

Anxiety level and functional dyspepsia incidence during COVID-19 pandemic

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ABSTRACT

The adaptation process of the learning system, the hospital environment, and the high risk of COVID-19 infection can be stressors for anxiety in clinical clerkship. Through the brain-gut-axis, the interaction of psychological factors, such as anxiety, can trigger symptoms related to functional dyspepsia. This study aimed to determine the relationship between anxiety levels and functional dyspepsia during the COVID-19 pandemic among clinical clerkship students. This research was conducted on clinical clerkship students/young doctors in 2021. This was an observational analytic study with a cross-sectional approach and involved 131 respondents. The hamilton anxiety rating scale (HARS) questionnaire was utilized to quantify the level of anxiety, while functional dyspepsia was measured based on Rome IV criteria. The data were analyzed by the Lambda (λ) coefficient of correlation test. This study revealed a significant relationship between anxiety level and functional dyspepsia during the COVID-19 pandemic.

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1. INTRODUCTION

Coronavirus disease 2019 (COVID-19) is pandemic crisis caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This infectious disease was discovered in China at the end of December 2019. The World Health Organization (WHO) declared COVID-19 a global pandemic after 121,000 confirmed cases [1]. The outbreak has expanded the risk of infection related to mortality cases and has prompted unendurable mental issues in individuals' emotional wellness. Particularly well-being health workers, the front line during the pandemic [2]. Anxiety is one of the biggest concerns during the rapid expansion of Coronavirus cases [3]. A few studies have uncovered the high anxiety levels in doctors, nurses, medical students, and other health workers during the Coronavirus flare-up, as in previous MERS-CoV and SARS-CoV-1 outbreaks [4]. A study in Jordan showed that 33.8% of clinical understudies had unusual uneasiness levels during the Coronavirus pandemic [5]. Several studies have shown an increasing prevalence of psychological factors such as anxiety, depression, insomnia, fear, somatization, and obsessive-compulsive symptoms among health care workers (HCWs) during the COVID-19 pandemic, especially among the clinical team in high-risk units such as emergency departments (ER) and intensive care units (ICU) [6]. A cross-sectional study using the beck anxiety inventory (BAI) online survey instrument also showed levels of anxiety ranging from mild to severe in young doctors during the COVID-19 pandemic [7]. Anxiety levels can be found in each individual with different intensities. Anxiety is understood as a pathological form of fear in times of normal conditions and manifested by mood disturbances such as thought, behavior, and physiological activity

[8]. Anxiety is a common psychological disorder that affects the gastrointestinal tract function through the brain-gut-axis and leads to functional dyspepsia symptoms [9].

Functional dyspepsia is a chronic disorder of the upper abdomen without organic abnormalities on endoscopic examination that is common in the general population [10]. Globally, the prevalence of functional dyspepsia ranges from 11% to 29.2%, with an incidence of 1-5% per year. In some countries, the incidence of dyspepsia is 15-40%, while the prevalence in Asia is 8-30%. The incidence in Indonesia remains high [11] it is estimated that 15-40% of the Indonesian population has dyspepsia with a community prevalence of around 20% [12]. The Indonesian ministry of health data shows that dyspepsia ranks 15 out of 50 diseases suffered by hospitalized patients in Indonesia with a proportion of 1.3%. Dyspepsia also ranks 35 out of 50 fatal diseases in Indonesia [13]. The ministry of health stated that Aceh's functional dyspepsia incidence reached 31.7% in 2016 [14].

Psychological factors (anxiety, depression, panic) affect the stimulating mechanism of the secretion of acetylcholine, gastrin, and histamine, which are developed and manifested in dyspepsia symptoms. This condition occurs due to direct stimulation of the central nervous system (CNS), especially the vagus nerve, which innervates the stomach [15]. A population survey in Japan shows that 8.5% of 5,157 subjects experienced functional dyspepsia during the pandemic and experienced an increase in gastrointestinal symptoms by 2.8%. Anxiety conditions during the COVID-19 pandemic are more closely associated with functional dyspepsia than depression and other psychological factors [16]. A descriptive study of 703 patients with functional dyspepsia and gastroesophageal reflux symptoms discovered that anxiety was responsible for 63% of the incidence of functional dyspepsia [17].

