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FACTORS ASSOCIATED WITH THE OCCURRENCE OF GASTROESOPHAGEAL REFLUX DISEASE (GERD) IN STUDENTS

Faktor Yang Berhubungan Terhadap Kejadian Gastroesophageal Reflux Disease (GERD) Pada Mahasiswa

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ABSTRACT

Background: Gastroesophageal Reflux Disease (GERD) cannot be left without action because it can cause severe stomach irritation in the long term, leading to stomach ulcers and infection. The prevalence of GERD among students in Indonesia is reflected in several studies. **Purpose:** This study aims to analyze factors related to the incidence of Gastroesophageal Reflux Disease in students. **Methods:** This type of research is an analytical survey research with a case-control research design. The population in this study were students of Universitas Prima Indonesia class of 2021, public health study program and information systems study program totaling 1,473 students, while the sample in this study was part of the student population divided into case and control groups. Furthermore, data analysis was carried out using the Chi-square test to determine the description and relationship of risk factors with the incidence of GERD. **Results:** The result showed that the eating habits (p= 0.00; OR = 19.12; 95% CI = 6.37-57.36), coffee consumption (p = 0.01; OR = 4.93; 95% CI = 1.98-12.26), stress level (p = 0.01; OR = 4.52; 95% CI = 1.95-10.50), and body mass index (p = 0.00; OR = 5.63; 95% CI = 2.36-13.42) has a significant relationship with the incidence of GERD in students. **Conclusion:** Reducing the consumption of ready-to-eat food and reducing the lifestyle of modern society which consumes excessive coffee and doing positive things to maintain stress levels are very important to increase public awareness in order to minimize the risk of GERD.

ABSTRAK

Latar Belakang: Penyakit Gastroesophageal Reflux Disease (GERD) tidak dapat dibiarkan begitu saja tanpa tindakan karena dapat menyebabkan iritasi

lambung yang parah dalam jangka panjang, sehingga dapat menyebabkan tukak lambung dan infeksi. Prevalensi GERD pada pelajar di Indonesia tercermin dalam beberapa penelitian. ***Tujuan:*** *Penelitian ini bertujuan untuk menganalisis faktor-faktor yang berhubungan Jenis penelitian ini adalah penelitian survei analitik dengan rancangan penelitian kasus-kontrol. Populasi dalam penelitian ini adalah mahasiswa Universitas Prima Indonesia angkatan 2021 program studi kesehatan masyarakat dan program studi sistem informasi yang berjumlah 1.473 mahasiswa, sedangkan sampel dalam penelitian ini adalah sebagian dari populasi mahasiswa yang dibagi menjadi kelompok kasus dan kontrol. Selanjutnya dilakukan analisis data dengan menggunakan uji Chi-square untuk mengetahui gambaran dan hubungan faktor risiko dengan kejadian GERD.* ***Hasil:*** *Hasil penelitian menunjukkan bahwa kebiasaan makan (p= 0,000; OR = 19,12; 95% CI = 6,376-57,369), konsumsi kopi (p = 0,001; OR = 4,93; 95% CI = 1,986-12,262), tingkat stres (p = 0,001; OR = 4,52; 95% CI = 1,952-10,508), dan indeks massa tubuh (p = 0,000; OR = 5,63; 95% CI = 2,362-13,420) memiliki hubungan yang signifikan dengan kejadian GERD pada mahasiswa.* ***Simpulan:*** *Mengurangi konsumsi makanan siap saji dan mengurangi gaya hidup masyarakat modern yang mengonsumsi kopi berlebihan serta melakukan hal-hal positif untuk menjaga tingkat stres sangat penting dilakukan untuk meningkatkan kewaspadaan masyarakat agar dapat meminimalkan risiko terjadinya GERD.*

INTRODUCTION

The awareness of the Indonesian people regarding the importance of maintaining stomach health is still very low, coupled with the lack of knowledge about Gastroesophageal Reflux Disease (GERD). This contributes to the high prevalence of the disease in the country. Therefore, proper treatment is needed, such as providing education to the community, including students throughout Indonesia. GERD is a chronic disease that is common in society, especially in adults. This disease is caused by the backflow of stomach contents into the esophagus, causing symptoms such as heartburn and regurgitation of stomach acid [1]. Heartburn is a burning sensation in the epigastrium (upper abdomen) that causes pain or stinging, while gastric acid regurgitation can cause a bitter taste on the tongue. The delay in filling the stomach with food is one of the causes of the disease [2].

