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Patterns of diet-related practices and symptoms of gastroesophageal reflux among high school students: A cross-sectional study

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Abstract

Background: GERD is a gastrointestinal motility disorder characterized by the reflux of gastric contents into the esophagus, causing typical symptoms such as heartburn (a burning sensation in the epigastric region), acid regurgitation (a bitter taste in the mouth), nausea, and dysphagia, which can lead to esophageal mucosal damage. Over the long term, it can result in complications like Barrett's esophagus. The prevalence of GERD in Asia was approximately 2.5%-7.8% in 2014, generally lower compared to Western countries. However, recent data indicates an increasing prevalence. Poor dietary patterns, such as irregular eating habits, consuming low-nutrient foods, excessive or insufficient food intake, can elevate gastric acid production and affect an individual's health.
Purpose: To determine the relationship between dietary patterns and symptoms of Gastroesophageal Reflux Disease (GERD) among vocational high school students.
Method: A quantitative study was applied using correlation analysis with a cross-sectional study approach. The research was conducted at Vocational High School Bojonegoro in January 2023. The study population comprised 305 students in grade 12. The sampling technique employed was purposive sampling, with a sample size of 74 respondents. The measurement tool for dietary pattern variables was the FFQ questionnaire, and GERD symptoms were assessed using the GERD-Q questionnaire. Data analysis techniques included univariate analysis to describe the frequency distribution of each variable and bivariate analysis using the chi-square test to determine the relationship between dietary patterns and GERD symptoms among students.
Results: Poor dietary patterns were found to cause GERD in 47 (97.9%) respondents, whereas good dietary patterns significantly minimized GERD; only 1 (2.1%) respondent experienced GERD symptoms in this study. The research resulted a value of $\rho = 0.000 < \alpha$ (0.05), indicating that the ρ value in this study was less than α (0.05) or below 0.05; thus, H_0 was rejected. It can be concluded that there is a relationship between dietary patterns and GERD symptoms, with a correlation coefficient value of 0.542 (moderate) and a positive correlation direction.
Conclusion: There is a significant relationship between dietary patterns and GERD symptoms. The correlation coefficient analysis also showed a figure of 0.542 (moderate) with a positive correlation direction, indicating that better dietary patterns lead to fewer respondents suffering from GERD.
Suggestion: It is advisable for students to avoid consuming spicy foods, fast food, fried food, and high-sugar food or beverages. They should pay more attention to a balanced diet and timely meals. Additionally, the school authorities are encouraged to establish regulations or advisories to cafeteria owners to refrain from providing fast food, nutritionally poor food, carbonated drinks, spicy food, and other items that may contribute to digestive problems among students.

Keywords: Dietary patterns; Gastroesophageal Reflux Disease (GERD); Student

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INTRODUCTION

Adolescents, as one of the productive and energetic groups, possess abundant energy to carry out daily routines and activities. Sometimes, their intense focus on activities like school or assignments leads them to overlook and pay less attention to their dietary intake (Torronen, Samuelsson, Roumeliotis, Room, & Kraus, 2021; Ramdhan & Bunga, 2021). Dietary patterns significantly influence adolescents' nutritional health. When adolescents maintain regular and balanced dietary patterns, they tend to have better health and reduced susceptibility to diseases. Conversely, imbalanced dietary patterns make adolescents more vulnerable to illnesses (Susanti & Fitriani, 2018).

Adolescents' dietary patterns and lifestyles greatly affect their health. Health quality is significantly affected by what individuals consume and how frequently they maintain such lifestyle patterns. However, societal demands often force people to neglect healthy lifestyles due to their hectic daily routines. This negligence can disrupt dietary patterns and lead to health issues such as GERD (Maret-Ouda, Markar, & Lagergren, 2020).

GERD is a gastrointestinal motility disorder characterized by the reflux of stomach contents into the esophagus, causing typical symptoms like heartburn (burning sensation in the epigastric area), acid regurgitation (bitter taste in the mouth), nausea, and dysphagia. This condition can lead to esophageal mucosal damage and, in the long term, result in complications like Barrett's esophagus. Typical GERD symptoms include upper abdominal pain and regurgitation of stomach contents into the oropharynx (Festi, Scaioli, Baldi, Vestito, Pasqui, Di Biase, & Colecchia, 2009; Vakil, Van Zanten, Kahrilas, Dent, & Jones, 2007). Despite being often underestimated by the global and Indonesian population, this condition can lead to severe complications if left untreated. Stomach acid rising into the esophagus can cause chest pain, shortness of breath, chronic coughing, and damage the esophageal lining, leading to severe inflammation, ulcers, and erosion. GERD also increases the risk of esophageal cancer, necessitating appropriate treatment to prevent serious complications (Marabotto, Pellegatta, Sheijani, Ziola, Zentilin, De Marzo, & Savarino, 2021; Jannah, Muliatie, & Kholili 2021).

