Prevalence and Relationship of Gastrointestinal Symptoms and Depression in Medical Students

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Abstract

Functional gastrointestinal disorders are extremely common in the population. Epidemiological studies demonstrate a higher prevalence of anxiety and depression in patients with functional dyspepsia than in healthy individuals, possibly indicating an intrinsic role of these psychiatric disorders in the etiopathogenesis. This cross-sectional study included 669 first- to fourth-year medical students at Omsk State Medical University. The study revealed a high prevalence of depression among medical students, significantly exceeding the average population data. An extremely high prevalence of undiagnosed gastrointestinal pathology was found among young people receiving higher medical education. The extremely high prevalence of GI syndromes combined with depression revealed in the study requires a comprehensive study in order to establish the leading causes of this association.

Keywords: depression, gastrointestinal pathology, prevalence, medical students

Introduction

According to epidemiological studies, about half of the population in developed countries has complaints associated with functional gastrointestinal disorders (Mykletun et al., 2010). A meta-analysis by Levy et al. notes that patients with functional gastrointestinal disorders have levels of anxiety and depression intermediate between psychiatric patient groups and healthy person groups (Levy et al., 2006). A number of researchers believe that a significant proportion of patients with functional gastrointestinal disorders require mental status correction (E, 2015; Mahov, Romasenko, & Turko, 2007). Also, therapy for this category of patients is often complicated by low adherence to treatment (E, 2015; Nikolaev & Martynov, 2020).

An association between the mental status of patients and the prevalence of gastrointestinal diseases has now been shown (Van Oudenhove & Aziz, 2013). Epidemiological studies demonstrate a higher prevalence of anxiety and depression in patients with functional dyspepsia than in healthy adults, which, according to Henningsen et al., indicates an intrinsic role of these mental disorders in the etiopathogenesis of functional dyspepsia (Henningsen, Zimmermann, & Sattel, 2003). Epidemiological evidence also suggests a role for personality traits, stressful life events in general (particularly episodes of sexual and physical abuse), and other psychosocial factors in functional dyspepsia (Hui, Shiu, & Lam, 1991; Koloski, Talley, & Boyce, 2005).

Coen et al. (2008); Coen et al. (2011) pathophysiological studies suggest that psychosocial factors and psychiatric disorders may play a role in functional gastrointestinal disorders by modulating the processing of afferent and efferent visceral signals in the brain. According to Van Oudenhove et al. (2012) and colleagues, the autonomic nervous system and the hormonal stressor system are important brain interfaces through which psychosocial factors and mental illness can influence gastrointestinal motor function.

A 1992 study by Walker, Katon, Jemelka, and Roy-Byrne (1992) that included 18,571 patients found that medically unexplained gastrointestinal symptoms at the time had a high prevalence in the general population (6-25%). Compared to those who reported no gastrointestinal symptoms, subjects who reported at least one of these symptoms were multiply more likely to have also experienced episodes of major depression, panic attacks, or agoraphobia during their lifetime. Subjects with two gastrointestinal symptoms had even higher lifetime rates. Rates of affective and anxiety disorders in the general population were higher in subjects with gastrointestinal symptoms compared to subjects without gastrointestinal symptoms (MA, V, V, & V, 2020; North, Hong, & Alpers, 2007).

Medical education is one of the most emotionally stressful and difficult, and therefore a detailed consideration of the category of medical students allows us to identify the spectrum of anxiety and depression and try to establish their relationship with the severity of gastrointestinal pathology symptoms. In addition, a peculiarity of studying the structure of this phenomenon among students is the absence of a significant baggage of concomitant somatic diseases. Undoubtedly, other factors such as smoking, alcohol consumption, irregular and unbalanced diet can also influence

doi.org/10.31838/hiv22.02.14 Received: 03.07.21, Revised: 05.08.21, Accepted: 10.09.21

the state of digestive organs (Kyrkou et al., 2018; M, N, & Ju, 2019).

This study is aimed to investigate the structure of gastrointestinal syndromes and to find associations between them and the psychological status of medical students. The determination of the relationship between the level of depression and distressing somatic symptoms can become the basis for the development of additional methods of correction of these conditions and improvement of the quality of life.

