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Relationship between Irritative Food Consumption and Dyspepsia Syndrome Among Medical Students at The University of Muslim Indonesia

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ABSTRACT

Introduction: Dyspepsia is a term used to describe a group of symptoms in the digestive tract, including pain in the upper abdomen (*epigastrium)*, nausea, vomiting, and bloating. **Objective:** To determine the relationship between the consumption of irritating foods and dyspepsia syndrome among medical students at the Faculty of Medicine, University of Muslim Indonesia, Class of 2022. **Method:** This study is an analytical observational study with a cross-sectional design. The study population consisted of all preclinical students of the 2022 cohort, totaling 385 individuals, and the sample was selected using total sampling based on inclusion and exclusion criteria, resulting in 283 respondents. The independent variable was irritating food consumption, while the dependent variable was dyspepsia syndrome. Data were collected using a dyspepsia syndrome questionnaire (based on Rome IV criteria) and *a Food Frequency Questionnaire* (FFQ) for irritating foods. Data analysis was performed using univariate and bivariate analysis with a Chi-square test at a significance level of 5%. **Results:** showed that out of 283 medical students at the University of Muslim Indonesia, class of 2022, who participated in the study, 34.6% experienced dyspepsia, with 24.7% frequently consuming spicy foods and 13.8% consuming acidic foods. **Conclusion:** Statistical analysis using the Chi-square correlation test found no significant association between irritating foods and dyspepsia syndrome among medical students at the University of Muslim Indonesia, class of 2022. Education on healthy eating patterns and other risk factors that can trigger dyspepsia is needed, along with further

research considering psychological factors and lifestyle.

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INTRODUCTION

Dyspepsia is a term used to describe a group of symptoms in the digestive tract, including pain in the upper abdomen (*epigastrium)*, nausea, vomiting, and bloating. These symptoms are not always present in every patient (Keenam *et al*., 2014). The general public refers to this condition as "stomach ache" (Francis and Zavala, 2023). Dyspepsia is classified into two types: organic dyspepsia and functional dyspepsia (Keenam *et al.,* 2014). Various studies have concluded that the most common symptoms of dyspepsia syndrome are caused by functional dyspepsia, accounting for 70-80% of all cases (Ahmadi, 2022; Francis and Zavala, 2023).

Large population-based studies reveal that the prevalence of dyspepsia ranges from 7-41%, but only 10-20% require medical treatment. In Asia, the prevalence of dyspepsia ranges from 8-30% (Purnamasari, 2017). Based on the Basic Health Research report by the Health Research and Development Agency of the Indonesian Ministry of Health, the prevalence of dyspepsia in Indonesia reaches 40-50%, with an increase of 11.3% from the total population in 2021 (Health Research and Development Agency of the Ministry of Health of the Republic of Indonesia, 2018). According to data from the Health Department of Makassar City, dyspepsia was among the top 10 most common diseases across all age groups in Makassar City in 2015, with 35,159 cases and 151 deaths (Hasanuddin, 2020). The prevalence of dyspepsia reaches 25-30% among medical students, with this figure being higher compared to students from other departments (Wong *et al.,* 2019). Medical students are prone to dyspepsia due to academic stress, irregular eating schedules, and consumption of irritating foods such as spicy and acidic foods. To date, there is no definitive data on the prevalence of dyspepsia among medical students at the University of Muslim Indonesia. Therefore, further research is needed to determine the extent of the problem and contributing factors, particularly patterns of consumption of irritating foods.

Several factors trigger dyspepsia symptoms, including gastric acid secretion, eating habits, *Helicobacter pylori* infection, and peptic ulcers (Syahputra and Siregar, 2021). Eating habits, which include food types and eating patterns, are risk factors for dyspepsia syndrome. Irritating foods are types of food that can cause irritation to the stomach lining, such as spicy foods, chocolate, alcoholic beverages, and fatty foods (Solomon and Ajayi, 2013; Nasution, Aritonang and Nasution, 2015; Cozma-Petrut *et al.*, 2017).