The global prevalence of GERD ranges from 11% to 38.8% and varies across countries. In Asia, GERD prevalence is relatively lower compared to Western countries, but the symptom rates are increasing each year. Data from 2014 indicated a considerable global GERD prevalence. In North America, the occurrence of GERD was 18.1%-27.8%, South America 23.0%, Europe 2.5%-7.8%, Australia 11.6%, and the Middle East 8.7%-33.1%. In Asia, the prevalence in 2014 was 2.5%-7.8%, generally lower than in Western countries. However, recent data indicates an increasing prevalence (Naomi, 2014). Other studies reported an increased prevalence of GERD in Asian countries, ranging from 6.3% to 18.3% in Iran, 24% in Palestine, and around 13-15% in Japan and Taiwan (Syam, Hapsari, & Makmun, 2016).

The epidemiological data on GERD prevalence in Indonesia is not precise. However, in Cipto Mangunkusumo Hospital Jakarta, 22.8% of patients undergoing endoscopy for digestive disorders had esophageal inflammation (Ajjah, Mamfaluti, & Putra, 2020). In a 2019 study at Dr. Soetomo Hospital Surabaya, 116 GERD patients were identified, with a higher prevalence among females (62 patients, 53.4%) than males (54 patients, 46.5%) (Radjamin, Nusi, & Kalanjati, 2019). In Bojonegoro, there were 1,102 cases of GERD in 2022. A preliminary survey conducted by researchers on January 9, 2023, using the GERD-Q questionnaire among 10 vocational high school students in Bojonegoro showed that 8 students (80%) had GERD, while 2 students (20%) did not.

As technology, industry, and socioeconomic improvements evolve, they lead to changes in behaviors and lifestyles, including unbalanced food consumption patterns. In this context, dietary patterns are one of the contributing factors to GERD (Kubo, Block, Quesenberry, Buffler, & Corley, 2014). Dietary patterns encompass food types, eating frequency, meal schedules, and portions. Poor dietary habits, irregular eating, consumption of low-nutrient foods, overeating, or undereating are proven to be associated with GERD symptoms. When there is no food in the stomach, increased stomach acid production can lead to heartburn and chest pain.

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Reflux symptoms typically occur 2-3 hours after meals due to post-meal bloating. The habit of sleeping one hour after eating can also trigger GERD by reducing lower esophageal sphincter (LES) pressure when lying down. Consuming acidic or spicy foods containing capsaicin can stimulate esophageal mechanoreceptors, causing unpleasant symptoms, especially if the esophageal lining is damaged. Eating large meals can increase reflux frequency by distending the stomach, increasing transient lower esophageal sphincter relaxation (TLESR), and delaying gastric regurgitation (Tarigan & Pratomo, 2019).

GERD can be prevented by maintaining a healthy and regular diet, avoiding spicy and acidic foods, increasing fresh fruit and vegetable intake to improve digestive health, losing weight, regular exercise, avoiding chocolate, caffeinated beverages, alcohol, and fatty foods. Additionally, avoiding overeating and eating at least 3 hours before sleeping can reduce GERD recurrence (Saputera & Budianto, 2017).

Based on the aforementioned details, researchers are interested in studying the relationship between dietary patterns and the occurrence of GERD among vocational high school students in Bojonegoro.

METHOD

This is a quantitative study using correlation analysis with a cross-sectional study approach. The research was conducted at Vocational High School Bojonegoro in January 2023. The study population comprised 305 students in grade 12. The sampling technique used purposive sampling, resulting in a sample size of 74 respondents.

The study involved conducting educational sessions or socialization on the importance of maintaining dietary patterns and preventing GERD. This was followed by distributing questionnaires to the students and analyzing the collected data. The study took place in classroom settings, with inclusion criteria consisting of grade 12 students who were not ill, present in class, and willing to participate as respondents. Exclusion criteria included students who were absent from class or in an unwell condition.

