

Gastrointestinal effects of coffee consumption and meal regularity on dyspepsia in medical students

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Abstract

Background: Dyspepsia is an upper gastrointestinal disorder characterized by epigastric pain, nausea, early satiety, and fullness. Medical students are prone to this condition due to academic demands, excessive coffee consumption, and irregular eating habits.

Objectives: This study aimed to assess the relationship between coffee intake and meal regularity with dyspepsia among medical students at Wijaya Kusuma University Surabaya.

Methods: A total of 81 respondents were selected using purposive sampling, with data collected through structured questionnaires and analyzed using the Chi-Square test.

Results: Showed that 54.3% consumed 3–4 cups of coffee daily, 49.4% had irregular eating patterns, and 49.4% experienced dyspepsia. Bivariate analysis revealed significant associations between coffee consumption ($p < 0.001$) and meal regularity ($p < 0.001$) with dyspepsia occurrence.

Conclusions: Coffee drinking habits and eating regularity are significantly correlated with dyspepsia, highlighting the need for educational efforts to promote regular meals and reduce caffeine intake as preventive measures.

Keywords: Coffee Consumption; Eating Pattern; Dyspepsia; Medical Students; Gastrointestinal Disorder; Lifestyle Factors.

1. Introduction

Dyspepsia is a non-communicable digestive disorder that is quite common, both in Indonesia and globally. According to 2023 WHO (1) data, the international prevalence of dyspepsia ranges from 13% to 40% of the population each year. In Indonesia, the prevalence rate is even higher, reaching 40–50%. According to the 2021 Indonesian Health Profile, dyspepsia is the leading cause of hospitalization, with 18,807 cases, consisting of 39.8% men and 60.2% women (2).

In 2022, an estimated 10 million people will experience dyspepsia, equivalent to 6.5% of the total population. Projections for 2023 show a significant increase, with the number of sufferers estimated to reach 28 million people, or approximately 11.3% of the Indonesian population (3). The high prevalence of dyspepsia is influenced by several factors, including coffee drinking habits and irregular eating patterns.

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Students often increase their caffeine intake to maintain concentration during long study periods or to stay awake, but excessive consumption can actually cause digestive system disorders. The increase in daily coffee consumption is most common among the 18–24 age group. In Indonesia, coffee consumption has increased by 98% in the past ten years, and more than half of the population is recorded as coffee consumers (4). High coffee intake can stimulate stomach acid production, which is one of the triggers of dyspepsia symptoms. Furthermore, regular eating patterns also play a crucial role in maintaining digestive health and preventing dyspepsia. A regular diet includes eating three meals a day at consistent times and not skipping main meals (5). This study focuses on identifying the relationship between coffee consumption and dietary regularity with the risk of dyspepsia in students at the Faculty of Medicine, Wijaya Kusuma University, Surabaya.

2. Methods

This study employed an analytical observational design with a cross-sectional method. The independent and dependent variables were measured simultaneously and then analyzed to determine the relationship between them. Data collection was conducted through questionnaires distributed in two formats: online using Google Forms and offline using paper sheets. The research sample was determined using a purposive sampling technique.

The study was conducted from March to May 2025. A total of 81 students participated, consisting of 14 students from the class of 2022, 33 students from the class of 2023, and 34 students from the class of 2024. Respondent selection took into account similarity in class schedules, ease of communication due to their active student status, and efficiency of questionnaire distribution. Before completing the questionnaire, the researcher explained the purpose and benefits of the study and then requested consent for participation through an informed consent form. Analysis of the relationship between variables was conducted using a bivariate statistical test using the Chi-Square method.

3. Results

3.1. Characteristics based on the occurrence of dyspepsia syndrome

This study presents a description of the characteristics of the research subjects based on the incidence of dyspepsia syndrome. This description is presented in Table 1 as follows:

Table 1 Characteristics Based on the Incidence of Dyspepsia Syndrome in Students of the Class of 2024, 2023, and 2022, Faculty of Medicine, Wijaya Kusuma University, Surabaya

Dyspepsia category	Frequency (n)	Percentage (%)
Positive	40	49.4%
Negative	41	50.6%
Total	81	100%

Source: Primary data

The results of the analysis in Table 1 show that the distribution of negative characteristics of dyspepsia was the most dominant, namely 41 subjects (50.6%), followed by positive characteristics of dyspepsia as many as 40 subjects (49.4)%.