In the pandemic era, it is essential to know in detail about the physical and mental health problem experienced by clinical clerkship students. Clinical clerkship students or young doctors are one of the populations at high-risk of exposure to COVID-19 infection. The adaptation process to the hospital environment, the education learning system, and the high-risk infection during the work hour can be stressors for anxiety which will have a significant correlation with gastrointestinal complaints. Consequently, this study aims to discover the correlation between anxiety level and functional dyspepsia incidence during the COVID-19 pandemic outbreak crisis. In addition, the differences in anxiety level and incidence of dyspepsia functional among the clinical clerkship students were also identified. This study is supposed to be an assessment material for strategy making by the faculty or university and hospital related to improving clinical clerkship students' physical and emotional well-being.

2. RESEARCH METHOD

This study employed analytical observational design with cross-sectional approach. Data collection was carried out in 2021 at the Zainoel Abidin Regional General Hospital, Banda Aceh, Indonesia. The minimum required sample size was 144 using a margin of error of 5%. The sample size of this study was 131. A total of 131 clinical clerkship students were selected by a non-probability sampling method using consecutive sampling, which was carried out by determining the minimum number of samples in the study.

The study included all clinical clerkship students from the Faculty of Medicine, Syiah Kuala University/RSUDZA, who agreed to fill out the questionnaire and have been undergoing psychomotor activities at the hospital for at least three months starting from March 2020-March 2021. The exclusion criteria were any participant who is: i) has been diagnosed with gastrointestinal disorders, ii) has been diagnosed with anxiety disorders, and iii) has alarm symptoms. This study used two e-questionnaires; hamilton anxiety rating scale (HARS) questionnaire measured anxiety level and functional dyspepsia by a questionnaire based on Rome IV criteria distributed online through personal online chat.

Data analysis was carried out using univariate and bivariate approaches. Univariate analysis was carried out to assess the patients' characteristics based on age, gender, period of clinical year, and history of COVID-19 infection. The result provided an overview of the anxiety level and functional dyspepsia incidence during the COVID-19 pandemic in clinical clerkship students of the Faculty of Medicine, Syiah Kuala University/RSUDZA. Meanwhile, a bivariate analysis was conducted to determine the correlation between the independent and dependent variables (anxiety level and functional dyspepsia incidence). The study was proven using a Lambda correlation coefficient test (λ).

3. RESULTS AND DISCUSSION

3.1. Results

Figure 1 illustrates the flow chart of the study results from 131 respondents who met the inclusion and exclusion criteria. The subjects' general characteristics include age, gender, period of clinical year, COVID-19 infection history, family with COVID-19 infection history, anxiety level, and functional dyspepsia incidence.

Furthermore, the respondent's characteristics are presented in Table 1. A total of 131 clinical clerkship students were included. Descriptive statistical analyses were used to describe the general characteristics section to determine the frequencies to describe the sample for the demographics section. In our study, female students were predominant, with a range of students around 21-27 years of age.