The variables studied were dietary patterns and GERD symptoms. The instruments used were questionnaire sheets containing questions about dietary patterns and the GERD symptoms. The measurement tool for dietary patterns was the FFQ questionnaire, and the GERD symptoms were assessed using the GERD-Q questionnaire. The assessment indicators for dietary patterns were divided into two categories: good if the calculated score was equal to or above the mean score ≥ 296.31, and poor if the calculated score was below the mean score ≤ 296.31. Assessment indicators for GERD symptoms were divided into two: no symptoms if GERD-Q score was ≤7, and with symptoms if GERD-Q score was 8-18.

Data processing involved editing, scoring, and tabulation. Data collection was based on primary data obtained from validated and reliable questionnaires. The data analysis technique used in this study included univariate analysis to describe the frequency distribution of each variable and bivariate analysis using the chi-square test to determine the relationship between dietary patterns and GERD symptoms among students.

This research obtained ethical clearance from the Health Research Institute of Nahdlatul Ulama Institute of Health Sciences, Tuban, with reference number: 30/0084223523/LEPK.IIKNU/III/2023.

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RESULT

Table 1. Characteristic of Respondent demography (N=74)

Variable	Result
Age (Mean ±SD) (Range)(Year)	(16.47±0.646)(16-18)
Gender (n/%)	
Male	50/67.6
Female	24/32.4
Dietary Pattern (n/%)	
Poor	58/78.4
Good	16/21.6
GERD Symptoms (n/%)	
With symptom	48/64.9
No symptom	26/35.1

Based on Table 1, out of 74 respondents, the average age was 16.47 years with a standard deviation of 0.646, falling within the age range of 16-18 years. The distribution of respondents' genders mostly comprised males, totaling 50 (67.6%) respondents. The majority of students had poor dietary patterns, accounting for 58 (78.4%) respondents. Consequently, GERD symptoms were more prevalent among students, totaling 48 (64.9%) respondents.

Table 2. The Relationship between Dietary Pattern and GERD Symptoms (N=74)

Dietary attern	GERD Symptoms		ρ-value	R
	No Symptom of GERD (n=26)	Symptom of GERD (n=48)		
Poor	11/42.3	47/97.9	0.000	0.542
Good	15/57.7	1/2.1		

Based on Table 2, it demonstrates the relationship between dietary patterns and the symptoms of GERD. Poor dietary patterns were found to cause GERD in 47 (97.9%) respondents, while good dietary patterns significantly minimized the symptoms of GERD, with only 1 (2.1%) respondent experiencing GERD in this study. Conversely, when there were poor dietary patterns, the with-symptoms of GERD was lower, with 11 (42.3%) respondents, whereas good dietary patterns resulted in increased instances of no GERD, totaling 15 (57.7%) respondents.

Statistical analysis using the Chi-Square test with SPSS 23.0 application indicated a significance level of α = 0.05. The study yielded a value of ρ = 0.000 < α (0.05), signifying that the ρ value in this study was less than α (0.05) or below 0.05. Thus, H_0 was rejected. It can be concluded that there is a relationship between dietary patterns and the occurrence of GERD. The correlation coefficient analysis resulted in a correlation value of 0.542 (moderate) with a positive correlation direction. This implies that the better the dietary patterns, the fewer students suffer from GERD.

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DISCUSSION

The research results obtained using the FFQ questionnaire indicate that most students have poor dietary patterns. Specifically, 47 students were identified to consume instant noodles (fast food) 4-6 times a week, 40 students consumed fried foods containing meat and vegetables 1-3 times a week, 40 students consumed fried tofu meatballs 1-3 times a month, and 34 students consumed chocolate 1-3 times a week. Regarding snack consumption, 39 students had snacks once a day, 16 students consumed spicy food 4-6 times a week, 28 students consumed instant flavored drinks 4-6 times a week, and 16 students consumed coffee more than once a day.

The poor dietary patterns among respondents might be attributed to personal preferences, their tendency to choose foods based on likes or dislikes. Adolescents often overlook the impact of unhealthy eating habits on their health. Personal preferences can significantly influence their food choices. Students tend to select foods based on taste, convenience, and personal preferences without considering nutritional value and its long-term health implications. Fast food, fried foods, spicy dishes, as well as high-sugar and caffeinated foods and drinks are often favored due to their delicious taste and easy availability. Dietary patterns refer to the ways or behaviors individuals or groups adopt in selecting and consuming food items daily, including meal frequency, portion size, and food types based on social and cultural factors within their living environment (Shalahuddin, 2018).