3.2. Characteristics based on frequency of coffee consumption

The description of the characteristics of the research subjects based on the frequency of coffee consumption per day is categorized into the amount of coffee consumed, namely 1-2 cups a day and 3-4 cups a day. The data is presented in the following table 2:

Table 2 Characteristics Based on the Frequency of Coffee Consumption in Students of the Class of 2024, 2023, and 2022, Faculty of Medicine, Wijaya Kusuma University, Surabaya

Coffee Consumption Categories	Frequency (n)	Percentage (%)
1-2 cups a day	37	45.7%
3-4 cups a day	44	54.3%
Total	81	100%

Source: Primary data

The results in Table 2 show that the distribution of the characteristics of the frequency of coffee consumption is highest in subjects who consume 3-4 cups of coffee a day.

3.3. Characteristics based on the frequency of coffee consumption

The description of the characteristics of the research subjects based on the frequency of coffee consumption per day is categorized into morning, afternoon, and evening/night. The data is presented in Table 3 below:

Table 3 Distribution of Characteristics Based on the Frequency of Coffee Consumption Time in Students of the Class of 2024, 2023, and 2022, Faculty of Medicine, Wijaya Kusuma University, Surabaya

Coffee Consumption Time Categories	Frequency (n)	Percentage (%)
Morning	12	14.8%
Midday	5	6.2%
Evening/night	64	79.0%
Total	81	100%

Source: Primary data

The results in Table 3 show that the distribution of the characteristics of the frequency of coffee consumption time is highest in subjects who consume coffee in the afternoon/evening.

3.4. Characteristics based on the frequency and duration of coffee consumption

The description of the characteristics of the research subjects based on the frequency of duration of coffee consumption is categorized into 6 months - 1 year, 1-2 years, and > 3 years. The data is presented in the following table 4:

Table 4 Distribution of Characteristics Based on the Frequency and Duration of Coffee Consumption in Students of the Class of 2024, 2023, and 2022, Faculty of Medicine, Wijaya Kusuma University, Surabaya

Coffee Consumption Duration Categories	Frequency (n)	Percentage (%)
6 months-1 year	33	40.7%
1-2 years	14	17.3%
>3 years	34	42.0%
Total	81	100%

Source: Primary data

The results in Table 4 show that the distribution of the frequency characteristics of the duration of coffee consumption was highest in subjects who consumed coffee for > 3 years.

3.5. Characteristics based on the frequency of regularity of eating patterns

The frequency of regular eating patterns in the research subjects was categorized as >3x/day, 1x/day, 2x/day, 3x/day. The characteristics of the research subjects based on the frequency of regular eating patterns are presented in Table 5 as follows:

Table 5 Characteristics Based on the Frequency of Regularity of Eating Patterns in Students of the Class of 2024, 2023, and 2022, Faculty of Medicine, Wijaya Kusuma University, Surabaya

Diet Category	Frequency (n)	Percentage (%)
1 time/day	9	11.1%
2 times/day	40	49.4%
3 times/day	25	30.9%
>3 times/day	7	8.6%
Total	81	100%

Source: Primary data

Table 5 shows that the distribution of the characteristics of regular eating patterns is highest in subjects with a 2-meal-a-day eating pattern.

3.6. The Relationship between Coffee Consumption Frequency and the Incidence of Dyspepsia Syndrome

The frequency of coffee consumption tested was classified into two categories: 1-2 cups of coffee per day and 3-4 cups of coffee per day. Dyspepsia syndrome was categorized into two categories: positive and negative. A positive response was given if the patient answered yes to one or more of the questions based on the modified ROME III criteria by Irfan (2019) and a negative response was given if the patient answered no to all of the questions.

Table 6 Cross-Table of Dyspepsia Syndrome Incidence Based on Coffee Consumption in Students of the 2024, 2023, and 2022 Classes of the Faculty of Medicine, Wijaya Kusuma University, Surabaya

Coffee Consumption Frequency	Dyspepsia Category		Total %
	Positive %	Negative %	
1-2 cups a day	2 (5.4%)	35 (94.6%)	37 (100%)
3-4 cups a day	38 (86.4%)	6 (13.6%)	44 (100%)
Total	40 (49.4%)	41 (50.6%)	81 (100%)

Source: Primary data

Table 6 shows that the highest frequency of coffee consumption was in subjects with 3-4 cups a day accompanied by positive dyspepsia (38 (86.4%)), while subjects with negative dyspepsia numbered 6 (13.6%). Then in subjects who consumed 1-2 cups of coffee a day accompanied by positive dyspepsia numbered 2 (5.4%), while subjects with negative dyspepsia numbered 35 (94.6%).