Medical students undergo 3.5 years of education. Pre-clinical students have very busy schedules, ranging from lectures, group discussions, to non-academic activities (Ahmadi, 2022). This is especially true for students of the 2022 cohort who have begun to enter a busy schedule. The busy schedule and activities of these students often affect their meal schedules and the types of food they consume daily. This has led to medical students having a high risk of developing functional dyspepsia. Based on the high incidence of dyspepsia, the researchers were interested in investigating the relationship between irritating foods and the occurrence of dyspepsia among medical students at the Faculty of Medicine, University of Muslim Indonesia, Class of 2022.

LITERATURE REVIEW

Irritating Foods

The habit of consuming certain foods, such as spicy, acidic, or sweet foods in excess, can increase the risk of digestive disorders. Spicy foods are commonly consumed in most Asian countries. The average daily consumption of chili peppers among Asians ranges from 2.5 to 8 grams per person (National Institute for Health and Care Excellence, 2014). The primary component of spicy foods is *capsaicin,* which is derived from chili peppers or chili powder. Capsaicin has biological effects through the activation of C-afferent nerve fibers, which can cause sensitization of the stomach and increase stomach acid production (Ahmadi, 2022). Excessive consumption of capsaicin can stimulate contractions of the digestive tract, particularly the stomach and intestines, leading to a burning sensation, upper abdominal pain, nausea, and vomiting. Additionally, chili powder can cause damage to the mucosal epithelial cells of the stomach. Consumption of chili powder (capsaicin 0.75 mg) resulted in increased nausea, a burning sensation, and higher levels of abdominal pain in patients with functional dyspepsia compared to a healthy control group (Ahmadi, 2022).

Acidic foods also play a role in slowing stomach emptying. Acidic chyme is neutralized by sodium bicarbonate ($NaHCO_3$) before entering the duodenum. If the neutralization process is incomplete, chyme accumulates in the stomach and irritates the stomach lining, potentially leading to gastritis (National Institute for Health and Care Excellence, 2014; Lauralee, 2016). In addition to spicy and acidic foods, sweet foods such as chocolate, cakes, ice cream, jam, and candy can also trigger digestive disorders. Sweet foods are difficult to digest and are quickly fermented by gut bacteria, producing excessive amounts of gas and water, causing bloating and discomfort in the upper abdomen. The Indonesian Ministry of Health recommends daily sugar intake of no more than 10% of total energy or approximately 200 kcal/day (equivalent to 50 grams or 4 tablespoons of sugar). Consuming sugar in excess of this limit has negative effects on health (Ministry of Health of the Republic of Indonesia, 2014).

Functional Dyspepsia

Functional dyspepsia is a disorder of the upper gastrointestinal tract characterized by symptoms such as epigastric pain, a feeling of fullness after eating, rapid satiety, nausea, and bloating, without any clear organic abnormalities found on endoscopic examination. One of the triggering factors for the onset of dyspepsia symptoms is the consumption of irritating foods, such as spicy and acidic foods. Excessive consumption of irritating foods triggers uncoordinated motor activity in the gastrointestinal tract and increased stomach acid production, which can cause a burning sensation, abdominal pain, nausea, and vomiting—characteristic symptoms of functional dyspepsia. Patients with dyspepsia exhibit a greater response to capsaicin compared to healthy individuals, indicating the presence of visceral hypersensitivity (Ahmadi, 2022). Impaired gastric emptying due to the consumption of acidic foods can exacerbate dyspepsia symptoms. The accumulation of acidic chyme causes irritation of the stomach lining and prolongs the time food remains in the stomach, contributing to feelings of fullness and excessive bloating (London: National Institute for Health and Care Excellence (NICE);, 2014; Futagami *et al.*, 2018).

METHOD

This study is an observational analytical study with a *cross-sectional* design, which is a research study using primary data collected at the same time. In this study, the researcher aims to determine the relationship between irritating foods and dyspepsia

syndrome among medical students at the Faculty of Medicine, University of Muslim Indonesia, class of 2022.