The prevalence of GERD in students in Indonesia is reflected in several studies. Research conducted on Pattimura University students in 2023 showed that 15.20% of respondents experienced GERD [3]. Meanwhile, research conducted at Diponegoro University in 2024 recorded a higher figure, namely 30.05% of students experienced GERD [4]. GERD can cause severe stomach irritation in the long term, which causes stomach

ulcers and infections. Unconsidered risk factors, and inappropriate treatment measures also allow for the potential for fatal stomach cancer [5]. The pathophysiology of GERD is multifactorial, and some of the known mechanisms are the effects of lower esophageal sphincter tone, the presence of a hiatal hernia, protection of the esophageal mucosa from reflux, and poor esophageal motility [6].

According to the American College of Gastroenterology, GERD is a condition in which stomach acid flows backward and up into the esophagus, entering the esophagus or throat (oropharynx) and damaging the esophageal tissue [7]. The prevalence of GERD in Asia in 2014 was 2.50–7.80%, generally lower than in Western countries. However, recent data show that the prevalence is increasing. This is due to lifestyle changes that increase the risk of GERD, such as: smoking and obesity [8]. In Indonesia itself, the latest prevalence data of gastroesophageal reflux disease is not yet available. However, at RSUPN Cipto Mangunkusumo Jakarta, an increase in GERD cases of 22.80% was found among all patients undergoing endoscopy to detect signs of dyspepsia [1]. Handling cases is very necessary through education to the community by instilling a healthy lifestyle from an early age.

Several factors can increase the risk of GERD in college students. This study identified several factors, including being overweight or obese,

unhealthy diet, excessive coffee consumption, and high stress levels. The cause of GERD initially occurs from small, seemingly simple habits, such as eating late and having irregular eating habits, so that the stomach produces excess acid (9). Apart from that, according to research by Bharudin et al (10), many people skip breakfast and choose to eat snacks. Therefore, the food consumed every day should contain elements that produce energy, build cells, and regulate all kinds of processes in the body (11). Eating habits are influenced by several factors such as the environment, for example, the opening of restaurants and fast-food outlets so that teenagers want to try them. Friendship factors also influence bad eating habits, such as inviting friends to eat at restaurants and new places (12).

Another factor that can cause GERD is excessive coffee consumption. Coffee can stimulate gastrin and acid secretion. Caffeine can also affect esophageal function by causing a decrease in basal pressure on the lower esophageal sphincter (LES) and contraction of the distal esophagus so that stomach contents rise into the esophagus (13). Coffee also contains thousands of other chemicals such as carbohydrates, lipids, nitrogen compounds, vitamins, minerals, alkaloids and phenolic compounds (14). Coffee is known to consist of three types of processing, namely decaffeinated coffee or low caffeine coffee (1). Instant coffee is a mixture of coffee, sugar and milk which first goes through a granulation process and is then packaged in aluminum foil, cans or bottles, and, when served, does not leave any dregs (15), and there is pure coffee or coffee made without any mixture so as to maintain the natural taste of the coffee beans (16).

Factors that also influence GERD are body mass index (BMI), namely the higher the BMI, the greater the risk of GERD (r=0.93; p=0.01) (6). Another factor is stress levels. Stress can reduce body productivity and cause changes in the body's metabolic balance, especially the digestive system, thereby increasing the production of stomach acid which ultimately causes GERD to recur (17). It can be seen as a personal reaction to external events/demands, such as writing an exam, or an internal state of mind, such as worrying about an exam. Interestingly, stress tends to increase when unable to cope with unpleasant situations that one faces (18). Stress is divided into two groups, namely: mild and severe stress (19). Screening has been conducted to identify stress levels in students before they experience severe stress, using the Depression Anxiety Stress Scale questionnaire (20). This questionnaire does not have right or wrong answers, but rather asks respondents to provide answers that reflect their actual condition.