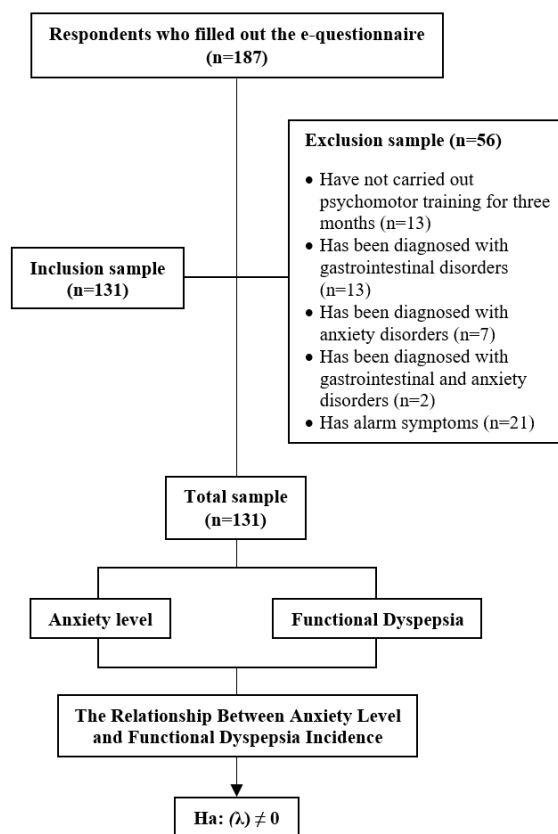


Figure 1. Study results flow chart

Table 1. The subjects' general characteristics

Characteristics	n (%)
Age in years	
21	7 (5.3)
22	25 (19.1)
23	53 (40.5)
24	32 (24.4)
25	8 (6.1)
26	2 (1.5)
27	4 (3.1)
Gender	
Male	30 (22.9)
Female	101 (77.1)
Period of clinical year in months	
14	8 (6.1)
15	58 (44.3)
21	2 (1.5)
23	9 (6.9)
26	54 (41.2)
COVID-19 infection history	
Yes	30 (22.9)
No	101 (77.1)
Family with COVID-19 infection history	
Yes	40 (30.5)
No	91 (69.4)

Table 2 indicates the anxiety levels of each respondent's dealing with the Hamilton Anxiety Rating Scale (HARS) questionnaire. The indicator for the study categorized each variable as no anxiety, mild anxiety, moderate anxiety, and severe anxiety. The analysis results show that 21.3% of participants experience anxiety with different anxiety levels. Furthermore, Table 3 explains the reason for the respondents' anxiety. The study shows that most anxieties were due to worries about getting infected by COVID-19. This reason was stated by 17 out of 28 respondents (60.7%) who experienced mild to severe anxiety. Hence, Figure 2 describes the distribution of functional dyspepsia incidence using Rome IV functional dyspepsia criteria. The results discovered that almost half of the subjects had experienced functional dyspepsia during the COVID-19 pandemic. Moreover, the results of the correlation analysis between anxiety levels with the incidence of dyspepsia functional during the COVID-19 pandemic are shown in Table 4. This table shows that anxiety has a significant correlation with the incidence of dyspepsia functional.

Table 2. The distribution of anxiety level

Anxiety levels	n (%)
No anxiety	103 (78.6)
Mild anxiety	13 (9.9)
Moderate anxiety	7 (5.3)
Severe anxiety	8 (6.1)
Very severe anxiety	0

Table 3. The reasons of anxiety

Reasons	Mild, moderate, and severe anxiety level		No anxiety
	n (%)		n (%)
Infected by COVID-19	17 (60.7)		56 (54.4)
Repeat the clinical year	3 (10.7)		7 (6.8)
Lack of competence	2 (7.15)		19 (18.4)
Change to the new system	2 (7.15)		2 (1.9)
Exams	4 (14.3)		3 (2.9)
Others	0		8 (7.8)
Do not feel anxious	0		8 (7.8)
Total	28 (100.0)		103 (100.0)

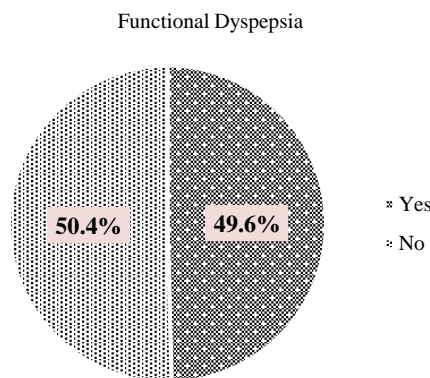


Figure 2. The distribution of functional dyspepsia incidence

Table 4. The correlation between anxiety level and functional dyspepsia incidence