The population in this study was all students of the Faculty of Medicine, University of Muslim Indonesia, class of 2022, totaling 385 students, where the sampling technique used was *total sampling*. Additionally, this study has the following inclusion criteria: experiencing dyspepsia symptoms for at least 3 weeks within the past 6 months prior to diagnosis; and having provided *informed consent*. Exclusion criteria also apply in this study, including: students who were absent during questionnaire administration; previous diagnosis of gastrointestinal disorders or organic dyspepsia based on endoscopic examination; presence of *alarm symptoms (*rectal bleeding and melena, weight loss >10%, anorexia, persistent vomiting, anemia, abdominal mass or lymphadenopathy, progressive dysphagia or odynophagia, family history of upper gastrointestinal tract cancer, history of gastrointestinal tract cancer or surgery, history of peptic ulcer, *jaundice/icterus)*(London: National Institute for Health and Care Excellence (NICE);, 2014; Futagami *et al.,* 2018). Thus, the researchers obtained results consistent with the inclusion and exclusion criteria, totaling 283 respondents.

This study used two questionnaires as research instruments. The dyspepsia syndrome questionnaire and the irritable food questionnaire. The dyspepsia syndrome questionnaire was developed based on the Rome IV criteria (Futagami *et al.*, 2018). This questionnaire consists of 6 questions with "yes" or "no" answer options. A positive response was indicated if there was a "yes" answer to one or more questions. A negative response was indicated if all questions were answered with "no." The irritable food questionnaire used a modified *Food Frequency Questionnaire* (FFQ). To obtain the categories, the FFQ results were first processed by converting all frequencies into ordinal values for each type of food, namely spicy food and acidic food. Scores are obtained from the mode for each type of food and then divided into three categories: frequent (>1x/day; 1x/day; 4-6x/week), infrequent (1-3x/week; 1-3 x/month), and never.

The validity and reliability tests for both questionnaires were conducted by (Azarine), where the functional dyspepsia syndrome questionnaire was validated and its reliability value was good, at 0.645. Meanwhile, the questionnaire on eating patterns and the frequency of irritating food/drink consumption ( ) has also been validated, with a very good reliability value of 0.85 (Ahmadi, 2022).

Data were collected via a structured questionnaire distributed in the form of a Google Form to all students of the class of 2022 who were present during the study period. Data analysis was conducted using univariate methods to describe the incidence of dyspepsia and food consumption patterns, and bivariate methods to assess the relationship between food consumption and functional dyspepsia.

The Research Ethics Committee of the University of Muslim Indonesia granted Ethical Approval/Recommendation for the Conduct of the Research with registration number UMI012406342.

RESULTS AND DISCUSSION

This study was conducted on medical students at the University of Muslim Indonesia, Class of 2022, with a total of 385 respondents. The study was conducted through a screening process using a questionnaire to identify subjects who met the inclusion and exclusion criteria. A total of 283 respondents were selected, and their data were recorded and analyzed statistically.

Table 1. Demographic Characteristics (N= 283)

Variable	Category	n (%)
Gender	Female	209 (73.9)
	Male	74 (26.1)
Place of Residence	With Parents	151 (53.4)
	Boarding house/rented room (without parents)	132 (46.6)

The results of the study indicate that out of 283 respondents, the majority were female, totaling 209 individuals (73.9%), while males accounted for 74 individuals (26.1%). The distribution of respondents according to place of residence shows that among students, there are more respondents who live with their parents, totaling 151 people (53.4%), while those who live without their parents only number 132 people (46.6%).

Table 2. Distribution of Dyspepsia Status and Dietary Patterns

Variables	Frequency (f)	Percentage (%)
Dyspepsia Status		
Dyspepsia	9	34.6
Normal	185	65.4
Frequency of Spicy Food Consumption		
Frequent	7	24
Rarely	207	73
Never	6	2.1
Frequency of Consumption of Sour Foods		
Frequent	39	**13**
Rarely	23	**82**
Never	12	**4.2**

Based on Table 2, the majority of respondents were in the normal category (65.4%), while only 34.6% experienced dyspepsia. Regarding dietary habits, most respondents reported rarely consuming spicy foods (73%), while 24% consumed them frequently, and 2.1% never consumed them. In terms of sour food consumption, 82% of respondents reported rarely consuming sour foods, 13% consumed them frequently, and only 4.2% reported never consuming them.

