


## The Effect Of BMI On The Incidence Of Gerd In Indonesian Citizens

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Article Info	ABSTRACT
<p><b>Keywords:</b> Gastroesophageal Reflux Disease (GERD), Body Mass Index (BMI), prevalence, Indonesia, risk factors.</p>	<p>Gastroesophageal Reflux Disease (GERD) is becoming increasingly common in Indonesia, influenced by changes in lifestyle and dietary patterns. This study aims to explore the relationship between Body Mass Index (BMI) and the incidence of GERD in the Indonesian population. The introduction provides background on the rising prevalence of GERD and the importance of researching risk factors such as BMI. The method involves a literature review from relevant journals sourced from Google Scholar, focusing on studies investigating the correlation between BMI and GERD in Indonesia. The results of the analysis indicate that higher BMI correlates positively with an increased risk of GERD, accompanied by pathophysiological mechanisms including increased intra-abdominal pressure and dysfunction of the lower esophageal sphincter.</p>
<p>This is an open access article under the <a href="https://creativecommons.org/licenses/by-nc/4.0/">CC BY-NC</a> license</p> 	<p><b>Corresponding Author:</b> M.Arif Munandar.K Universitas Muslim Indonesia <a href="mailto:ariffkumi2016@gmail.com">ariffkumi2016@gmail.com</a></p>

### INTRODUCTION

Gastroesophageal Reflux Disease (GERD) is a condition in which stomach acid rises back into the esophagus, causing a burning sensation in the chest known as heartburn. This condition occurs when the lower esophageal ring muscle does not close properly, allowing stomach acid to flow back into the esophagus. GERD is a common health problem in various countries, including Indonesia. The prevalence of GERD in Indonesia has increased along with changes in people's lifestyles and diets, such as increased consumption of fatty and acidic foods, as well as irregular eating habits.(Ndraha et al., 2023). In addition, factors such as obesity, stress, and lack of physical activity also contribute to the increase in cases of GERD. This phenomenon is of concern because GERD not only affects the quality of life of individuals who experience it, but can also cause serious complications such as esophagitis, esophageal stricture, and even esophageal adenocarcinoma if not treated properly. On the other hand, the economic burden on the health system is also increasing, considering the cost of long-term care and treatment required to manage this condition. Therefore, increasing awareness of risk factors and prevention efforts for GERD is very important to reduce its prevalence and impact in society.(Handayani et al., 2023).

Body Mass Index (BMI) is one of the important parameters used to measure a person's nutritional status. BMI is calculated based on an individual's weight and height, with a formula that divides weight in kilograms by the square of height in meters. BMI values are often used to identify whether a person is normal, underweight, or overweight. Based on this categorization, a person with a high BMI, or obesity, has been identified as having a greater risk of various chronic diseases, including diabetes, hypertension, and heart disease. Obesity

not only affects general health but also has a significant impact on quality of life. Research also shows a relationship between high BMI and an increased risk of Gastroesophageal Reflux Disease (GERD). Obesity can increase intra-abdominal pressure, which in turn increases the risk of stomach acid reflux into the esophagus, triggering GERD symptoms. This condition highlights the importance of maintaining an ideal body weight not only to prevent chronic diseases but also to reduce the risk of GERD and other related complications. (Warella Carla Juen et al., 2023).

The increasing prevalence of obesity in Indonesia, especially among young adults, raises serious concerns about the increasing incidence of Gastroesophageal Reflux Disease (GERD). A high-fat, low-fiber diet, often found in fast food and processed foods, and lack of physical activity due to an increasingly sedentary modern lifestyle, are some of the main factors contributing to weight gain and the risk of GERD. Stress, which is also increasingly common in fast-paced urban life, worsens this condition by affecting eating patterns and body metabolism. Given the diverse geographical conditions and diverse eating cultures in Indonesia, from spicy food in Sumatra to sweet food in Java, a deep understanding of the relationship between Body Mass Index (BMI) and GERD in various populations is essential. Detailed research is needed to identify how these factors interact and influence the risk of GERD in Indonesians, so that effective prevention and intervention strategies can be developed that are tailored to the local context. This will help reduce the prevalence of GERD, improve the quality of life of individuals, and reduce the economic burden that this disease places on the national health system. (Surya Dana et al., 2024).