Materials and Methods

An open single-center cross-sectional study included 669 students of the Medical Faculty of the Omsk State Medical University in years I - IV, aged 17 - 38 (mean age 19.8 ± 1.8 years), including 229 men aged 17 - 35 (mean age 19.9 ± 1.9 years) and 440 women aged 17 - 38 (mean age 19.7 ± 1.7 years). The detailed sex and age structure of the sample is presented in Table 1.

Table 1. Sex and age structure of the sample

Year of Study		All respondents	Male	Female
1	Number of respondents	191	61	130
	Age, years	17-23 (18.3±1.2)	17-23 (18.3±1.2)	17-23 (18.3±1.2)
2	Number of respondents	101	52	49
	Age, years	18-23 (19.2±0.9)	18-23 (19.4±0.9)	18-22 (18.9±0.8)
3	Number of respondents	158	45	113
	Age, years	18-38 (20.1±1.8)	19-25 (20.1±1.2)	18-38 (20.1±2.0)
4	Number of respondents	219	71	148
	Age, years	20-35 (21.2±1.4)	20-35 (21.2±2.0)	20-27 (21.1±1.0)

Age: min-max case (mean ± standard deviation)

Among concomitant pathologies the most frequent were: refractive disorders - 58 respondents (9%) and chronic tonsillitis - 29 respondents (4%). Gastrointestinal diseases were reported by 8 respondents (1.2%). Normal body weight (BMI 18.5 - 24.9 kg/m) was noted in 479 (71.6%) respondents, overweight and obesity were recorded in 92 (13.7%) respondents, low body weight in 98 (14.7%) respondents.

The Beck Depression Scale was used to assess the presence and severity of depression (AT, WY, & K, 1974). The questionnaire includes 21 categories of symptoms and complaints, each of which consists of 4-5 statements corresponding to specific manifestations of depression. Each item on the scale is scored from 0 to 3, depending on the severity of the symptom. A score of 10 on the scale was considered to be the minimum level of depression. A score of 10 to 15 corresponded to mild depression, 16 to 20 to moderate depression, 21 to 30 to severe depression, and more than 30 to heavy depression.

The Gastrointestinal Symptom Rating Scale (GSRS) was used to assess the severity of gastrointestinal symptoms, which allowed verifying the presence of diarrheal, dyspeptic, constipation, reflux and abdominal pain syndromes (Beck, Rial, & Rickels, 1974; Coen et al., 2009). The presence of one or another syndrome was indicated by a score of 2 or more.

Statistical data processing was performed using Stat Soft Statistica for Windows software package. Student's t-test was used for statistical analysis, if the distribution in the samples met the requirements of parametric study. Alternatively, nonparametric methods (Pearson, Kolmogorov-Smirnov, Wald-Wolfowitz runs test, Mann-Whitney U test) were used. The level of significance α was defined as a probability of less than 0.05.

Results

Half of the students (51.3%) showed signs of depression of varying severity (Fig. 1). Of note is the revealed prevalence of moderate, severe, and heavy degrees of depression, which together accounted for a quarter of the respondents.

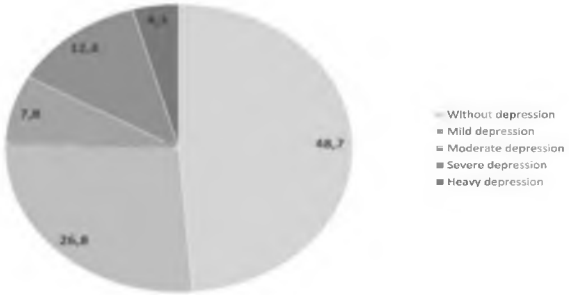

Fig. 1. Prevalence and severity of depression in the general sample.

The average level of depression severity in the sample was 11.5±8.5 Beck scores and was significantly higher in women compared to men (11.9±8.1 vs. 10.7±9 scores, p=0.01; Mann-Whitney U test).