Table 3. Distribution of Respondents According to Frequency of Spicy Food Consumption with Dyspepsia Syndrome

Variables	Prevalence of Dyspepsia		Total	*P-value*
	Dyspepsia	Normal	N(%)	
	n (%)	n (%)		
Frequency of Spicy Food Consumption				**0.276**
Frequent	29 (41.4)	41 (58.6)	70 (100)	
Rarely	68 (32.9)	139 (67.1)	207 (100)	
Never	1 (16.7)	5 (83.3)	6 (100)	
Frequency of Acidic Food Consumption				**0.367**
Frequent	17 (43.6)	22 (56.4)	39 (100)	
Rarely	76 (32.8)	156 (67.2)	232 (100)	
Never	5 (41.7)	7 (58.3)	12 (100)	

Table 3 shows the distribution of dyspepsia according to the frequency of spicy and acidic food consumption. Among respondents who frequently consumed spicy foods, 41.4% experienced dyspepsia, while 58.6% did not. In the group that rarely consumed

spicy foods, 32.9% had dyspepsia, and 67.1% were normal. Meanwhile, among those who never consumed spicy foods, 16.7% reported dyspepsia, and 83.3% were normal.

A similar pattern was found in the frequency of acidic food consumption. Of those who frequently consumed acidic foods, 43.6% experienced dyspepsia and 56.4% were normal. In respondents who rarely consumed acidic foods, 32.8% had dyspepsia and 67.2% were normal. Among those who never consumed acidic foods, 41.7% experienced dyspepsia compared to 58.3% who were normal.

Although a higher proportion of dyspepsia was observed among individuals who frequently consumed spicy and acidic foods, the association between food consumption patterns and dyspepsia was not statistically significant ($p = 0.276$ and $p = 0.367$, respectively). This suggests that, in this study population, spicy and acidic food consumption may not be a major determinant of dyspepsia.

An assessment was conducted to determine the relationship between dietary intake and dyspepsia among medical students at the University of Muslim Indonesia, Class of 2022, based on dyspepsia and the frequency of consumption of irritating foods. Dyspepsia is a collection of complaints and symptoms in the upper digestive tract, specifically in the epigastric region, including nausea, vomiting, bloating, feeling full quickly, a sensation of fullness, burning in the chest or digestive tract, and frequent belching (Keenem *et al.,* 2014). This syndrome or complaint can be caused by various specific diseases, particularly stomach diseases. This syndrome is not contagious but is common in the general population (National Institute for Health and Care Excellence, 2014).

The assessment of dyspepsia in this study was based on the Rome IV criteria, showing that among the 2022 students, 98 respondents (34.6%) experienced dyspepsia, while 185 respondents (65.4%) did not. This prevalence of dyspepsia is lower than the results of a study (Husnul Ikhsan et al., 2020) among first-year medical students at Andalas University, which reported a prevalence of dyspepsia of 46.0%, and from a study (Putri et al., 2022) on medical and health science students at Jambi University, which reported a prevalence of 53.8%. However, the prevalence of dyspepsia in this study is consistent with data from *the World Health Organization (*WHO), where dyspepsia cases worldwide account for 13–40% of the total population annually, and in Asian countries, dyspepsia ranges from 5–30%.(Suryanti, 2019; Francis and Zavala, 2024)

Nutrition in food is an important aspect to consider. This is related to the role of food as a source of essential nutrients for the body. Dietary patterns, including the type, quantity, and frequency of meals, need to be considered to alleviate the digestive system's ability to process consumed food. The types of food consumed should be monitored to avoid damaging the stomach lining (Savira *et al.,* 2023). However, many people neglect the nutritional composition of their meals, leading to an unbalanced diet ( ). Several studies have reported that the consumption of certain foods can trigger or alleviate dyspepsia symptoms.

Most students from the 2022 cohort prefer spicy foods over acidic foods such as rujak, asinan, yogurt, and many others, which is one reason why acidic foods are consumed less frequently by respondents. This may also be influenced by the availability of food in their environment and the dishes prepared at home or in nearby eating establishments, which are likely to be predominantly spicy in nature. (Putri et al., 2015; Siregar, 2021)