Previous studies in various countries have shown that individuals with a high Body Mass Index (BMI) have a greater risk of experiencing Gastroesophageal Reflux Disease (GERD) compared to those with a normal BMI. This factor is associated with additional pressure on the abdomen caused by excess body fat, which can increase the likelihood of gastric acid reflux into the esophagus. However, specific research on the relationship between BMI and GERD in Indonesia is still limited. This condition shows the importance of conducting more in-depth studies to understand the local dynamics and unique factors that may influence the prevalence of GERD in various regions of Indonesia. Geographical variations, traditional diets, and genetic and lifestyle differences between ethnicities in Indonesia may influence how this disease develops and interacts with BMI. Thus, more focused and detailed research is needed to fill this knowledge gap and develop effective and locally relevant prevention strategies. This step is expected to help reduce the burden of GERD disease in Indonesia and improve the health and quality of life of the community as a whole.

Increasing the understanding of the relationship between Body Mass Index (BMI) and Gastroesophageal Reflux Disease (GERD) in Indonesia has great potential to make a significant contribution to the development of more effective prevention and treatment strategies. Weight loss programs integrated with healthy lifestyle changes, such as increasing physical activity and adopting a balanced and low-fat diet, can be a crucial step in reducing the prevalence of GERD. Health education that targets the community about the dangers of obesity and its impact on digestive health is also important to increase awareness and prevention of GERD among the Indonesian population. In addition, identification of specific risk factors that may be unique to the Indonesian population, such as local spicy and sour

diets, as well as genetic and ethnic aspects, can help in designing more targeted and effective interventions. With this approach, it is hoped that the burden of GERD disease can be reduced significantly and the quality of life of the Indonesian population as a whole can be improved.(Ndraha et al., 2023).

Social and economic conditions play a crucial role in the increasing rates of obesity and Gastroesophageal Reflux Disease (GERD) in Indonesia. Rapid urbanization often results in lifestyle changes, including unhealthy diets and decreased physical activity. Diets dominated by fast and processed foods that are high in fat and sugar can increase the risk of obesity and, therefore, the likelihood of GERD. On the other hand, limited access to health services in rural areas is also a factor that makes it difficult to detect and manage conditions such as obesity and GERD early. A comprehensive and inclusive approach is needed to address these challenges, including public health education on the importance of a healthy lifestyle, increasing access to adequate health services, and policies that support an environment that supports active lifestyles and healthy foods across all levels of society. Thus, it is hoped that these efforts will not only reduce the prevalence of obesity and GERD, but will also improve the overall well-being and quality of life in Indonesia.

Research on the relationship between BMI and GERD in Indonesia may also provide insight into gender differences in the prevalence and risk factors for GERD. Several studies have suggested that women may be more susceptible to GERD than men, especially after menopause. Hormonal factors and differences in body fat distribution between men and women may influence the risk of GERD. Further research is needed to explore these aspects in the context of the Indonesian population. In addition, it is important to consider genetic and ethnic factors in this study. Indonesia, with its wide ethnic diversity, offers a unique opportunity to study how genetic and environmental factors interact to influence the risk of GERD. The data obtained may help in the development of more personalized and evidence-based medical approaches.

Finally, collaboration between health institutions, academics, and government is needed to overcome the increasing problem of GERD. With an integrated and evidence-based approach, it is hoped that the incidence of GERD in Indonesia can be reduced, and the quality of life of the community can be improved. This study is expected to provide a significant contribution to these efforts, as well as enrich the scientific literature on the relationship between BMI and GERD.

The authors' observations in this study include the urgent need to fill the knowledge gap on the relationship between Body Mass Index (BMI) and Gastroesophageal Reflux Disease (GERD) in the Indonesian context. Although there is consistent evidence from international studies on the correlation between high BMI and higher risk of GERD, similar studies in Indonesia are still limited. This encourages the need for in-depth studies that consider unique factors that may influence local dynamics, such as traditional dietary patterns, ethnic variations, and access to health services.