Coffee consumption and smoking are often found among students, where both of these are risk factors for GERD. This is in line with a 2019 study conducted at the University of Papua, which found that 23.90% of medical students smoked (17). In another study conducted at Hang Tuah University, Surabaya in 2019, 55 students were found to consume coffee out of 86 students who were respondents in the study (13). GERD can also be experienced by people who are physically and mentally exhausted, resulting in stress that can increase stomach acid production. This can be proven in a study conducted in the Ranomut Manado Health Center Work Area in 2020, where 66.70% of respondents experienced stress for various reasons (17). This research aims to determine the factors that have a very dominant influence on the incidence of GERD.

METHODS

This study is an observational analytical study with quantitative methods. The research design used is case control. In this study, the sample consists of a portion of the student population. The sample was selected using a simple random sampling technique with the Lemeshow formula, which resulted in a total of 44 respondents. This study used a sample ratio between the case and control groups, which was 44:44. To anticipate the possibility of sample dropouts, the number of samples was increased to 100 respondents, which were divided into 50 respondents in the case group and 50 respondents in the control group. This research was conducted in June 2024 at the Prima Indonesia University.

The sample population consists of two study programs, namely the public health study program and the information systems study program and are students who are still actively studying in the 2021 intake, totaling 1,473 students. The inclusion criteria in this study include active students registered at Universitas Prima Indonesia, especially in the Public Health and Information Systems study programs, who are willing to provide consent to participate in the study, and have or do not have a history of GERD. In addition, exclusion criteria are students who are taking certain medications that can interfere with research results, and students who are inactive or on leave from study. The dependent variable in this study was the incidence of Gastroesophageal Reflux Disease,

while the independent variables were eating habits, coffee consumption, stress levels and body mass index.

Direct data collection was carried out by giving questionnaires to students, namely the GERD questionnaire, diet questionnaire, coffee consumption, stress levels, and measurement of student body mass index. The GERD questionnaire consists of six questions, where the questionnaire asks the respondent to recall what was felt in the last seven days. The answer choices are day 0, day 1, day 2-3, and day 4-7 and are scored as points 0, 1, 2, and 3, with the result that if the GERD-Q point <7 then the respondent is likely not experiencing GERD, while if the points are 8-18 (11) then the respondent is likely experiencing GERD. The dietary pattern variable questionnaire contains 21 questions, the coffee consumption variable questionnaire contains six questions, the stress level variable questionnaire contains 42 statements, and the body mass index variable questionnaire is completed by respondents by filling in their weight and height after which a calculation is carried out using the BMI calculation formula with the results Obese if BMI ≥ 25.0 kgm², Normal if BMI 18.5–25.0 kg/m², Thin if BMI ≤ 18.5 kg/m²(20) then divided again into two answer categories, namely normal BMI and abnormal BMI. Before filling out the questionnaire, the sample was given a consent form to state their willingness to participate in this study. All respondent answers will be recorded in the survey and rechecked if there are any errors.

Data analysis began by calculating the frequency distribution of demographic data of cases (GERD) and controls (non-GERD) (gender, age, study program, place of residence, and routine activities). Data from this study were analyzed descriptively to determine the frequency distribution of eating patterns, coffee consumption, stress levels, and body mass index. All results are presented in percentage and tabular form. After that, the researchers conducted a bivariate analysis to determine the effect of diet, coffee consumption, stress levels, body mass index on the incidence of GERD. Multivariate analysis using binary logistic regression test was performed to determine the dominant model or variables that influence the incidence of GERD in students with the help of SPSS application. This study has received ethical approval from the Health Research Ethics Commission of Universitas Prima Indonesia with number: 013/KEPK/UNPRI/VI/2024.

