

The Relationship Between Stress and Anxiety with the Occurrence of Functional Dyspepsia Among Medical Students of Sumatera Utara University

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ABSTRACT

Background: Functional dyspepsia is characterized by upper gastrointestinal symptoms like epigastric bloating, pain, and early satiation without structural disease evidence, including negative findings on endoscopy. Psychological triggers, such as stress and anxiety, may influence its occurrence. Previous research in Indonesia, including studies at Tarumanegara University, Mulawarman University, and the Islamic University of North Sumatra, has found associations between psychological factors and functional dyspepsia symptoms. Most respondents experienced dyspepsia linked to stress and anxiety. A study on patients at Dr. M. Jamil Hospital also confirmed this relationship. Building on the data mentioned, this study aims to explore and confirm the relationship between stress, anxiety, and the occurrence of functional dyspepsia in medical students at Sumatera Utara University.

Methods: This research utilized a cross-sectional analytical approach with a sample of 261 medical students from Sumatera Utara University, selected via quota sampling, and applied the Rome IV and DASS-21 criteria questionnaires. Data were collected from September 2022 until October 2022.

Results: This study showed a 47.9% prevalence of functional dyspepsia among respondents, with 44.1% experiencing moderate stress and 72.4% having very severe anxiety. The Chi-square test revealed significant relationships between stress ($p=0.026$) and anxiety ($p=0.038$) with functional dyspepsia incidence. Spearman correlation tests further confirmed significant relationships between stress levels ($p=0.049$) and anxiety levels ($p=0.030$) and functional dyspepsia.

Conclusion: There is a relationship between stress and anxiety with the incidence of functional dyspepsia in medical students of Sumatera Utara University.

Keywords: Functional dyspepsia, medical students, stress, anxiety, Sumatera Utara University

ABSTRAK

Latar Belakang: Dispepsia fungsional adalah pengklasifikasian dari dispepsia, didefinisikan sebagai kumpulan gejala pada saluran cerna atas seperti perut kembung, nyeri epigastrik, dan rasa cepat kenyang saat makan yang tidak disebabkan oleh kelainan organik pada pemeriksaan endoskopi. Salah satu faktor yang dapat menyebabkan terjadinya dispepsia fungsional adalah faktor psikis seperti stres dan kecemasan. Penelitian sebelumnya di Indonesia, termasuk yang dilakukan di Universitas Tarumanegara, Universitas Mulawarman, dan Universitas Islam Sumatera Utara, telah menemukan hubungan antara faktor psikologis dan gejala dispepsia fungsional. Sebagian besar responden mengalami dispepsia yang terkait dengan stres dan kecemasan.

Hubungan ini juga ditegaskan dalam sebuah penelitian yang dilakukan pada pasien di Rumah Sakit Dr. M. Jamil. Berdasarkan berbagai teori dan data, penelitian ini bertujuan untuk mengidentifikasi hubungan antara stres dan kecemasan dengan kejadian dispepsia fungsional pada mahasiswa kedokteran Universitas Sumatera Utara.

Metode: Penelitian menggunakan metode potong lintang analitik, melibatkan 261 mahasiswa yang dipilih melalui teknik quota sampling dan menggunakan kuesioner Roma IV serta DASS-21. Penelitian dilakukan dari September 2022 hingga Oktober 2022.

Hasil: Penelitian menunjukkan prevalensi dispepsia fungsional sebesar 47,9%, dengan 44,1% mengalami stres (terutama tingkat sedang) dan 72,4% mengalami kecemasan (terutama tingkat sangat berat). Uji Chi-square menunjukkan hubungan signifikan antara stres ($p=0,026$) dan kecemasan ($p=0,038$) dengan kejadian dispepsia fungsional, serta uji korelasi Spearman menunjukkan hubungan signifikan antara tingkat stres ($p=0,049$) dan kecemasan ($p=0,030$) dengan kejadian dispepsia fungsional.

Simpulan: Terdapat hubungan antara stres dan kecemasan dengan kejadian dispepsia fungsional pada mahasiswa kedokteran Universitas Sumatera Utara.