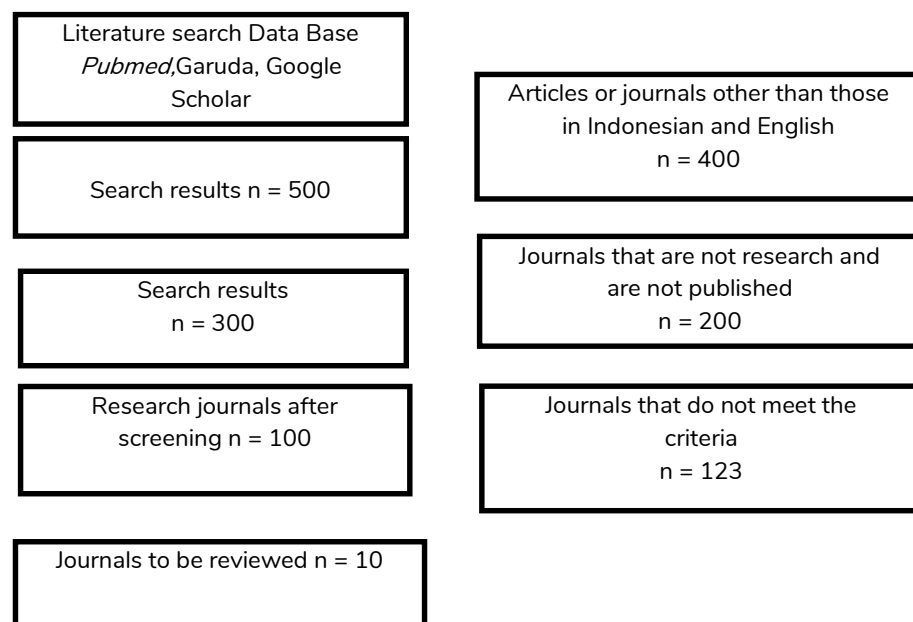
This study aims to gather strong empirical evidence on the relationship between BMI and GERD in the Indonesian population. Thus, this study will not only provide a better understanding of the risk factors contributing to the prevalence of GERD in Indonesia, but will also help design more targeted and effective prevention strategies. Through a comprehensive

scientific approach, it is hoped that this study can provide a basis for better health policies in reducing the burden of this chronic disease and improving the welfare of the community as a whole.

## RESEARCH METHOD

This study used a literature review method to investigate the relationship between Body Mass Index (BMI) and Gastroesophageal Reflux Disease (GERD) in the Indonesian context. This approach allows researchers to collect and evaluate existing evidence from various previous studies that are relevant to the topic. Through a comprehensive literature review, this study aims to identify patterns of association between high BMI and the risk of GERD in the Indonesian population. The use of literature review as a research methodology can provide an in-depth understanding of the context and landscape of existing research, while identifying knowledge gaps that need to be filled. In this way, this study does not only rely on data from international studies, but also considers local factors that may influence the relationship between BMI and GERD, such as traditional dietary patterns, ethnic differences, and access to health services.(Sommeng et al., 2023).

The purpose of this literature review is to present comprehensive and up-to-date evidence on the relationship between BMI and GERD in Indonesia. The results of this study are expected to provide a strong basis for the development of better prevention and management strategies for GERD, as well as provide guidance for researchers and health practitioners in designing interventions that are specifically tailored to the needs of the Indonesian community.



**Figure 1.** PRISMA Flow Research Article The Effect of BMI on the Incidence of Gerd in Indonesian Citizens

## RESULTS AND DISCUSSION

### Results

In the literature screening process for this study, we started with a total of 500 initial search results. Of these, 300 search results were eliminated because they did not meet the basic research criteria. In addition, there were 400 articles or journals that were rejected because they were written in languages other than Indonesian and English, which are the languages prioritized to ensure readability and relevance of information. Journals that were not original research results or were not published were also eliminated, totaling 200 journals. Furthermore, 123 journals did not meet the established quality criteria, such as publication period and full-text accessibility.

After going through this rigorous selection process, we finally selected 10 journals to be reviewed further. These journals were selected based on the quality of the research, relevance to the topic, and their suitability to the established criteria. The results of this literature research will provide a comprehensive picture of The Influence of BMI on the Incidence of GERD in Indonesian Citizens. By reviewing key findings from selected journals, this study is expected to identify key factors that contribute to The Influence of BMI on the Incidence of GERD in Indonesian Citizens. This process ensures that the analysis conducted is based on strong and relevant evidence, thereby supporting the development of new knowledge and deeper understanding of The Influence of BMI on the Incidence of GERD in Indonesian Citizens.