The results of the Chi square test measurements regarding the relationship between the frequency of coffee consumption and the incidence of dyspepsia syndrome can be seen in table 7 below:

Table 7 Chi Square Test Results for the Relationship between Coffee Consumption and the Incidence of Dyspepsia Syndrome

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-square	52,701	1	<.001

Source: Statistical test results

Based on the results of the Pearson Chi-Square test, a p value of <0.001 was obtained, which means that H₀ is rejected, so it can be concluded that there is a significant relationship between the frequency of coffee consumption and the incidence of dyspepsia syndrome.

3.7. The Relationship between Regularity of Diet and the Incidence of Dyspepsia Syndrome

Regularity of eating patterns is categorized into four categories: eating >3 times a day, eating once a day, eating twice a day, and eating three times a day. The results of the analysis of the relationship between regularity of eating patterns and the incidence of dyspepsia syndrome can be seen in Table 8 as follows:

Table 8 Cross-Table of Dyspepsia Syndrome Incidence Based on Regularity of Diet in Students of the 2024, 2023, and 2022 Classes of the Faculty of Medicine, Wijaya Kusuma University, Surabaya

Regularity Frequency Dietary habit	Dyspepsia Category		Total %
	Positive %	Negative %	
>3 times/day	0 (0.0%)	7 (100%)	7 (100%)
1 time/day	7 (77.8%)	2 (22.2%)	9 (100%)
2 times/day	31 (77.5%)	9 (22.5%)	40(100%)
3 times/day	2 (8.0%)	23 (92.0%)	25(100%)
Total	40 (49.4%)	41 (50.6%)	81 (100%)

Source: Primary data

Table 8 shows that the frequency of regular eating patterns in subjects who eat twice a day with positive dyspepsia shows the greatest results, namely 31 (77.5%) subjects, compared to those who eat > 3 times a day.

The results of the Chi Square test measurements regarding the relationship between regular eating patterns and the incidence of dyspepsia syndrome can be seen in Table 9 below:

Table 9 Results of the Chi Square Test on the Relationship between Regularity of Eating Patterns and the Incidence of Dyspepsia Syndrome

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-square	39,511	3	<,001

Source: Statistical test results

The results of the Pearson Chi-Square test showed a χ^2 value of 39.511 with a degree of freedom (df) of 3 and a significance value of $p < 0.001$. This indicates a highly significant relationship between dietary patterns and the incidence of dyspepsia syndrome.

4. Discussion

4.1. Prevalence of Dyspepsia Syndrome

Research shows that dyspepsia syndrome is quite common among medical students, with a prevalence of 49.4% (positive), although slightly lower than among those without dyspepsia (50.6%). This incidence is thought to be related to academic stress, irregular eating patterns, and caffeine consumption (6)(7)(8).

4.2. Frequency of Coffee Consumption

The majority of college students consume 3–4 cups of coffee per day (54.3%), which can potentially cause dyspepsia symptoms. Caffeine is known to increase stomach acid production and trigger gastrointestinal irritation (9)

4.3. *-Coffee Consumption Time

The habit of consuming coffee at night (79%) can worsen digestive function, especially when combined with an irregular eating schedule (10).

4.4. Duration of Coffee Consumption

A coffee drinking habit of over three years (42%) indicates that coffee has become part of students' routines. Prolonged consumption without controlled dosage poses risks to the digestive and nervous systems (11)(12).

4.5. Regular Eating Patterns

The twice-daily eating pattern was the most prevalent (49.4%) among respondents. Low meal frequency increases the risk of dyspepsia due to unbalanced gastric acid production by digestive activity (13).

4.6. Bivariate Analysis

College students who consume 3–4 cups of coffee per day show a prevalence of dyspepsia of up to 86.4%. A pattern of eating twice a day also shows the highest prevalence of dyspepsia (77.5%), indicating that frequency of coffee consumption and eating irregularities are significantly associated with the incidence of dyspepsia (14)(15)(16)(17).

5. Conclusion

Based on the research results above, several main findings were obtained:

- The majority of students are accustomed to consuming 3-4 cups of coffee per day, with a total of 44 respondents (54.3%).
- The most common eating pattern is eating twice a day, experienced by 44 respondents (49.4%).
- A total of 40 students (49.4%) were identified as having dyspepsia syndrome.
- Statistical analysis showed a significant relationship between the level of coffee consumption and the incidence of dyspepsia syndrome ($p = 0.001$).
- Regularity of eating patterns was also shown to have a significant relationship with the emergence of dyspepsia syndrome ($p = 0.001$).

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Statement of informed consent

This study was approved by the Health Research Ethics Committee of Wijaya Kusuma University Surabaya (Approval No. 46/SLE/FK/UWKS/2025) on March 14, 2025. All respondents were informed about the objectives and procedures of the research, and their participation was entirely voluntary. Written informed consent was obtained from all participants prior to data collection.

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