

The Relationship Between Caffeine Intake And Gastritis Symptoms Among University Students

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Abstract

Gastritis is a condition characterised by inflammation of the gastric mucosa (stomach lining), marked by nausea, vomiting, weakness, and abdominal discomfort. The incidence of gastritis in Indonesia is relatively high, with a prevalence of 274,396 cases amongst a population of 238,452,952. This study aims to analyse the relationship between caffeine consumption and gastritis symptoms among university students. This is a quantitative study with a cross-sectional design. The population comprised all students at Teuku Umar University, and the sample was selected using time-based accidental sampling. Specifically, between March and April 2026, 308 respondents who met the inclusion criteria were recruited during the data collection period. Data were collected using a questionnaire covering respondent characteristics, caffeine consumption, and gastritis symptoms. Data analysis was conducted using univariate analysis to describe each variable and bivariate analysis with the chi-square test to assess relationships between variables. The results showed a significant association between caffeine consumption and gastritis symptoms (p -value = 0.008). This study concludes that there is a significant association between caffeine consumption and gastritis symptoms. Therefore, students are advised to limit the amount and frequency of their caffeine consumption as a preventive measure against gastritis.

Keywords: caffeine intake, gastritis, university students



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INTRODUCTION

Gastritis is an inflammatory condition affecting the gastric mucosa, defined based on histological findings of the gastric mucosa; it is associated with an inflammatory process occurring in the gastric lining epithelium and the presence of lesions on the gastric mucosa (Parida et al., 2024). This condition can cause various symptoms, such as upper abdominal discomfort, nausea, vomiting, and epigastric pain, which can interfere with daily activities. If left untreated, gastritis can impair gastric function and increase the risk of gastric cancer, which can be fatal (Septiana et al., 2025).

According to data from the World Health Organisation (WHO), the incidence of gastritis worldwide reached between 1.8 million and 2.1 million people annually in 2020, with 35% of cases in Canada, 31% in China, 29.5% in France, 22% in the UK, and Japan 14.5%, whilst there are approximately 583,635 (32.5%) cases of gastritis occurring annually in South-East Asia (Saparina & Sefrianti, 2020). Data from the Ministry of Health of the Republic of Indonesia for 2018 indicates that the incidence rate of gastritis in Indonesia was 40.8%. The incidence of gastritis in Indonesia is relatively high, with a prevalence of 274,396 cases amongst a population of 238,452,952 in Indonesia. This data also indicates that gastritis is one of the top 10 most common conditions in hospitals, with 33,580 cases (60.86%), and is more frequently suffered by women (Suwindri et al., 2021). The percentage of gastritis cases in several cities across Indonesia shows the highest incidence in Medan at 91.6%, followed by Jakarta at 50%, Palembang at 35.5%, Bandung at 32%, Denpasar at 46%, Surabaya at 31.2%, Pontianak at 31.2%, and Aceh at 31.7% (Lestari et al., 2025).

According to data from the Diskominsa Statistics Office (2023), the number of gastritis cases in West Aceh Regency during 2018–2022 fluctuated. In 2018, 559 cases were recorded, before rising significantly to 3,089 cases in 2019. Subsequently, the number of cases fell to 2,558 in 2020 and declined further to 2,384 cases in 2021. However, in 2022, there was a sharp increase to 8,731 cases, representing a substantial rise over the previous year (Sabul Hajijah et al., 2025). Based on the results of a preliminary survey of several students at Teuku Umar University, it was found that 17 students with high caffeine intake experienced symptoms of gastritis.

According to Ilham et al. (2019), if gastritis is not treated promptly, the condition can worsen and eventually lead to stomach acid causing sores or ulcers, which may even be accompanied by symptoms such as vomiting blood. In some cases, inappropriate management of gastritis has the potential to trigger serious complications, one of which is gastric cancer (Suryawati et al., 2023). Gastritis is often regarded as a trivial problem by the general public, yet it can be the start of a condition that may cause significant difficulties for the sufferer (Irianty et al., 2020).

According to Varentina et al. (2023), gastritis can affect people of all ages, from young people to the elderly. University students are among those at risk of developing gastritis. This is because university life is a period during which students engage in various academic activities, such as studying, completing assignments, and undertaking research practicals (Natari et al., 2025). Gastritis is a condition that can potentially affect anyone, regardless of age or demographic group, with a variety of triggers ranging from irregular eating habits, consumption of unhealthy food, an unhealthy lifestyle, high workloads, to the habit of consuming alcoholic beverages (Murti et al., 2025).