### Analysis Results

No	Writer	Year	Article Title	Number of Samples	Research Design	Results	Determinant Factors
1	Oandu Tridana Akti	2020	Factors Analysis for Gastroesophageal Reflux Disease in COVID-19 Pandemic Era on Resident Physicians, Faculty of Medicine, Brawijaya University	10 Samples	Quantitative Research Methods	Factor analysis shows a relationship between the COVID-19 pandemic and the incidence of GERD in resident doctors	COVID-19 pandemic, stress, change of routine
2	The Story of Nyoman Hardana Sasmita	2018	The Relationship between Overweight and Gastroesophageal Reflux Disease at Sanglah General Hospital, Denpasar	10 Literature Review	Literature Review	Overweight is positively correlated with increased cases of GERD at Sanglah General Hospital, Denpasar	Diet, lifestyle
3	The Sun Fund	2020	The Relationship between Obesity and the Incidence	20 Research Samples	Quantitative Research Methods	Obesity is associated with a higher risk of	Eating habits,

			of GERD in Students of the Faculty of Medicine, Baturrahmah University			GERD in medical students	physical activity
4	Nurul Fadila Rahmadani	2023	Incidence of Gastroesophageal Reflux Disease Based on GERD Q Score in Students of the Faculty of Medicine, Patimura University	30 Samples	Observational	High GERD Q score is associated with increased incidence of GERD in Patimura University students	Diet, daily activities
5	Nurul's Charisma	2023	Relationship between Body Mass Index (BMI) and Gastroesophageal Reflux Disease (GERD) Based on GERD Scores at the Highways and Construction Services Office of North Sumatra Province	10 Samples	Cross-sectional study	High BMI is associated with higher GERD scores in Highways Department employees	Diet, physical activity
6	Fauza Fitri's Flower	2020	The Relationship Between Diet and the Occurrence of Gastroesophageal Reflux Disease (GERD)	-	Case-control	Unhealthy diet increases the risk of GERD	Consumption of spicy foods, alcohol
7	Princess Novi Handayani	2023	The Relationship of Night Shifts to Gastroesophageal Reflux Disease (GERD) in Nurses at Sanglah Central General Hospital	20 Samples	Retrospective cohort	Night shifts associated with increased risk of GERD in Sanglah Hospital nurses	Shift duration, adequate rest
8	Nuzana Ndraha	2023	Relationship of Lifestyle to GERD Incidence at Koja Regional Hospital, North Jakarta	20 Research Samples	Population survey	Unhealthy lifestyles correlate with increased cases of GERD at Koja Regional	Diet, daily activities

						Hospital, North Jakarta	
9	The Greatest Showman	2022	Relationship between Body Mass Index and GERD Incidence	10 Research Samples	Prospective	A high BMI is associated with an increased incidence of GERD	Eating habits, regular exercise
10	Alexander	2020	Relationship between Body Mass Index and Degree of Erosive Esophagitis in GERD Patients	20 Research Samples	Case-control study	High BMI is associated with increased degrees of erosive esophagitis in GERD patients.	Smoking habits, alcohol consumption

## Discussion

GERD, or Gastroesophageal Reflux Disease, has become an increasingly common health problem in Indonesia along with changes in people's lifestyles and diets. This disease is characterized by the rise of stomach acid into the esophagus, which causes symptoms such as a burning sensation in the chest or heartburn. Along with increasing urbanization, changes in diet towards foods that are higher in fat and lower in fiber, and less active lifestyles, the prevalence of GERD in Indonesia also tends to increase. Body Mass Index (BMI) as an important indicator to measure a person's nutritional status, has been consistently associated with an increased risk of developing GERD in various international studies. High BMI or being overweight can increase pressure on the abdomen, worsen stomach acid reflux, and ultimately increase a person's chances of developing GERD. Therefore, a deep understanding of the relationship between BMI and the prevalence of GERD in Indonesia is essential to develop more effective prevention strategies and mitigate the health impacts of this condition. (Ajjah et al., 2020).