RESULTS

Based on Table 1, it shows that the male gender of the research subjects in the case group was 11 people (22%) and the control group was seven people (14%), while the female gender in the case group was 39 people (78%) and the control group was 43 people (86%). Based on the characteristics of the age of respondents with the age of 20 years in the case group as many as seven people (14%) and controls as many as four people (8%); respondents with the age of 21 years in the case group as many as 35 people (70%) and controls as many as 36 people (72%); respondents with the age of 22 years in the case group as many as six people (12%) and controls as many as nine people (18%); respondents with the age of 23 years in the case group as many as one person (2%) but in the control group there were none; respondents with the age of 24 years in the case group as many as one person (2%) and in the control group as many as one person (2%). Based on the characteristics of the study program of respondents with a public health study program in the case group, there were 38 people (76%) and controls were 43 people (86%).

Meanwhile, the information system study program in the case group was 12 people (24%) and the control group was seven people (14%). Based on the characteristics of the residence, respondents who lived in boarding houses/contracts in the case group were 23 people (46%) and the control group 29 people (58%), while respondents who lived with their parents in the case group were 27 people (54%) and the control group 21 people (42%). Based on the characteristics of the activities or routines that respondents are currently carrying out, respondents with only lecture activities in the case group were 40 people (80%) and controls were 40 people (80%). Meanwhile, respondents with lecture activities while working in the cases group of 10 people (20%) and control group also as many as 10 people (20%).

Table 2 shows that diet is significant for the incidence of GERD in students (p=0.00; OR= 19.12 CI95% (6.37 – 57.36). Students with poor diet are 19.1 times more likely to suffer from GERD compared to those with good diet. Furthermore, the coffee consumption variable shows that coffee consumption is significant for the incidence of GERD in students (p=0.01; OR=4.9 CI95% (1.98 – 12.26). Students with heavy coffee consumption are 4,9 times more likely to suffer from GERD compared to those with moderate coffee consumption. The stress level variable shows that stress level is significant to the incidence of GERD

in students (p = 0.01; OR = 4.5 CI95% (1.95 - 10.50). Students with abnormal stress levels are 4.5 times more likely to suffer from GERD compared to those with normal stress levels. And the body mass index variable shows that body mass index is significant to the incidence of GERD in students (p = 0.00; OR = 5.6 CI95% (2.36 - 13.42). Students with abnormal BMI are 5.6 times more likely to suffer from GERD compared to those with normal BMI.

Based on Table 2, it shows that the dominant variable for the incidence of GERD in students of Universitas Prima Indonesia in 2024 is the dietary pattern variable (p=0.00; OR=17.0; 95%CI5.026-57.67), meaning that dietary patterns are significant for the incidence of GERD. Poor diet is 17 times more likely to increase students' risk of experiencing GERD compared to good diet. Furthermore, the dominant variable for the incidence of GERD in students of Universitas Prima Indonesia in 2024 is the body mass index variable (p = 0.02; OR 5.6; 95% CI 1.85-17.04), meaning that body mass index (BMI) is significant for the incidence of GERD. Abnormal BMI is 5.6 times more likely students are at risk of experiencing GERD compared to normal BMI. In addition, another dominant variable is the coffee consumption variable (p = 0.04; OR = 3.3; 95% CI 1.03-10.99) meaning that coffee consumption is significant for the incidence of GERD. Heavy coffee consumption is 3.3 times more likely for students to be at risk of experiencing GERD compared to moderate coffee consumption.

Table 1

Frequency Distribution Based on Gender, Age, Study Program, Place of Residence, and Activity/Routine in the Case Group (GERD) and Control Group (NON−GERD)

Characteristics	Case		Control	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Gender				
Male	11	22	7	14
Female	39	78	43	86
Age				
20 years	7	14	4	8
21 years	35	70	36	72
22 years	6	12	9	18
23 years	1	2	0	0
24 years	1	2	1	2
Study Program				
Public Health	38	76	43	58
Information Systems	12	24	7	42
Residence				
Boarding House	23	46	29	58
With Parents	27	54	21	42
Activity				
Studying	40	80	40	80
Study While Working	10	20	10	20

Table 2
The Relationship Between Eating Habits, Coffee Consumption, Stress Level, Body Mass Index and the Incidence of Gastroesophageal Reflux Disease (GERD) in Students of Universitas Prima Indonesia in 2024