Kata Kunci: Dispepsia fungsional, mahasiswa kedokteran, stres, kecemasan, universitas sumatera utara

INTRODUCTION

Dyspepsia is a common condition encountered in daily medical practice. Functional dyspepsia, a subtype of dyspepsia, is characterized by a range of symptoms in the upper gastrointestinal tract, including bloating, epigastric pain, and early fullness, without any indication of structural abnormalities, even upon upper endoscopy, that could account for these symptoms.¹ Symptoms that may appear in functional dyspepsia include epigastric pain, heartburn, a feeling of fullness after eating, or early satiety.² The onset of functional dyspepsia is often associated with psychological issues. In the adult population of the United States, dyspepsia is frequently triggered by various problems such as sexual and verbal abuse during childhood or adulthood. In Australia, functional dyspepsia patients have high anxiety and depression scores. A high prevalence of functional dyspepsia, around 76%, is found in Spain among victims of domestic violence.³

There's many studies in Indonesia that have shown an association between psychological factors with occurrence of functional dyspepsia symptoms. For instance, a study conducted on medical students of Tarumanegara University found a positive correlation between anxiety and the severity of functional dyspepsia.⁴ Another study involving 173 medical students of Mulawarman University, as well as 80 medical students of Islamic University of North Sumatra, showed similar results. Most respondents experienced functional dyspepsia, and a relationship was found between stress and the occurrence of functional dyspepsia.^{5,6} Meanwhile, a study conducted on 40 dyspepsia patients at Dr. M. Jamil Hospital in Padang found that most patients reported moderate

dyspepsia. Additionally, the psychosomatic disorders experienced by functional dyspepsia patients included depression and anxiety.⁷

Several theories link psychological factors with onset of dyspepsia symptoms due to the brain-gut axis mechanism, which involves the central nervous system, autonomic nervous system, and enteric nervous system. Disruptions in the brain-gut axis—such as from psychosocial stimuli—can activate the hypothalamic-pituitary-adrenal (HPA) axis, triggering cortisol release as the body's physiological response to stressors. This response can affect gastrointestinal motility and lead to the onset of dyspepsia symptoms³.

Based on various studies outlining the theoretical connection between stress, anxiety, and the occurrence of functional dyspepsia, along with the notably high prevalence of the condition in different regions, this study aims to explore the potential association between stress, anxiety, and the incidence of functional dyspepsia among medical students at Sumatera Utara University.

METHODS

This study uses an analytical approach with a cross-sectional design to investigate the association between stress, anxiety, and the prevalence of functional dyspepsia among medical students of Sumatera Utara University. The study was conducted online by distributing questionnaires including Roma IV criteria and DASS-21 criteria through Google Form links on various social media platforms. Data were collected from September 2022 until October 2022.

In this study, the population consisted 261 medical students of class 2019-2021 from Sumatera Utara University. Participants were selected using a quota sampling technique, which involved setting a predetermined number of respondents who met the inclusion and exclusion criteria from each classes.

Data analysis utilized IBM SPSS software (Statistical Products and Service Solutions), version 25.0 for Windows, developed by SPSS Inc., Chicago, US. The statistical analyses conducted included the Chi-square test and Spearman’s rank correlation, which were utilized to evaluate the association between independent and dependent variables in categorical data, applying a significance level of $p < 0.05$.

The study has been approved by the Health Research Ethics Committee of the Sumatera Utara University through letter No.763/KEPK/USU/2022. This procedure aims to clarify the objectives and responsibilities of the researchers and ensure the rights of both researchers and respondents.

Inclusion Criteria

Medical students of Sumatera Utara University aged 17-24 years who still active as student and also agreed to participate in the study by signing the informed consent and were cooperative.

Exclusion Criteria

1. Medical students of Sumatera Utara University who present alarm signs (such as rectal bleeding or melena, weight loss greater than 10%, anorexia, persistent vomiting, anemia or bleeding, abdominal masses, lymphadenopathy, progressive dysphagia or odynophagia, family history of upper gastrointestinal malignancy, history of gastrointestinal malignancy or previous gastrointestinal surgery, jaundice, and a history of peptic ulcer disease).
2. Medical students of Sumatera Utara University who are experiencing menstruation when dyspepsia symptoms occur.

RESULTS

Table 1. Frequency Distribution of Respondents by Gender and Age

| Characteristics | Frequency (n) | Percentage (%) |
|-----------------|---------------|----------------|
| Gender | | |
| Male | 102 | 39,1% |
| Female | 159 | 60,9% |
| Age | | |
| 17 | 6 | 2,3% |
| 18 | 15 | 5,7% |
| 19 | 85 | 32,6% |
| 20 | 84 | 32,2% |
| 21 | 59 | 22,6% |
| 22 | 11 | 4,2% |
| 24 | 1 | 0,4% |

In this study, there were 102 male respondents (39.1%) and 159 female respondents (60.9%), indicating that the majority participants were female. Furthermore, the most common age among respondents was 19 years as many as 85 respondents (32.6%) in this group.