In addition to these factors, gastritis can also be caused by a habit of consuming foods or drinks containing caffeine. A caffeine habit refers to a person's tendency to consume caffeine-containing drinks or foods—such as coffee, tea, chocolate, and fizzy drinks—over the long term and continuously (Aisyah et al., 2024). Research conducted by Maidartati et al. (2021) indicates that there is a significant association between coffee consumption and the incidence of gastritis in adolescents (Maidartati et al., 2021). The caffeine content in drinks or food can accelerate stomach acid production. This causes gas production in the stomach to exceed normal levels, leading to bloating. Long-term, high-frequency consumption of caffeinated drinks—i.e., more than three cups per day—may increase the risk of elevated stomach acid levels, leading to irritation of the gastric mucosa (Tatu et al., 2025). Coffee is the most widely consumed

caffeinated drink in the world. According to data from the International Coffee Organisation (ICO), global coffee consumption in the 2020–2021 period reached 166.35 million 60-kg bags. This figure represents a 1.3 per cent increase compared with the previous period, which stood at 164.2 million 60-kg bags (Ardila et al., 2023).

The consumption of caffeinated drinks such as coffee, tea, and energy drinks is on the rise amongst university students, as they seek to improve their concentration and boost their energy levels whilst attending lectures. This habit is thought to increase the risk of developing symptoms of gastritis, a view supported by various studies that have found a link between caffeine consumption and the onset of gastritis. Given that gastritis is a common health problem amongst students and can disrupt their studies and reduce their quality of life, research is needed to analyse the relationship between caffeine consumption and symptoms of gastritis.

RESEARCH METHOD

Research Design

This study is a quantitative study with a cross-sectional design, in which data collection for both the dependent and independent variables was carried out simultaneously. The study was conducted at Teuku Umar University between March and April 2026.

Research Target/Subject

The study population comprised all 8,628 students at Teuku Umar University. The sample was selected using a non-probability sampling method with a time-based accidental sampling technique, namely a sampling technique involving respondents encountered by chance within a predetermined study period. The inclusion criteria for the study comprised active students at Teuku Umar University who owned a smartphone, had a Google account, had active internet access, and were willing to participate as respondents. Meanwhile, the exclusion criteria comprised individuals who were not active students at Teuku Umar University, were currently experiencing dysmenorrhoea, had a history of congenital stomach disease, or did not complete the questionnaire in full.

Research Procedure

The independent variable in this study was caffeine consumption, whilst the dependent variable was gastritis symptoms. Caffeine consumption was defined as the respondents' habits regarding the consumption of caffeinated foods and drinks over the past week. The variable was measured using a questionnaire based on the Food Frequency Questionnaire (FFQ) to obtain information on the types and quantities of caffeine consumed. The frequency of consumption of various caffeinated foods and drinks, such as coffee, tea, energy drinks, chocolate brownies, and chocolate biscuits, was assessed based on the number of portions or cups consumed over the past week. Subsequently, total caffeine intake was calculated in milligrams (mg) and categorised as low intake (≤ 150 mg) and high intake (> 150 mg) in accordance with the National Standardisation Agency's maximum limit for caffeine consumption—whether consumed directly or mixed into food or drink—of 150 mg/day (Dewi et al., 2024).

The gastritis symptom variable is defined as complaints related to gastric disorders experienced by respondents over the past week, including nausea, vomiting, epigastric pain, loss of appetite, weakness, and other symptoms (Febriana et al., 2022). This variable was measured using a gastritis symptom questionnaire designed based on the frequency of symptom occurrence, with the response options 'Yes' and 'No'. The data obtained were on an ordinal scale. They were subsequently categorised as 'no gastritis symptoms' if respondents

reported fewer than three characteristic or general symptoms, and 'gastritis symptoms' if they reported three or more characteristic or general symptoms in the past week. The establishment of these categorisation thresholds was based on the professional judgement of doctors consulted during the development of the research instrument.

