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Risk Factors for Gastroesophageal Reflux Disease among Medical Study Program Students at Universitas Jambi

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Abstract

Gastroesophageal Reflux Disease (GERD) is a non-communicable disease that can reduce students' quality of life. Risk factors include stress, diet, obesity, smoking, and coffee consumption. **Purpose:** This study aims to identify the most significant factors related to GERD among students of the Medical Study Program at Universitas Jambi in 2024. **Methods:** Using a cross-sectional quantitative design, 107 active students from the 2017-2023 cohorts were selected through stratified random sampling. Data were collected using GERD questionnaires, SRQ-20 (stress), diet, smoking, coffee consumption questionnaires, and anthropometric measurements. Data analysis was conducted using Chi-Square and Cox regression with SPSS. **Results:** the prevalence of GERD was 29.90%, predominantly among female students (68.20%). Significant risk factors for GERD include stress (PR=11.750), diet (PR=3.294), and coffee consumption (PR=3.549). Obesity (PR=1.020) and smoking (PR=1.553) were not significant. Stress was the most dominant factor contributing to GERD (PR=9.377; 95% CI: 2.226-39.496). **Conclusion:** The study highlights the need for health education, stress management, and lifestyle modifications, including dietary adjustments and reduced coffee consumption, to prevent GERD among students.

Introduction

Indonesia faces two main challenges in health development: high level of infectious diseases and increasing non-communicable diseases (NCDs) due to urbanization, modernization and globalization [1]. One of the most common NCDs is Gastroesophageal Reflux Disease (GERD), a chronic digestive disorder that causes heartburn, acid regurgitation and pain when swallowing. If left untreated, GERD can lead to serious complications such as Barrett's esophagus and esophageal cancer [2-5]. Globally, the prevalence of GERD continues to increase, with 783,95 million cases in 2019 [6]. In Southeast Asia, Singapore recorded a prevalences of 10,50%, while in Indonesia the GERD rate reached 22,80% in Jakarta in 2016 [4,7,8].



Among medical students, the prevalence of GERD is quite high due to study stress and poor lifestyle [9]. Research shows that the prevalence of GERD among medical students in Indonesia reaches 22,40%. Risk factors include poor diet, excessive consumption of tea and coffee, and hasty eating habits. Stress and unhealthy lifestyles worsen GERD symptoms, especially in final year students. The impact extends to quality of life and productivity, as well as affecting physical, emotional and social health [10, 11].

An initial survey of students in Jambi Province in 2024 revealed that 53% of medical students surveyed experienced GERD, with main symptoms such as heartburn, heartburn and regurgitation. Bad eating habits such as rarely eating habits, such as rarely eating eating breakfast, eating after 9 pm, and consuming spicy and fatty foods, also contribute. With the high prevalence of GERD, interventions to control risk factors are needed, especially among college students. It is hoped that the results of this research can help design GERD prevention policies in Jambi Province.

The prevalence of GERD in Indonesia continues to increase, with the rate of gastroesophageal reflux disease detected through endoscopic examination in Jakarta reaching 22.80%. The National Health Target in the 2020-2024 RPJMN is to reduce the prevalence of Non-Communicable Diseases (NCDs) including GERD.

Without appropriate intervention, GERD will increasingly impact the quality of life of individuals, increase the economic burden and severe disease, and cause serious complications, especially in students who are vulnerable due to irregular eating patterns, consumption of spicy and fatty foods, academic stress, or sedentary lifestyle. Other unhealthy conditions that affect GERD. Therefore, researchers want to know "What are the Risk Factors Associated with Gastroesophageal Reflux Disease (GERD) in Medical Study Program Students, Faculty of Medicine and Health Sciences, Jambi University

Methods

Study Design

This type of research was descriptive analytical observational with a cross sectional design. This research was conducted at the faculty of Medicine and Health Sciences, Jambi University on Medical Study program students from June-August 2024.

Population and Sample

The population of this study was all 485 students of the FKIK Jambi University for year 2017-2023. The subjects selected were Jambi University Medical Study Program student who were still actively studying and willing to be subjects, and had or had not experienced GERD based on the results of the GERD questionnaire assessment, while students who had a history of Esophagogastroduodenoscopy (EGD) and a history of disease with a diagnosis of Non-Erosive Reflux Disease (NERD), dyspepsia, gastritis, hepatitis, or pancreatitis, and students from the class of 2017 with a proportion of 100%. The study determined a minimum sample size of 130 subjects using a formula ($P=0.365\%$, $\alpha=5\%$, $\beta=80\%$, $Z\alpha=1.96$, $Z\beta=0.80$). Stratified random sampling was employed to ensure proportional representation from each class.