A gender analysis of the expression of depression at different stages of study revealed that a statistically significant increase in the expression of depression in women compared to men persisted in years 1, 3 and 4 (13.16±7.94 vs. 10.85±9.48 points, p=0.03, Student's t-test; 13.49±8.95 versus 11.33±7.41 scores, p=0.038, Student's t-test; 9.54±7.91 versus 7.32±6.45, p=0.021, Student's t-test, respectively), while no significant differences in depression manifestation between men and

women were found in Year 2 (11.8±5.94 versus 11.58±10.5, scores p>0.05, Student's t-test).

In the general sample, the severity of depression in medical university students had maximum values at 1 (12.43±8.5 points; p=0.03; Student's t-test) and 3 (12.87±8.57 points; p=0.04; Student's t-test) years of study, with a downward trend in depression severity in years 2 (11.68±8.57 points; p=0.03; Student's t-test) and 4 (9.57±8.07 points; p=0.04; Student's t-test), respectively (Fig. 2).

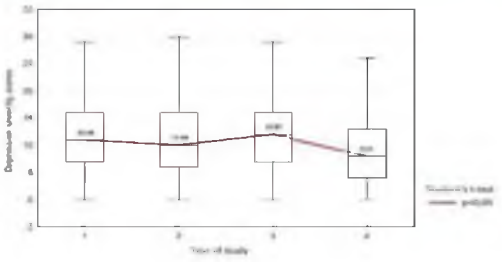

Fig. 2. Severity of depression in respondents at different levels of education.

Two-thirds of the respondents (64.4%) according to the questionnaire have at least 1 syndrome of gastrointestinal tract disorders, the most frequently recorded were abdominal pain syndrome, dyspeptic and reflux syndromes. The structure is presented in Table 2.

Table 2. Prevalence of gastrointestinal syndromes in the general sample of respondents

Syndrome	All respondents, number (%)	Male, number (%)	Female, number (%)
Diarrheal syndrome	55 (8.2)	26 (3.9)	29 (4.3)
Dyspeptic syndrome	239 (35.7)	72 (10.8)	167 (24.9)
Constipation syndrome	63 (9.4)	23 (3.4)	40 (6.0)
Reflux syndrome	127 (19.0)	45 (6.7)	82 (12.3)
Abdominal pain	341 (51.0)	96 (14.4)	245 (36.6)

1 gastrointestinal syndrome was found in 188 respondents (28.1%), a combination of 2 syndromes in 133 respondents (20.0%), a combination of 3 syndromes in 79 respondents (11.8%), a combination of 4 syndromes in 20 respondents (3.0%), and a combination of all 5 syndromes in 11 respondents (1.6%). Table 2 clearly shows that the incidence of the absolute majority of gastrointestinal syndromes is higher in women.

In an analysis of psychoemotional background in individuals without gastrointestinal disorders, the mean Beck test score did not reach the level of diagnosable depression and was significantly lower than in those with symptoms of digestive tract disorders (7.4±6.5 points vs. 13.3±8.9 points, p=0.01; Student's t-test).

When studying the structure of this phenomenon, a steady trend toward an increase in the severity of depression manifestations was noted with an increase in the number of gastrointestinal tract lesion syndromes up to 4 syndromes (Fig. 3).

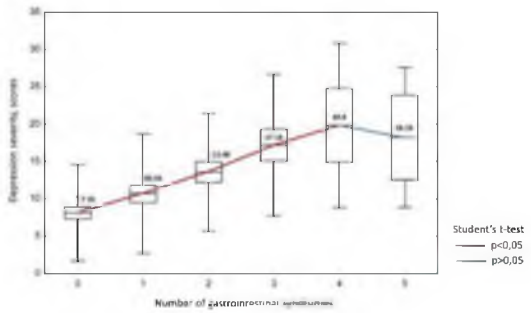

Fig. 3. Depression severity in respondents with different numbers of gastrointestinal syndromes.