Anxiety levels	Functional dyspepsia Incidence				Total	Percentage (%)	r	p-value
	Yes		No					
	n	%	n	%				
No anxiety	44	42.7	59	57.3	103	100	78.6	0.215 0.007
Mild anxiety	8	61.5	5	38.5	13	100	9.9	
Moderate anxiety	7	100	0	0	7	100	5.3	
Severe anxiety	6	75	2	25	8	100	6.1	
Very severe anxiety	0	0	0	0	0	0	0	

3.2. Discussion

The COVID-19 pandemic has overwhelmed and disrupted healthcare services in Indonesia and worldwide, especially among healthcare workers (HCWs). Clinical clerkship students are part of the HCWs, the high-risk population exposed to COVID-19 infection during the hospital's clinical clerkship period. Clinical clerkship students could spread the infection to patients and their family members. This study highlights that COVID-19 infections in clinical clerkships students are probability acquired in healthcare settings in terms of airborne droplets and direct contact with contaminated surfaces during their working hours.

The results of this study indicated that mild anxiety is the most anxiety level found in clinical clerkship students' experience, relevant to the findings of previous studies which using descriptive statistical analysis revealed that 48% of subjects experienced mild anxiety [16]. The finding of this research is in line with previous studies conducted on Saudi Arabian students during the COVID-19 pandemic showing 21.5% of respondents had mild-moderate anxiety, 8.8% had moderate-severe anxiety, and 4.3% had severe-very severe anxiety. The current study also supported the result of this study by evaluating the effects of the COVID-19 pandemic on doctors working at the internal medicine department of the Tertiary Care Hospital. The study shows that 56.6% of respondents experienced mild anxiety based on the beck anxiety inventory (BAI) score [17]. Similarly, the current study shows that the anxiety rate of medical students increase to 61% during the COVID-19 pandemic, compared to the previous medical student [18].

Medical students show higher anxiety levels than the general population because they are more likely to be infected with COVID-19 in the work area. Anxiety in medical students that are difficult to overcome can negatively impact academic performance, professionalism, empathy for patients, academic dishonesty, and absence from learning processes as ways to overcome anxiety effects [19]. Common sources of anxiety include risks to the health of the individual or their relatives, fear of exposure, high possibilities of infection, and uncertainties about the virus development [20].

Similarly, the results of this study about the impacts and sources of anxiety are in line with the study on young doctors in Iran. The study shows that the prevalence of anxiety during the COVID-19 pandemic was 38.1%, with a high level of anxiety discovered in young doctors with a history of COVID-19. A history of COVID-19 infection determines anxiety development in young doctors. This condition is related to young doctors who have only recently adapted to the COVID-19 patient care environment. In contrast, this condition did not affect other health workers [6]. This study also shows that the anxiety stressors were worries regarding competence and exams. The current study discovered that the high anxiety levels among medical students were due to a lack of clinical rotation, which was replaced with online learning. This learning arrangement was considered to potentially affect their competence compared to the learning system before the COVID-19 pandemic [21].

