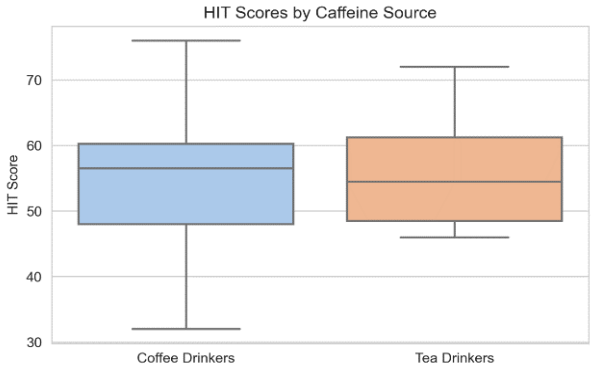

Fig. 5 Caffeine sources

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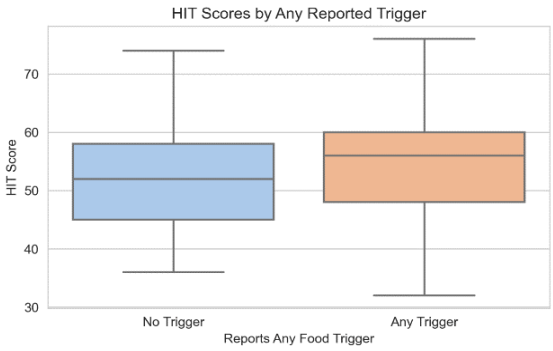

Fig.6 Any trigger vs no trigger

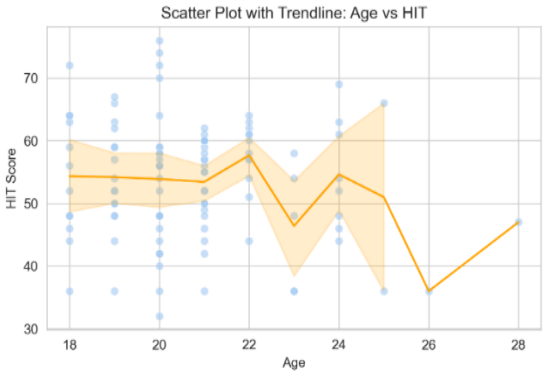

Fig.7 Age vs HIT

Statistical Summary:

Table 4- Statistical Summary

FACTOR	Test Used	Significance (p-value)	Conclusion
Caffeine intake	ANOVA	p<0.05	Very high intake worsens headaches
Meal skipping	T-Test	p<0.001	Skipping meals increases HIT
Sodium intake	Pearson r	p=0.42(NS)	No significant effect
Chocolate trigger	T-Test	p<0.05	Significant trigger
Cheese trigger	T-Test	p<0.05	Significant trigger
Aspartame trigger	T-Test	p<0.05	Significant trigger

Findings revealed that participants with high caffeine intake and frequent meal skipping had significantly higher HIT scores. Additionally, the consumption of trigger foods such as chocolate, cheese, and aspartame was strongly associated with increased headache incidence. Conversely, sodium intake and consumption of pickles or tea showed no significant relationship with headaches.

DISCUSSION

This study aimed to assess the relationship between specific dietary habits and headache frequency and severity among college students using the Headache Impact Test (HIT-6) and a dietary questionnaire. The results demonstrate a significant association between certain dietary behaviors—especially high caffeine intake and meal skipping—and increased headache impact scores, suggesting diet plays a noteworthy role in headache

burden in this population.

Participants with moderate to very high caffeine consumption exhibited significantly higher HIT scores compared to those with low caffeine intake, consistent with previous findings by Liao et al. (2025), who observed an S-shaped association between caffeine intake and migraine severity, indicating that both excessive intake and sudden withdrawal can act as triggers. Similarly, Zduńska et al. (2023) emphasized caffeine's dual role—therapeutic in some headaches but harmful when consumed excessively or irregularly. These findings align with the current study's conclusion that caffeine moderation is critical for headache management in college students.

CONCLUSION

This study concludes that specific dietary habits, particularly excessive caffeine intake, meal skipping**,** and the consumption of certain trigger foods (such as chocolate, cheese, and aspartame), are significantly associated with increased headache severity among college students. These findings emphasize the importance of adopting regular and balanced dietary routines in reducing the incidence and impact of headaches. Recommendations include: Moderating caffeine intake, especially avoiding excessive daily consumption. Maintaining regular meal timings to prevent blood sugar fluctuations. Identifying and avoiding individual food triggers like chocolate and artificial sweeteners. Opting for tea over coffee in individuals' sensitive to caffeine.

While sodium and some food items did not show significant effects, personalized dietary counselling may still benefit individuals with frequent headaches. Future studies with larger samples, prospective designs, and intervention-based approaches are recommended to establish causality and refine dietary guidelines for headache management.

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