Table 2. Frequency Distribution of Respondents Experiencing Symptoms of Functional Dyspepsia

| Functional Dyspepsia | Frequency (n) | Percentage (%) |
|------------------------------------|---------------|----------------|
| Having symptoms | 126 | 48,3% |
| Didn't have any symptoms | 135 | 51,7% |
| Classifications of Symptoms | | |
| Postprandial Distress Syndrome | 72 | 27,6% |
| Epigastric Pain Syndrome | 23 | 8,8% |
| Mixed Dyspepsia | 31 | 11,9% |

According to **Table 2**, there were 126 respondents (48.3%) who experienced functional dyspepsia, with the most common type of symptoms were postprandial distress syndrome, affecting 72 individuals (27.6%). Meanwhile, 135 respondents (51.7%) did not experience functional dyspepsia. This study also found that respondents experiencing stress were primarily at a moderate level, whereas those experiencing anxiety were predominantly at a very severe level.

The analysis results in **Table 3** that using Chi-square test indicate a significant relationship between stress and functional dyspepsia ($p < 0.05$). The Spearman correlation test yielded a p-value of 0.049 ($p < 0.05$), confirming a correlation between stress levels and functional dyspepsia.

Table 3. The Relationship Between Stress and Functional Dyspepsia

| Stress | Functional Dyspepsia | | | | Total | | p value |
|----------------------|----------------------|-------|----|-------|-------|-------|---------|
| | Yes | | No | | n | % | |
| | n | % | n | % | | | |
| Yes | 64 | 24,5% | 51 | 19,5% | 115 | 44% | 0,034* |
| No | 62 | 23,8% | 84 | 32,2% | 146 | 56% | |
| Stress Levels | | | | | | | |
| Normal | 62 | 23,8% | 84 | 32,2% | 146 | 56% | 0,049** |
| Mild | 16 | 6,1% | 12 | 4,6% | 28 | 10,7% | |
| Moderate | 23 | 8,9% | 16 | 6,1% | 39 | 15% | |
| Severe | 15 | 5,8% | 19 | 7,2% | 34 | 13% | |
| Extremely Severe | 10 | 3,8% | 4 | 1,6% | 14 | 5,4% | |

*) Chi-square test **) The Spearman Correlation

Table 4. The Relationship Between Anxiety and Functional Dyspepsia

| Anxiety | Functional Dyspepsia | | | | Total | | p value |
|-----------------------|----------------------|-------|----|-------|-------|-------|---------|
| | Yes | | No | | n | % | |
| | n | % | n | % | | | |
| Yes | 98 | 37,5% | 90 | 34,5% | 188 | 72% | 0,046* |
| No | 28 | 10,8% | 45 | 17,2% | 73 | 28% | |
| Anxiety Levels | | | | | | | |
| Normal | 28 | 10,7% | 45 | 17,3% | 73 | 28% | |
| Mild | 6 | 2,3% | 7 | 2,7% | 13 | 5% | |
| Moderate | 24 | 9,2% | 31 | 11,8% | 55 | 21% | 0,030** |
| Severe | 25 | 9,6% | 14 | 5,3% | 39 | 14,9% | |
| Extremely Severe | 43 | 16,5% | 38 | 14,6% | 81 | 31,1% | |

*) Chi-square test **) The Spearman Correlation

The analysis results in **Table 4** that using the Chi-square test shows a significant relationship between anxiety and functional dyspepsia ($p < 0.05$). The Spearman correlation test yielded a p-value of 0.030 ($p < 0.05$), indicating a correlation between anxiety levels and functional dyspepsia.

DISCUSSION

In this study, the findings revealed that most respondents experienced moderate levels of stress. This aligns with the study by Ashari et al⁵ in a study conducted among medical students at Mulawarman University, which similarly reported moderate stress level was the most frequently observed level among respondents. A comparable study by Syahputra and Purnama⁶ reported that respondents from the Faculty of Medicine at UISU predominantly experienced moderate stress levels. Azis and Bellinawati⁸ revealed that medical students are at a higher risk of experiencing stress compared to students in non-medical programs. Various factors contribute to stress among medical students, including living far from parents, financial issues, coursework demands, academic performance, and others.

Meanwhile, the highest level of anxiety reported by respondents in this study was classified as very severe. A similar finding was observed in a study conducted by Marsidi⁹ among RMIK students at Esa Unggul

University in preparation for the exit competency exam, where most respondents experienced anxiety categorized as very severe. Anxiety is a condition that causes feelings of discomfort, weakness, and fear of uncertain situations or events¹⁰. According to research conducted by Setiyani¹¹, health science students experience higher levels of anxiety and depression compared to non-health science students. This is attributed to various factors, including the demands for greater engagement in the learning process, a more competitive environment, reduced break time due to tight schedules, and the necessity to develop time management skills and mental resilience in their studies. However, a different result was found in the study by Rahmadiyah¹² among medical students at Tanjungpura University, where the majority of respondents experienced anxiety at a mild level. This was attributed to the respondents' ability to manage their anxiety effectively, preventing it from negatively impacting their overall well-being and daily lives.