Data Collect

Data collection involved questionnaires covering eating patterns, GERD symptoms, stress levels, smoking habits, coffee consumption, body weight, and height. Eating patterns were evaluated using a modified Diet History Questionnaire (DHQ), along with dietary behavior

and dietary practice questionnaires. These tools assessed four domains: eating regularity, meal frequency, food types, and portions, with scores ranging from 0 to 78. A score of ≥ 47 was considered indicative of a good diet, while < 47 indicated a poor diet. GERD was diagnosed using the GERD-Q questionnaire, with scores ranging from 0 to 18; a score ≥ 8 indicated GERD.

Stress levels were measured using the SRQ-20 questionnaire, where more than 6 “Yes” responses classified a subject as experiencing stress. Smoking habits were assessed through a smoking questionnaire, while coffee consumption patterns were measured via a separate questionnaire. Body weight (BB) and height (TB) were recorded as part of the study’s physical assessments. The total number of students who became respondents was 107 after selection for inclusion and exclusion.

Data Analysis

Data analysis was conducted using univariate, bivariate, and multivariate methods. Chi-Square and Cox Regression analysis tests were used through SPSS software to examine relationships between the different variables.

Results

The results of research regarding the general description of frequency distribution based on the characteristics of Jambi University Medicine Study Program students in 2024, active year 2023/2024 (n=107 students), obtained results students aged over 20 years are 50.50%, while under 20 years are 49.50%. Respondents from the class of 2018 were 2.80%, 2019 were 3.70%, 2020 were 20.60%, 2021 were 26.20%, and the classes of 2022 and 2023 were 23.40% each. Female students dominate at 68.20%, while males make up 31.80%. As many as 56.10% live alone (boarding/rented) and 43.90% live with parents/guardians. A sample of table is presented in Table 1.

Table 1. Characteristics of Respondents

Variable	Category	n	%
Age	≤ 20 Years	53	49,50%
	> 20 Years	54	50,50%
Class	2018	3	2,80%
	2019	4	3,70%
	2020	22	20,60%
	2021	28	26,20%
	2022	25	23,40%
	2023	25	23,40%
Gender	Male	34	31,80%
	Female	73	68,20%
Current residence	Living Alone	60	43,90%
	With parents	47	56,10%

Source: Processed primary data, 2024.

The results of the proportion of characteristics of risk factors among students in the FKIK Jambi University Medicine study program in 2024 show that students with GERD (29.90%), who experience stress are as many as (56.10%), students with poor eating patterns (47.70%), students who suffer from obesity are (15.90%), students who smoke are (13.10%) and those who consume coffee are (66.40%). A sample of table is presented in Table 2.

Table 2. Table of Characteristics based on Risk Factors

Variable	n	%
GERD		
Suffering	32	29,90%
Not Suffering	75	70,10%
Stress		
Experiencing	60	56,10%
Not Experiencing	47	43,90%
Diet		
Bad	51	47,70%
Good	56	52,30%
Obesity		
Obesity	17	15,90%
Non-Obesity	90	84,10%
Smoking		
Yes	14	13,10%
No	93	86,90%
Cofee Consumption		
Yes	71	66,40%
No	36	33,60%

Source: Processed primary data, 2024.

The data analysis of students from the Medical Study Program at the Faculty of Medicine and Health Sciences, Universitas Jambi, in 2024 shows that most students experience stress. The most common symptoms include fatigue (57.90%), digestive discomfort (52.30%), sleep disturbance (51.40%), persistent tiredness (49.50%), frequent headaches (49.50%), feelings of anxiety and tension (45.20%), Difficulty concentrating (38.30%), digestive disorders (35.50%), frequent crying (32.70%), loss of appetite (32.70%), decreased interest in life (30.80%), difficulty enjoying daily activities (29.90%), indecisiveness (29%), and feelings of fear (28.30%). Additionally, students experience trembling hands (28,00%), feelings of unhappiness (24.20%), worthlessness (19.60%), trouble at work (13.10%), suicidal thoughts (8.40%), and a lack of purpose in life (7.50%).

The analysis also indicates that most students have poor eating habits. The primary issues are frequent delays in lunch until 5 PM (95.20%), rarely having lunch (95.20%), and long intervals between meals (90.30%). They tend to eat dinner late at 10 PM (87.10%). Additionally, 66.10% frequently drink soda, which causes bloating, 63.90% consume 2 portions of carbohydrates in one meal, and 62.90% regularly snack after meals. Other habits include eating fast food (61.30%), acidic foods (59.70%), and lying down after large meals (53.20%).

Regarding coffee consumption, 67% of students drink 1-2 cups daily, with most consuming it in the afternoon or evening (52%). Instant coffee is the most popular (41%). Notably, 46% of students do not feel bloated after drinking coffee, and 51% do not experience nausea.