When analyzing the structure of this phenomenon by gender, it was found that both men and women had a significant increase in the severity of depression depending on the presence and number of gastrointestinal syndromes. Thus, it was marked that manifestation of depression significantly increased in the presence of at least one gastointestinal syndrome (10.10±6.79 points in males, p<0.01, Student's t-test; 10.8±8.72 points in women, p<0.01, Student's t-test) and tends to increase up to 3 syndromes in men (18.8±10.64 points, p<0.01, Student's t-test), and up to 4 syndromes in women (21±10.07 points, p=0.01; Student's t-test).

An analysis of the relationship between depression and the presence of separate syndromes revealed that the greatest degree of depression was observed in respondents with reflux (17.2±12.27 points) and constipation (15.0±10.1 points) syndromes (p<0.01; Mann-Whitney U test). Respondents with dyspeptic syndrome had significantly lower level of depression than respondents without gastrointestinal dysfunction (14.1±8.8 vs. 8.1±6.4 points, p=0.01; Wald-Wolfowitz runs test).

Level of manifestation of depression was significantly higher in respondents with abdominal pain compared to respondents without gastrointestinal dysfunction (11.1±8.9 vs. 8.1±6.4 points, p<0.01; Wald-Wolfowitz runs test).

Analysis of occurrence of depression in subjects with various gastrointestinal syndromes is presented in Fig. 4. Reflux and constipation syndromes appeared to have the highest

prevalence among respondents with depression ($\chi2=13.17$, $p<0.01$; $\chi2=7.61$, $p=0.054$, Pearson).

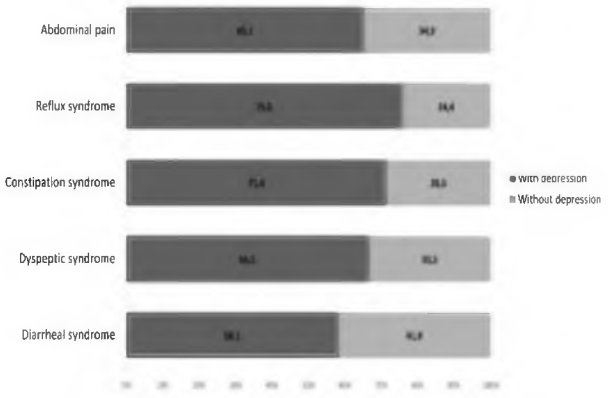

Fig. 4. Prevalence of gastrointestinal syndromes in respondents with and without depression

Discussion

A high prevalence of depression (half of the students) was revealed among the medical students, which significantly exceeds the average population level (2-30%). Signs of depression are registered significantly more often and more severely in women, that agrees with the global evidence (Kulich et al., 2008).

The detected negative dynamics of the severity of the manifestations of depression in the 1st and 3rd year requires an analysis of the causes, but empirically the most likely reason is the complexity of educational programs at these levels of education.

The study revealed an extremely high prevalence of undiagnosed gastrointestinal pathology among young people pursuing higher medical education. Two thirds of the respondents in our study had at least one gastrointestinal syndrome, while only 1.2% of the respondents reported having an established diagnosis. Among the most frequently reported gastrointestinal syndromes are abdominal pain syndrome, dyspeptic and reflux syndrome, indicating a predominant lesion of the upper digestive tract in medical students.

Our analysis of the association of psycho-emotional status and gastrointestinal lesions clearly demonstrated some regularities. Thus, in individuals without gastrointestinal pathology syndromes depression was detected less frequently.

The relationship between mental status and digestive function showed a steady increasing trend in manifestation of depression with increasing severity of gastrointestinal lesions. The most prominent was a direct link of depression severity with reflux and constipation syndromes, which demands further investigation and could be explained by different influence of the autonomic nervous system departments on gastrointestinal function.

Conclusion

The extremely high prevalence of gastrointestinal lesion syndromes combined with depression, revealed in the study, requires a comprehensive study to identify the leading causes of such association. It can serve as a basis for further choice of optimal management decisions, including strengthening of psychoprophylactic measures among medical students, optimization of educational programs, schedule, organization of accessible and high-quality nutrition and extracurricular activities, organization of screening of depression and gastrointestinal diseases during medical examinations of students.

The confirmed relationship between interstitial symptoms and depression emphasizes the need to use psychocorrection as a means of preventing and treating depression-related gastrointestinal pathology.

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