In this study, 125 respondents (47.9%) were found to experience dyspepsia with postprandial distress syndrome being the most common type of symptom. Similar findings were reported by Indra¹³ in a study conducted among medical students at the Sumatera Utara University, where most respondents did not experience functional dyspepsia, and postprandial distress syndrome was the dominant type among those who did. This type of dyspepsia is classified

according to the Rome IV diagnostic criteria, with symptoms including bloating and early satiety, making it difficult to finish a regular portion of food¹⁴. In various epidemiological studies and clinical practice, postprandial distress syndrome is the most commonly observed symptom. The pathophysiology is quite heterogeneous and multifactorial. However, mechanisms such as delayed gastrointestinal motility, hypersensitivity, and duodenal inflammation play key roles in the onset of these symptoms¹⁵.

Bivariate analysis results showed a significant association between stress levels and the occurrence of functional dyspepsia. This study aligns with research conducted by Hasibuan and Darungan¹⁶ on medical students at UISU ($p < 0.05$), Ikhsan et al¹⁷ on medical students at UNAND ($p < 0.05$), and Asharis et al⁵ on medical students at Mulawarman University ($p < 0.05$), all of which also demonstrated a strong, significant relationship between stress and functional dyspepsia.

This study also found a significant relationship between anxiety levels and the occurrence of functional dyspepsia. Similar findings were reported in research by Rahmadyah¹² on medical students at Tanjungpura University ($p < 0.05$) and by Angelia and Sutanto⁴ on medical students at Tarumanagara University ($p < 0.05$), both of which identified a strong positive correlation between anxiety and functional dyspepsia. The study by Huang et al¹⁸ on medical students at Xi'an Medical University found that the majority of respondents with functional dyspepsia experienced mild anxiety, depression, and stress, primarily due to social life, daily schedules, and activities.

The influence of psychological factors on the onset of symptoms is thought to involve the brain-gut axis mechanism, where stimuli can impact the autonomic nervous system, hormonal balance, and immune function⁷. This mechanism is mediated by the hypothalamic-pituitary-adrenal (HPA) axis. When the body is exposed to stress, the HPA axis and autonomic nervous system are activated, resulting in the secretion of corticotropin-releasing hormone (CRH), which sends visceral afferent information to the brain and triggers both physical and psychological responses². This was demonstrated in a study by Widya Murni⁷ on patients with functional dyspepsia and psychosomatic symptoms, which showed a significant increase in plasma cortisol levels.

Dysfunction or abnormalities in the gut-brain axis can lead to impaired integration of signaling processes. Signals that are not pain or noxious stimuli, such as those arising from psychological issues, may be

perceived as pain and discomfort¹⁹. The autonomic nervous system, particularly the sympathetic nervous system, triggers a rapid response from the body to stressors, activating the "fight or flight" response. This results in increased functioning of body systems and various organs, except for the digestive system. The release of cortisol stimulates increased production of stomach acid, while the slowing of gastrointestinal motility due to sympathetic nervous system activation leads to symptoms such as epigastric pain and feelings of fullness or early satiety²⁰.

LIMITATION AND SUGGESTION

Based on the analysis of this study, there were respondents who experienced functional dyspepsia without the presence of stress and anxiety factors. In research conducted by Indra¹³ on medical students of Sumatera Utara University, a significant relationship was found between eating patterns and the consumption of irritative beverages with the occurrence of functional dyspepsia. Meanwhile, the findings of Sitompul²¹ indicate a relationship between the use of NSAIDs and eating patterns with dyspepsia syndrome. This suggests that psychological factors are not the only contributors to functional dyspepsia. Additionally, this study did not identify the specific causes of stress and anxiety experienced by the respondents. Consequently, future researchers should examine other risk factors associated with functional dyspepsia, including genetic influences, dietary choices, medications, and gender, also identifying the specific causes of stress and anxiety experienced by the respondents.

CONCLUSION

Based on the research findings and data analysis, it was observed that the predominant stress level among respondents was moderate, while the most common anxiety level was classified as very severe. This study also identified a significant relationship between stress and anxiety with the occurrence of functional dyspepsia among the respondents.

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