Instruments and Data Collection Techniques

The instruments used in this study were questionnaires on caffeine consumption and gastritis symptoms. Prior to use, the instruments underwent validity and reliability testing with 30 students who had characteristics similar to those of the study respondents. Validity testing was carried out using Pearson's product-moment correlation, with a table r value of 0.361 at a 5% significance level. The test results showed that all questionnaire items had calculated r values exceeding the table r value and were therefore deemed valid. Furthermore, the reliability test using Cronbach's alpha yielded 0.744 for the variable 'amount of caffeine consumption' and 0.789 for 'gastritis symptoms'. All Cronbach's alpha values were above 0.60; consequently, the instrument was deemed reliable and suitable for use in the study.

Data analysis technique

The data collected were then analysed using SPSS software. The analysis carried out included univariate analysis to determine the characteristics of each variable and bivariate analysis using the chi-square test to determine the relationship between the dependent and independent variables, with a significance level of <0.05 .

RESULTS

Univariate Analysis

Table 1. Frequency Distribution of Respondent Characteristics, Caffeine Intake, and Gastritis Symptoms

Characteristics	n	%
Sex		
Male	75	24.4
Female	233	75.6
Total	308	100
Age		
<21	185	60.1
≥21	123	39.9
Total	308	100
Faculty		
Faculty of Health Science	135	43.8
Faculty of Engineering	57	18.5
Faculty of Social Science and Political Science	45	14.6
Faculty of Economics and Business	35	11.4
Faculty of Agriculture	20	6.5
Faculty of Fisheries and Marine Science	16	5.2
Total	308	100
Caffeine Intake		
Low	177	57.5
High	131	42.5
Total	308	100
Gastritis Symptoms		
Not Experiencing	201	65.3
Experiencing	107	34.7
Total	308	100

Source: Primary data, 2026

Based on the results of the univariate analysis in Table 1, it can be seen that the majority of respondents in this study were female, totalling 233 (75.6%), whilst males numbered 75

(24.4%). In terms of age, the majority of respondents were in the <21 years age group, totalling 185 (60.1%). In terms of faculty, the largest number of respondents came from the Faculty of Health Sciences, totalling 135 people (43.8%). Regarding caffeine consumption, it was found that the majority of respondents did not consume caffeine, totalling 177 people (57.5%). This indicates that many respondents do not have the habit of consuming caffeine. As for the variable relating to gastritis symptoms, the majority of respondents did not experience any symptoms of gastritis, totalling 201 respondents (65.3%). This indicates that the majority of respondents were not suffering from gastritis compared to those who were.

Bivariate Analysis

Table 2. The Relationship between Caffeine Intake and Gastritis Symptoms

Caffeine Intake	Gastritis Symptoms		Total	p-value	OR
	Not Experiencing	Experiencing			
Low	127	50	177	0.008	1.956
High	74	57	131		
Total	201	107	308		

Source: Primary data, 2026

Based on the results of the chi-square test, a p-value of 0.008 (p-value < 0.05) indicates that there is a significant association between caffeine consumption and symptoms of gastritis, with an Odds Ratio (OR) of 1.956, suggesting that respondents with high caffeine consumption have a 1.956 times greater risk of experiencing symptoms of gastritis compared to those with low caffeine consumption.

DISCUSSION

Caffeine can stimulate increased gastric acid secretion, thereby potentially raising stomach acidity levels and irritating the gastric mucosa, particularly in individuals with sensitive stomachs. Furthermore, caffeine consumption can also increase gas formation in the digestive tract, which may cause discomfort, such as bloating (Ratukore et al., 2022). Average caffeine consumption of ≥ 3 cups per day prior to physical activity—whether in the morning, afternoon, or evening—can increase gastric acid production, leading to gastritis (Isnani et al., 2025).

Based on the results of the bivariate analysis in this study, there was a significant association between caffeine consumption and gastritis symptoms (p = 0.008; p < 0.05). The odds ratio (OR) of 1.956 indicates that respondents with high caffeine consumption had a 1.956 times greater risk of experiencing gastritis symptoms compared to those with low caffeine consumption. In this study, the majority of respondents did not have high caffeine intake; low caffeine consumption accounted for 57.5%, while high caffeine consumption accounted for 42.5%. Nevertheless, some respondents reported caffeine intake of up to 640 mg per day, which exceeds the recommended safe daily limit and may be associated with an increased likelihood of gastritis symptoms.