We also found that the incidence of functional dyspepsia during the COVID-19 outbreak by clinical clerkship students was 49.6%. Previous research in Peru found that the prevalence of functional dyspepsia in medical students was 16.9%, higher than the prevalence of Irritable Bowel Syndrome [22]. Similarly, the previous study discovered a high incidence of uninvestigated dyspepsia (46%) among medical students in four universities in Latin America. Furthermore, the current study stated that the prevalence of gastrointestinal disorders, including functional dyspepsia, increased significantly during the regional lockdowns due to the COVID-19 pandemic compared to normal conditions in the previous year, 18.3% and 12.7%, respectively, with a p-value of <0.001 [23]. During the COVID-19 pandemic, this disorder is associated with increased psychosocial factors (anxiety, depression, panic) affecting brain-gut-axis interaction. Moreover, other studies support this result through a population survey, which showed that 8.5% of respondents had functional dyspepsia. In comparison, there was a 2.8% increase in gastrointestinal symptoms during the coronavirus pandemic [13]. His study is also in line with Oliviero *et al.* study, which demonstrated the proportion of patients who considered themselves improving, unchanged, or worsening compared to their condition before the pandemic. Around 44% of patients experienced increased functional dyspepsia symptoms during the pandemic [24].

This study demonstrated a significant relationship with a weak correlation between the anxiety level and functional dyspepsia incidence. This result agrees with the study by Annisa, who stated that there is a significant relationship between anxiety, functional dyspepsia syndrome, and its severity [11]. Furthermore, Adibi *et al.* found that patients with functional dyspepsia had a fundamentally higher anxiety level than patients without functional dyspepsia [25]. The result of this study is also in line with a large-scale epidemiology study by Shadi and Jenifer by showing an anxiety disorder more frequently happens in patients with functional dyspepsia compared to other psychosocial factors, such as depression and stress [26]. A study by Esterita *et al.* using PRISMA criteria revealed a significant correlation between functional dyspepsia and psychological conditions, e.g., anxiety. Therefore, it is essential to identify psychological conditions in patients with functional dyspepsia to determine the therapy option and to improve prognosis, also increasing the quality of life [27]. Furthermore, Aro *et al.* mentioned that a population study of 2,860 subjects discovered that anxiety is highly associated with functional dyspepsia, particularly symptoms of feeling full and bloating after a meal

(postprandial distress syndrome) [28]. The study is supported by Werden, who mentioned a significant relationship between anxiety and gastrointestinal symptoms (p -value=0.009) [29]. Similarly, Kugler found that 50.4% of subjects with dyspepsia had a high mean anxiety score (p <0.001). This condition is believed to be related to the severity of symptoms, which is the most critical factor in predicting anxiety [30].

Anxiety is suspected to affect the secretion of acetylcholine, gastrin, and histamine, which subsequently can cause dyspepsia. This condition happens due to a direct effect on the central nervous system, specifically the vagus nerve that innervates the stomach [31]. According to Drossman, psychosocial conditions have significant roles in the emergence of gastrointestinal disorders and cause functional gastrointestinal disorders through the brain-gut-axis mechanism. Anxiety will affect gastrointestinal motility, sensitivity, and barrier. This condition is manifest in alternating sympathetic and parasympathetic autonomic nervous balance disorders (vegetative imbalance) and affects the immune system (psycho-neuro-immune-endocrine), hormonal function, and the hypothalamic-pituitary-adrenal (HPA) axis through the release of corticotropin-releasing hormone (CRH) [32]. The conditions mentioned above can affect the digestive tract directly or simultaneously. The communication between the digestive tract and the HPA axis through the brain-gut-axis mechanism allows psychological conditions, such as anxiety, to cause gastrointestinal disorders, such as dyspepsia [11], [31].

4. CONCLUSION

Clinical clerkship students or young doctors experienced different anxiety levels during the COVID-19 outbreak, and were dominated by mild anxiety. The study revealed that almost half of the study subjects felt the symptom of dyspepsia functional during the COVID-19 pandemic. Of course, both problems can affect each other through the brain-gut-axis mechanism. The study also proofed that there is a significant relationship between the anxiety level and functional dyspepsia incidence. The findings from the present study can be used as an important anchor point for raising public awareness about mental health, especially in the state of the changes in the aftermath of the pandemic. We recommend to all related institutions handle the psychological factors that occur in medical personnel in particular to reduce levels of anxiety and improve the coping strategies of the health workers.

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