### Relationship between BMI and GERD Prevalence

The relationship between Body Mass Index (BMI) and the prevalence of Gastroesophageal Reflux Disease (GERD) has been the main focus of several studies conducted in Indonesia. Data from these studies indicate that individuals with a high BMI tend to have a greater risk of developing GERD. For example, a study by Nyoman Hardana Sasmita (2018) at Sanglah General Hospital, Denpasar found that excess body weight was positively correlated with an increase in GERD cases. This may be related to the additional pressure exerted by excess body fat on the abdomen, which can trigger reflux of stomach acid into the esophagus. Similar findings were also found in a study by Teguh Surya Dana (2020) at the Faculty of Medicine, Baturrahmah University, which showed that obesity was associated with a higher risk of developing GERD in students. Obesity, defined by a high BMI, can cause increased intra-abdominal pressure and disrupt the function of the lower esophageal sphincter, which is responsible for preventing stomach acid from rising. (Purthana & Somayana, 2020).

The importance of BMI as an important indicator in evaluating the risk of GERD is also supported by international studies. These studies show that high BMI not only increases the risk of GERD, but also various other chronic diseases such as diabetes, hypertension, and heart disease. Therefore, BMI management is key in efforts to prevent and manage GERD at the individual and population levels. A deeper understanding of the relationship between BMI and GERD prevalence in Indonesia not only strengthens the need for earlier and more effective clinical interventions, but also supports the need for a holistic approach in public health promotion. Prevention strategies that target weight control and healthy lifestyle promotion will be crucial in reducing the burden of GERD and improving the overall quality of life of the community. The effect of Body Mass Index (BMI) on the incidence of Gastroesophageal Reflux Disease (GERD) in Indonesian citizens is an important topic in the context of public health. The following is a discussion with key points and flowing paragraphs:

### **Pathophysiological Mechanisms Underlying This Relationship**

Obesity has a significant impact on the development of Gastroesophageal Reflux Disease (GERD) through complex pathophysiological mechanisms. These factors not only directly affect the organs involved in digestion, but also through hormonal and inflammatory changes that affect the body system as a whole. First, obesity directly increases intra-abdominal pressure. Excess body fat places extra pressure on the abdomen and digestive organs, including the stomach. This pressure can cause stomach acid to reflux into the esophagus, which is a major characteristic of GERD. The lower esophageal sphincter, which is supposed to act as a valve to prevent acid reflux, can be compromised by the added pressure of excess abdominal fat.

Second, obesity also affects the function of the lower esophageal sphincter. This sphincter is a muscle structure that is important in maintaining the integrity of the sphincter, especially when intra-abdominal pressure increases. Excessive body fat can damage the structure and function of the lower esophageal sphincter, allowing stomach acid to rise more easily into the esophagus and causing more frequent and severe GERD symptoms. In addition, obesity causes changes in the production of hormones and inflammatory substances in the body. Excess body fat, especially in the visceral area, can produce more hormones such as leptin and resistin, which are involved in regulating appetite and metabolism. Dysfunction in the production of these hormones can affect the control of gastric acid reflux and worsen GERD symptoms.

Finally, obesity is also associated with increased levels of inflammatory substances in the body, such as pro-inflammatory cytokines and other inflammatory mediators. Chronic inflammation that occurs in obese individuals can damage the esophageal mucosa and increase sensitivity to acid reflux. This worsens GERD symptoms and increases the risk of complications such as erosive esophagitis. By understanding these complex pathophysiological mechanisms, it is important to emphasize the importance of weight management in the prevention and management of GERD. A holistic approach, including lifestyle changes to reduce weight, healthy dietary management, and regular medical supervision, can help reduce the risk and severity of GERD in obese individuals. (Sakti & Mustika, 2022).



### Public Health Implications and Prevention Strategies

A thorough understanding of the relationship between Body Mass Index (BMI) and Gastroesophageal Reflux Disease (GERD) is essential in designing effective prevention strategies in Indonesia. Appropriate preventive measures can help reduce the incidence of GERD, given its increasing prevalence along with changes in people's lifestyles and diets. First, educating the public about the importance of maintaining ideal body weight is key to preventing GERD. Maintaining a healthy BMI can reduce pressure on the abdomen and help maintain optimal lower esophageal sphincter function, thereby reducing the risk of acid reflux. Promoting a healthy lifestyle, including encouraging a balanced diet and regular physical activity, can also help control BMI and reduce the likelihood of GERD.