The findings of this study are consistent with research conducted by Badriansyah et al. (2025), which found a significant association between coffee (caffeine) consumption and the incidence of gastritis in adolescents. This may occur because caffeine in coffee acts as a stimulant on the central nervous system and can increase gastric acid production when consumed in excess (Badriansyah et al., 2025). These findings are also consistent with previous research indicating a significant association between coffee (caffeine) consumption patterns and gastritis symptoms in adolescents; respondents with frequent coffee consumption had a twofold higher risk of gastritis symptoms than those with infrequent consumption. This is because

caffeine in coffee can increase gastric acid production by stimulating gastrin secretion. This can be a major contributing factor to gastritis (Azmi & Alnur, 2024).

However, the findings of this study are not consistent with those of a study that indicates no significant association between coffee (caffeine) consumption and gastritis among university students. Low levels of coffee (caffeine) consumption do not affect the incidence of gastritis, as gastritis can be caused by several factors, such as diet and stress (Sabiqah, 2023). Research conducted by Rosyidi & Utami (2023) also showed the same result, namely that there is no significant association between coffee (caffeine) consumption and the incidence of gastritis in adolescents. This is because even when consumed in moderation and infrequently, coffee (caffeine) can help minimise the onset of gastritis symptoms (Rosyidi & Utami, 2023).

Researchers hypothesise that the link between caffeine consumption and symptoms of gastritis in university students may arise from a physiological mechanism whereby caffeine stimulates gastric acid secretion, thereby increasing gastric acidity and potentially irritating the gastric mucosa, particularly when consumed in excessive amounts or on an empty stomach. Furthermore, the habit of university students consuming caffeinated drinks to support their academic activities is often accompanied by irregular eating patterns, which may increase the risk of developing gastritis symptoms. Excessive caffeine consumption can stimulate the central nervous system, leading to increased gastric activity and secretion of the hormones gastrin and pepsin. Gastrin, a hormone produced by the stomach, plays a role in stimulating the secretion of highly acidic gastric juice in the gastric fundus. This increased gastric acid production can cause irritation and inflammation of the gastric mucosa, a condition known as gastritis (Suryawati et al., 2023).

This study has several limitations, namely that it employed a cross-sectional design, which can only describe the association between caffeine consumption and gastritis symptoms at the time of data collection; consequently, it cannot establish a causal relationship. Furthermore, data were collected using a self-report questionnaire; consequently, the study results may be subject to information bias due to limitations in respondents' memory or to subjectivity in their responses. Additionally, this study did not account for several other factors that may influence the onset of gastritis symptoms, such as dietary patterns, stress levels, NSAID use, bacterial infections, smoking habits, and sleep quality.

CONCLUSION

Based on the research findings, it can be concluded that the majority of respondents do not consume high caffeine intake and do not experience gastritis symptoms. The results of the bivariate analysis indicate a significant association between caffeine consumption habits and gastritis symptoms among students at Teuku Umar University. Based on the findings of this study, it is recommended that university students be educated on gastritis prevention at the university level, specifically regarding limiting normal caffeine intake, as well as on the importance of maintaining a healthy diet and lifestyle, to minimise the onset of gastritis symptoms. Future researchers are advised to investigate other factors that may influence gastritis symptoms.

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AUTHOR CONTRIBUTIONS

Conceptualization, M.D.I.N. and F.F.S; Methodology, M.D.I.N.; Software, M.D.I.N.; Validation, M.D.I.N., F.F.S., and P.D.; Formal Analysis, M.D.I.N.; Investigation, M.D.I.N.; Resources, M.D.I.N., F.F.S., P.D.; Data Curation, M.D.I.N., F.F.S.; Writing – Original Draft Preparation, M.D.I.N., F.F.S., and P.D.; Writing – Review & Editing, M.D.I.N; Visualization, M.D.I.N; Supervision, F.F.S. and P.D.; Project Administration, F.F.S. and P.D.; Funding Acquisition, F.F.S.

CONFLICTS OF INTEREST

The authors declare there is no conflict of interest. The research was conducted independently without any commercial, financial, or personal conflict that could have influenced the study design, data collection, data analysis, interpretation of the results, manuscript preparation, or the decision to publish the findings.

DECLARATION OF ARTIFICIAL INTELLIGENCE USE

This study used artificial intelligence (AI) tools and methodologies in the following capacities:

1. Manuscript writing support: AI-based language models, such as DeepL and Grammarly, were employed to refine the manuscript (improving grammar, sentence structure, and readability).

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