The analysis also highlights smoking habits, with 9.30% of students using e-cigarettes. Additionally, 5.60% did not smoke daily in the past month, while 7.50% smoked indoors, and 8.40% smoked inside their homes.

Table 3. Summary of Stress, Dietary Habits, Coffee Consumption, and Smoking Behavior among Medical Students at FKIK Universitas Jambi, 2024

Variable	Key Indicators	Percentage (%)
Stress	Fatigue	57.90
	Digestive discomfort	52.30
	Sleep disturbance	51.40
	Presistent tiredness	49.50
	Frequent Headache	49.50
	Anxiety and tension	45.20
	Difficulty concentrating	38.30
	Digestive disorders	35.50
	Frequent crying	32.70
	Loss of appetite	32.70
	Decreased interest in life	30.80
	Difficulty enjoying daily activities	29.90
	Loss of interest in life	30.80
	Indecisiveness	29.00
	Feelings of fear	29.00
	Suicidal thoughts	8.40
	Experience trembling hands	28.00
	Feelings of unhappiness	24.20
	Worthlessness	19.60
	Trouble at work	13.10
	Suicidal thoughts	8.40
Diet	lack of purpose in life	7.50
	Delayed or skipped lunch	95.20
	Rarely having lunch	95.20
	Eat dinner late at 10 PM	87.10
	Long intervals between meals	90.30
	Late dinner	87.10
	Frequent consumption of processed foods	87.10
	Soda consumption	66.10
Coffee consumption	Fast food consumption	61.30
	Drinking 1–2 cups/day	67.00
	Consumption in the afternoon/evening	52.00
Smoking	Instant coffee	41.00
	Use of e-cigarettes	9.30
	Smoking indoors	8.40

Note: Data are presented as percentages. Respondents may report more than one symptom or behavior.

Based on research on students of the Medical Study Program at FKIK Universitas Jambi in 2024, it was found that students experiencing stress had a higher incidence of GERD (50%) compared to those who were not stressed (4.30%). The Chi-square test results showed a p-value of $0.0 < \alpha (0.05)$, indicating a significant relationship between stress and the occurrence of GERD, with stressed students being 11.7 times more likely to develop GERD.

For dietary habits, students with poor eating habits had a higher incidence of GERD (47.10%) compared to those with healthy eating habits (14.30%). The test results showed a p-value of $0.0 < \alpha (0.05)$, with students who have poor eating habits being 3.2 times more likely to develop GERD. Regarding obesity, the proportion of obese students with GERD was slightly lower (29.40%) compared to non-obese students (30%). The Chi-square test showed a p-value of $1 > \alpha (0.05)$, indicating no significant relationship obesity and GERD, with a PR of 1.020. Students who smoked had a lower incidence of GERD (42.90%) compared to non-smokers (28%). A p-value of $0.41 > \alpha (0.05)$ indicated no significant relationship between smoking and GERD, with a PR of 1.553. For coffee consumption, students who drank coffee

had a higher incidence of GERD (39.40%) compared to those who did not drink coffee (11.10%). The Chi-square test showed a p-value of $0.0 < \alpha$ (0.05), indicating a significant relationship between coffee consumption and GERD, with coffee drinkers being 3.5 times more likely to develop GERD. A sample of table is presented in Table 4.

Table 4. Bivariat Table of Risk Factors for GERD

Variabel	Gastroesophageal Reflux Disease (GERD)						PR (95% CI)	p-Value ^a
	Suffering		Not Suffering		Total			
	n	%	n	%	n	%		
Stress							11,750	0,000*
Stress	30	50	30	50	60	100	(2,958-46,682)	
Not stress	2	4,3	45	95,7	47	100		
Diet							3,294	0,000*
Bad	24	47,1	27	52,9	51	100	(1,628-6,663)	
Good	8	14,3	48	85,7	56	100		
Obesity							1,020	1,000
Obesity	5	29,4	12	70,6	17	100	(0,458-2,273)	
Non Obesity	27	30,0	63	70,0	90	100		
Smoking							1,553	0,411
Yes	6	42,9	8	57,1	14	100	(0,771-3,048)	
No	26	28	67	72	93	100		
Coffee							3,549	0,005*
Consumption	28	39,4	43	60,6	71	100	(1,348-9,343)	
Yes	4	11,1	32	88,9	36	100		
No								

^aAnalyzed using Chi Square

*Statistically significant at $p=0.05$

Based on the final multivariate Cox regression analysis, stress and diet were significantly associated with the incidence of GRED. Stress showed a strong association with GRED, with a PR of 9.377 and a p-value of 0.000. This indicates that individuals experiencing stress had about 9 times higher risk of developing GRED compared to those without stress, after controlling for other variables.