These findings are in line with previous research indicating that fatty, fried, acidic, spicy, orange-colored foods, Bali orange juice, tomatoes, tomato preservatives, chocolate, coffee/tea, carbonated drinks, and alcohol act as triggers for GERD. Irregular eating schedules, large meals at once, or eating right before bedtime are identified triggers for GERD symptoms (Taraszewska, 2021).

The occurrence of GERD based on questionnaire results indicates that the majority of students experience GERD symptoms, such as upper abdominal pain, acid regurgitation, acid reflux, and nausea. The GERD-Q survey results revealed that 18 students experienced stomach pain (gastritis) for 2-3 days. These symptoms are primary indicators of GERD, where stomach acid ascends to the esophagus, causing a burning sensation behind the breastbone (Buntara et al., 2020). Moreover, 35 students experienced regurgitation, where stomach contents rise into the throat or mouth once a day, signifying the reflux of stomach acid into the upper digestive tract. Additionally, 12 students experienced frequent retrosternal pain, likely caused by irritation of the esophageal lining due to the ascent of stomach acid. Of 8 students frequently experienced nausea once a day, possibly due to digestive disturbances caused by gastric reflux. Furthermore, 24 students faced difficulty sleeping at night due to heat sensations in the chest or rising stomach contents.

Other studies indicate several symptoms of GERD, including upper abdominal pain, acid regurgitation, belching, quick satiety, retrosternal pain resembling angina, nausea, dysphagia, and respiratory symptoms such as nocturnal choking, bronchitis, recurrent pneumonia, lung fibrosis, or asthma. These findings suggest that GERD symptoms can disrupt sleep and affect the quality of students' lives (Mardalena, 2018).

Regarding dietary patterns and GERD symptoms, the results showed a relationship between dietary patterns and the onset of GERD in students. Poor dietary patterns, including fast food, fried foods, spicy dishes, and sweetened beverages, have demonstrated an increased risk of gastric diseases. Foods consumed by students, such as fast food and fried foods containing saturated fats, high salt content, and various additives, can stimulate stomach acid production. This imbalance in stomach acid can weaken the valve function between the stomach and esophagus, allowing stomach acid to easily reflux into the esophagus, leading to GERD symptoms (Shewfelt & Shewfelt, 2017).

Spicy foods are also known to be associated with GERD. Components in spicy foods can affect the movement and function of the digestive tract, leading to inflammation in the digestive tract. This can worsen GERD symptoms and increase the risk of acid reflux. Consuming high-sugar foods and drinks also contributes to GERD. Excessive sugar consumption can stimulate acid production in the

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stomach, disrupting the acid balance and increasing the risk of acid reflux (Mulat, 2016).

This study aligns with previous research showing a connection between dietary patterns and the symptom of gastroesophageal reflux disease (GERD) among medical students (Ajjah et al., 2020). Considering the prevalence of GERD, it is essential to implement self-management approaches among students to combat GERD, as the younger generation faces potential future health problems that can impose health and economic burdens (Baklola, Terra, Badr, Fahmy, Elshabrawy, Hawas, & El-Gilany, 2023). Presently, GERD is a widespread issue in society with the potential to cause significant health concerns. The financial burden associated with diagnosing and treating this condition significantly impacts healthcare expenditures (Martinucci, Natilli, Lorenzoni, Pappalardo, Monreale, Turchetti, & de Bortoli, 2018). Hence, it needs attention from all sectors—society, healthcare services, and government as policymakers—to address the rising incidence of GERD and reduce its prevalence.

CONCLUSION

There is a significant relationship between dietary patterns and the symptoms of GERD. The correlation coefficient analysis also shows a figure of 0.542 (moderate) with a positive correlation direction. This means that the better the dietary pattern, the fewer respondents suffer from GERD.

SUGGESTION

Students should avoid consuming spicy food, fast food, fried food, and high-sugar food or drinks. They should pay more attention to having a balanced nutritional diet and eating at proper times. Additionally, it is hoped that the school authorities establish regulations or guidelines for cafeteria owners not to provide fast food, unhealthy food, soda drinks, spicy food, and other items that may cause digestive issues among students.

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