Eating Habits	GERD				p-value	OR	CI95%
	Case		Control				
	n	%	n	%			
Not good	34	68	5	10			
Good	16	32	45	90	0.00	19.12	13.01
Total	50	100	50	100			
Coffee Consumption	Case		Control		p-value	OR	CI95%
	n	%	n	%			
Heavy	26	52	9	18			
Moderate	24	48	41	82	0.01	4.93	2.62
Total	50	100	50	100			
Stress Level	Case		Control		p-value	OR	CI95%
	n	%	n	%			
Abnormal	35	70	17	34			
Normal	15	30	33	66	0.01	4.52	2.19
Total	50	100	50	100			
Body Mass Index	Case		Control		p-value	OR	CI95%
	n	%	n	%			
Abnormal	32	64	12	24			
Normal	18	36	38	76	0.00	5.63	2.83
Total	50	100	50	100			

DISCUSSION

The results of the study showed that diet is related to the incidence of GERD, supported by research by Ardhan et al [18], which states that there is a significant relationship between eating habits and the incidence of Gastroesophageal Reflux Disease in medical students at the University of Mataram. This study uses an analytical observational study type with a case-control approach and obtains a p-value = 0.03. Based on the analysis of research data, it was found that there was a relationship between eating patterns and the incidence of GERD, such as eating frequency, sleeping habits after eating, eating irregularities, and types of food consumed. This is in line with research conducted at Syiah Kuala University in 2020 from 216 students. There were 179 people who had a good diet and 37 people who had a bad diet, and only 38 people of 216 students suffered from GERD, while 178 did not suffer from GERD [1]. Meanwhile, according to research by Rodríguez et al [21] on nursing students, 70.50% of students needed changes in their diet, 25.40% of students had a healthy diet, and 4.20% had an inadequate diet.

The results of the study showed that coffee consumption is related to the occurrence of GERD, supported by research by Saraswati et al [13].

Coffee is a common source of caffeine among adults, including students and workers. Therefore, it is not surprising that they tend to consume more coffee than other age groups. With its benefits that can increase brain activity and improve nutrient flow, coffee helps maintain a better mood and increase their focus. Students who often consume coffee should reduce their daily coffee intake to reduce the effects of caffeine when consuming coffee [22].

The results of the study showed that stress levels are related to the incidence of GERD, supported by research by Syadiyah et al [23] which stated that there is a significant relationship between stress levels and GERD incidents in the Pandan Health Center Working Area, Pacet District, Mojokerto Regency using an observational quantitative research method with a cross-sectional research design that obtained a p-value = 0.00. This shows that stress levels can be influenced by changes in the physiological function of the body's systems, including the digestive system. Feelings of restlessness, nervousness, tension and anxiety often arise when there is psychological pressure, such as mental pressure, family problems, or pressure to meet student assignment deadlines [15]. The rate of

depression among students, especially medical students, is alarming (24).

The results of the study showed that body mass index was related to the incidence of GERD, supported by research by the research of Surya et al (25) which stated that there is a significant relationship between body mass index (BMI) and the incidence of GERD in medical students at Baiturrahman University with a p value = 0.02. Factors that can affect body mass index are if physical activity increases, the body mass index results will be more normal, and vice versa if physical activity decreases, it can increase body mass index. Further research is needed to explore various aspects of the relationship and assessment of parameters that influence students' BMI (26).

CONCLUSION

Levels and body mass index have a significant relationship with the incidence of GERD in students. Therefore, always pay attention and maintain your own health, as well as the health of each family to stay healthy and avoid all existing diseases. Especially Gatroesophageal Reflux Disease which has so far only been considered as a common stomach disease and becomes an important strategy so that the community and students no longer underestimate GERD and the occurrence of wounds and infections in the stomach for a long time.

CONFLICT OF INTEREST

There is no conflict of interest in this research.

AUTHOR CONTRIBUTIONS

DVL contributed to data curation, writing, and original drafting. SDS contributed to supervision. SDS, VTH, and DVL contributed equally to review, editing, and revision of this article.

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