In this study, the frequency of consumption of irritating foods was measured using two points, namely the frequency of eating spicy foods and the frequency of eating sour foods. The data showed that 29 respondents who frequently consumed spicy foods

and 68 respondents who rarely consumed spicy foods experienced dyspepsia. The results of the statistical analysis using the *chi-square* test yielded a result of 0.276. This result indicates that *the* P *value* is > 0.05, thus indicating no significant relationship between the frequency of eating spicy foods and dyspepsia syndrome among medical students at the University of Muslim Indonesia, Class of 2022. This is consistent with the study conducted by (Kwon and Romero, 2010), which showed that spicy food does not significantly affect digestive function in healthy individuals and that tolerance to spiciness can increase over time. Supported by research conducted by (Petersen, 2014) on the general population in their country, which showed no direct relationship between spicy food consumption and an increase in gastrointestinal symptoms. (Petersen, 2014) stated that while spicy food can trigger discomfort in some individuals, many people consume it regularly without experiencing digestive issues. This may be due to the fact that reactions to spicy foods vary greatly among individuals (Kwon and Romero, 2010). Medical students who experience dyspepsia due to frequent consumption of spicy foods are accustomed to a diverse lifestyle and have a higher tolerance for spicy foods. The higher number of students who rarely consume spicy foods may also be due to their greater knowledge of health and nutrition. They understand how to regulate their diet and choose balanced foods, thereby reducing the risk of gastrointestinal problems (Harrison and Kwiatkowski, 2015).

Foods with high levels of spiciness can stimulate increased gastrin production, which triggers stomach acid. Spicy foods and chili peppers contain *capsaicin*, which has side effects but also benefits. *Capsaicin* works by first activating C-afferent fibers, which intensify symptoms, followed by desensitization, where there is a decrease in electrical activity transmission in the normal stomach (Koch and Schubert, 2015). Capsaicin enhances digestion by stimulating TRPV1 receptors in the digestive tract, which in turn stimulate the production of digestive enzymes such as amylase, lipase, and protease. This stimulation facilitates the breakdown of carbohydrates, fats, and proteins. The increased secretion of these enzymes contributes to more efficient digestion, helping the body break down and absorb nutrients from food (McCarty, DiNicolantonio, and O'Keefe, 2015). The activation of these receptors also helps improve intestinal motility. By stimulating these receptors, capsaicin can increase intestinal peristalsis, the rhythmic contractions that push food through the digestive system. This causes food to move more quickly through the digestive tract (Koch and Schubert, 2015). Capsaicin also stimulates the production of stomach acid, which is essential for the digestive process (Imatake, Matsui, and Moriyama, 2009). Stomach acid helps break down food into smaller particles, making it easier for digestive enzymes to work. The low pH created by stomach acid provides an ideal environment for digestion and inhibits the growth of pathogenic bacteria, thereby improving digestive efficiency (Koch and Schubert, 2015; Werner, 2021).

Data on the frequency of consuming acidic foods shows that those who rarely consume acidic foods are more likely to experience dyspepsia. This is evidenced by the results of respondents who rarely consume acidic foods and experience dyspepsia, totaling 76 people, and respondents who never consume acidic foods and experience dyspepsia, totaling 5 people. The statistical analysis yielded a result of 0.367. This result indicates that *the P-value* is >0.05, thus indicating no significant association between acidic foods and dyspepsia syndrome among medical students at the Faculty of Medicine, University of Muslim Indonesia, Class of 2022. The results of this study are similar to those of (Pramardika, Fatimah, and Kasaluhe, 2022), which was conducted on inpatients at Aji Muhammad Parikesit Tenggarong General Hospital, Kutai Kertanegara District, East Kalimantan Province, showing no association between acidic foods and dyspepsia

syndrome. However, these findings contradict those of Putri, Ernalia, and Bebasari (2015), who studied medical students at the University of Riau and found a significant association between acidic foods and dyspepsia syndrome. This discrepancy may arise because the causes of functional dyspepsia are not always related to excessive stomach acid. Factors such as delayed gastric emptying, hypersensitivity to stimuli, and psychosocial factors may also contribute to dyspepsia symptoms. Symptoms (Ford, Talley, and Moayyedi, 2009; Putri, Ernalia, and Bebasari, 2015)

CONCLUSION

There were 98 students from the Faculty of Medicine, University of Muslim Indonesia, class of 2022, who experienced dyspepsia out of a total of 283 respondents. Among the students, 70 frequently consumed spicy foods, 207 rarely did, and 6 never did. Among the 2022 cohort of medical students at the University of Muslim Indonesia, 39 students frequently consumed acidic foods, 232 rarely did so, and 12 never did. There was no significant association between irritating foods and dyspepsia syndrome among the 2022 cohort of medical students at the University of Muslim Indonesia.

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