Second, medical surveillance of individuals with high BMI is essential for early detection and risk management of GERD. Counseling individuals with high BMI about the higher risk of developing GERD can encourage them to seek medical care more proactively. This includes the use of appropriate pharmacological therapy and lifestyle recommendations that can reduce GERD symptoms and complications. By strengthening this comprehensive approach, it is hoped that it can reduce the burden of GERD disease in Indonesia and improve the quality of life of the community as a whole. The active role of various parties, from health workers to the general public, is needed to create an environment that supports GERD prevention through weight management and a healthy lifestyle.

### CONCLUSION

Overall, the relationship between Body Mass Index (BMI) and Gastroesophageal Reflux Disease (GERD) suggests that high BMI or obesity may increase an individual's risk of developing GERD. Studies have shown that obesity not only increases intra-abdominal pressure and affects the function of the lower esophageal sphincter, but also contributes to systemic inflammation that may worsen GERD symptoms. Therefore, it is important to raise awareness of the importance of maintaining ideal body weight and encouraging a healthy lifestyle in an effort to prevent GERD. Strategies involving public education, promotion of a balanced diet, regular physical activity, and medical supervision of individuals at high risk may help reduce the prevalence of GERD in Indonesia. These efforts should not only consider clinical aspects, but also take into account relevant social and economic impacts in improving the overall quality of life in Indonesian society.

### REFERENCES

- Ajjah, B. F. F., Mamfaluti, T., & Putra, T. R. I. (2020). Hubungan Pola Makan Dengan Terjadinya Gastroesophageal Reflux Disease (Gerd). *Journal of Nutrition College*, 9(3), 169–179. <https://doi.org/10.14710/jnc.v9i3.27465>
- Handayani, P. N., Kumbara, C. I. Y. K., Widiyana, I. G. R., & Merati, K. T. P. (2023). Hubungan Shift Malam Terhadap Penyakit Refluks Gastroesofagus Pada Perawat Di Rumah Sakit Umum Pusat Sanglah. *E-Jurnal Medika Udayana*, 12(1), 79. <https://doi.org/10.24843/mu.2023.v12.i01.p14>
- Ndraha, S., Harefa, G. A., & Khumar, B. (2023). Hubungan Gaya Hidup Terhadap Kejadian GERD (Gastroesophageal Reflux Disease) di RSUD Koja Jakarta Utara. *Jurnal*

- MedScientiae*, 2(3), 341–346. <https://doi.org/10.36452/jmedscientiae.v2i3.2909>
- Purthana, N. H. S., & Somayana, G. (2020). Hubungan Antara Berat Badan Lebih Dengan Penyakit Refluks Gastroesophageal Di Rsup Sanglah Denpasar Periode Juli – Desember 2018. *Jurnal Medika Udayana*, 9(6), 30–34. <https://ojs.unud.ac.id/index.php/eum>
- Sakti, P. T., & Mustika, S. (2022). Analisis Faktor Risiko Gastro-Esophageal Reflux Disease di Era Pandemi COVID-19 pada Mahasiswa Program Pendidikan Dokter Spesialis Fakultas Kedokteran Universitas Brawijaya. *Jurnal Penyakit Dalam Indonesia*, 9(3), 164. <https://doi.org/10.7454/jpdi.v9i3.793>
- Sommeng, F., Utami, R., Dwimartyono, F., Wahab, M. I., & Abdul Muthalib. (2023). Peran Code Blue terhadap Penanganan Henti Napas Henti Jantung di Rumah Sakit. *Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran*, 3(8), 541–551. <https://doi.org/10.33096/fmj.v3i8.365>
- Surya Dana, T. S. D., Ivan, M., & Anggraini, D. (2024). Hubungan Obesitas Terhadap Kejadian Gastroesophageal Reflux Disease Pada Mahasiswa Fakultas Kedokteran Universitas Baiturrahmah. *Scientific Journal*, 3(1), 01–07. <https://doi.org/10.56260/sciena.v3i1.123>
- Warella Carla Juen, Kusadhiani Indrawanti, & Maradjabessy Rahmadani Fadila Nurul. (2023). Kejadian Gastroesophageal Reflux Disease (Gerd) Berdasarkan Skor Gerd-Q Pada Mahasiswa Fakultas Kedokteran Universitas Pattimura Tahun 2023. *Kejadian Gastroesophageal Reflux Disease (Gerd) Berdasarkan Skor Gerd-Q Pada Mahasiswa Fakultas Kedokteran Universitas Pattimura Tahun 2023*, 5, 76–84.