Diet was also significantly associated with GRED, with a PR of 2.493 and a p-value of 0.027. This means that individuals with an unhealthy diet had approximately 2.5 times higher risk of developing GRED compared to those with a healthy diet. In contrast, coffee consumption was not significantly associated with GRED, as shown by a p-value of 0.156 and a 95% confidence interval that includes 1.

The omnibus test ($p = 0.000$) indicates that the overall regression model is statistically significant.

Table 5. Final Multivariate Cox Regression Model Table of GRED Incident

Variable	B	PR	95%CI	p-value ^a	p-value (Omnibus)
Stress	2,238	9,377	2,226-39,496	0,000*	
Diet	1,913	2,493	1,112-5,587	0,027*	0,000
Coffe Consumption	0,763	2,144	0,743-6,182	0,156	

^aAnalyzed using Cox Regression

*Statistically significant at $p=0.05$

Discussion

In this study, 68.20% of respondents were female, reflecting the predominance of women in the sample. This is consistent with the study by Radjainin et al. (2019), which showed that

women are more prone to GERD than men due to the influence of estrogen and progesterone hormones that affect the relaxation of digestive muscles [12]. The data showed that 29.90% of respondents had GERD, a result consistent with a study at Universitas Baiturrahmah, where the prevalence of GERD among medical students reached 16.80% [13], as well as a study in India reporting 25% prevalence from 600 respondents [14]. Another study at Syiah Kuala University's Faculty of Medicine (2020) recorded a GERD prevalence of 27.60% [7], while Hemdi et al. (2022) reported a rate of 31.80%. This consistency may be due to the use of the same method, the GERD-Q questionnaire [15].

A total of 43.90% of students experienced stress, which was significantly associated with GERD incidence ($p=0.000$). The study by Mile et al. (2020) also found that 66.70% of GERD sufferers experienced stress, indicating that stress is a major factor in triggering increased stomach acid production [16]. These results align with a study at Universitas Muhammadiyah Manado, which noted high stress levels among GERD sufferers [16], as well as studies by Prasetyo (2022) and Srianti (2015), which showed a significant relationship between stress and stomach acid increase ($p=0.007$). Stress, through cortisol production, reduces essential minerals and B vitamins important for immune function, thus affecting digestive health and triggering GERD [4,17].

About 24.30% of students had poor eating habits, and the analysis results showed a significant relationship between eating habits and GERD incidence ($p=0.000$). This is in line with the study by Mile et al. (2020), which found that 77.80% of respondents with poor eating habits suffered from GERD. Factors such as the consumption of spicy and instant foods and irregular eating habits have been shown to contribute to GERD [4]. The study by Ajjah et al. (2020) also showed a relationship between fast food consumption and GERD ($p=0.01$) [7]. Another study in Korea in 2011 noted that the consumption of spicy food (OR 1.09) and carbonated drinks (OR 1.69) increased the risk of GERD [18].

Around 65.40% of students regularly consumed coffee, and the analysis results showed a significant relationship between coffee consumption and GERD ($p=0.004$). The study by Hartoyo et al. (2022) found similar results, where coffee consumption was strongly associated with an increased incidence of GERD ($p=0.006$) [19]. Iswan Ramdhana at Universitas Syiah Kuala also reported the same findings ($p=0.000$). Caffeine in coffee can lower Lower Esophageal Sphincter (LES) pressure and increase gastric acid secretion, leading to GERD [20]. The study by Thomas et al. showed that caffeine can stimulate G cells, increasing stomach acid production and triggering GERD [21].

Research Limitation

The limitation of this research is that in the data collection process, there were 23 people (17.60%) who refused to be interviewed, because they were out of town/not in Jambi so that there were 107 respondents who had met the inclusion and exclusion criteria, so that there may have been selection bias as 23 (17.60%) refused. Furthermore, in research it is possible that variations in chance will arise because the confidence interval (CI) range is too wide in the comparison results, namely 95% CI: 2.958-46.682) so that it can reduce confidence in the research results. Furthermore, there is information bias due to attempts to cover up real information.

Conclusion

Based on the findings of the study, several conclusions can be drawn regarding the factors associated with GERD among students of the Medical Study Program at FKIK Jambi University. The research highlights that stress plays a significant role as the dominant factor contributing to GERD, with other factors such as diet and coffee consumption also showing meaningful associations. Meanwhile, variables such as obesity and smoking habits do not appear to have a substantial relationship with GERD incidence. These insights underscore the importance of managing stress and maintaining a healthy lifestyle to reduce the risk of GERD among students.

Ethics approval

The ethical approval of this research was issued by the Faculty of Public Health, University of Jambi.

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