

# Impact of Depression on Health-Related Quality of Life among Patients with Functional and Gastrointestinal Motility Disorders

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## ABSTRACT

Psychological factors exert an influence on the expression of functional and gastrointestinal motility symptoms. This study aims to examine the prevalence of depression, health-related quality of life of patients with functional and gastrointestinal motility disorder, and to examine the correlation between depressive symptoms and self-rated health status and utility index. The 175 participants recruited from a motility clinic completed Patient Health Questionnaire – 9 (PHQ-9), 5-level EQ-5D version (EQ-5D-5L), and Short Form (36) Health Survey. Data were analyzed by descriptive statistic and analysis of correlation. Approximately 25% had depression. Quality of life scores were  $76.01 \pm 13.45$  by EQ-5D-5L and  $59.28 \pm 20.87$  (physical components) and  $66.10 \pm 19.12$  (mental components) by Short Form (36) Health Survey. The depressive score was significantly correlated with self-rated health status ( $r = -0.428$ ,  $p < 0.001$ ) and utility index ( $r = -0.350$ ,  $p < 0.001$ ) of quality of life. In conclusion, depression is prevalent among patients with functional and gastrointestinal motility disorders. Clinicians and psychologists should evaluate their mood symptoms during follow-up their physical symptoms for improvement of health-related quality of life.

## Keywords

Functional and gastrointestinal motility disorder; depression; quality of life; health-related quality of life; prevalence

## Introduction

Functional and gastrointestinal motility disorder is common digestive disorder and one of the prevalent psychiatric consultation liaison problems (Oshima & Miwa, 2015). It is characterized by chronic recurrent gastrointestinal symptoms (Drossman, 2016). As a complex, unclear pathophysiology known as biopsychosocial model (Van Oudenhove, 2016), the functional and gastrointestinal motility disorder is known as a difficult-to-treat disorder

and significantly impacts health-related quality of life. Previous studies found that treating these conditions with adjunctive antidepressants (Thiwan & Drossman, 2006; Lydiard, 2001) and/or supplementation with psychological intervention (Palsson & Whitehead, 2013) helped improve the symptoms and health-related quality of life of patients.

Psychological factors play an important role in functional and gastrointestinal motility disorders. Stress and negative past events can contribute to these conditions and influence

gastrointestinal symptoms via bidirectional brain-gut pathways, leading to gut motility and immunity change, neurohormonal dysfunction, and autonomic up-regulation (Van Oudenhove, 2016). Psychiatric illnesses also have a strong association with these, especially anxiety and depressive disorders (Fond et al., 2014; Mak et al., 2012). A previous study revealed that identifying psychological conditions with psychological treatment can help patients reduce the severity of gastrointestinal symptoms (Haag et al., 2007).

As a chronic non-life-threatening disorder, functional and gastrointestinal motility disorders disturb patients' daily living activities leading to poorer quality of life than in the normal population and patients with other chronic illnesses (Koloski et al., 2000; Chang, 2004). Moreover, previous studies found that comorbid psychiatric disorders may worsen life impairment and can predict health-related quality of life better than the GI symptoms (Vu et al., 2014).

In the present study, we aim to 1) examine the prevalence of depression, health-related quality of life in patients with functional and gastrointestinal motility disorders, and 2) examine a correlation of depressive symptoms and health-related quality of life in these patients. We expected that the results of the present study lead to better understanding of depressive symptom and its effects on quality of life. This will lead to a greater understanding of the patients' psychological states. Moreover, it may lead to additional treatments and studies which are important in psychology and education.

## Method and Materials

### Participants

This study was a cross-sectional study conducted at the Motility Clinic of the Division of Gastroenterology, Department of Medicine, Siriraj Hospital, Mahidol University. Subjects were selected if they were (1) aged more than 18 years old, (2) diagnosed with functional and gastrointestinal motility disorders based on the ROME IV criteria (Drossman & Hasler, 2016), and (3) had no difficulty in communication. Written informed consent was obtained from all participants, and this study was approved by the institutional review board at the Siriraj

Institutional Review Board (SIRB), Faculty of Medicine, Siriraj Hospital; COA. No. Si 053/2017.

### Measures

The participants were asked to complete a set of self-report questionnaires: 1) The Patient Health Questionnaire (PHQ-9) to assess depressive symptoms and severity. The PHQ-9 cut-off point  $\geq 9$  had 84% sensitivity and 77% specificity for defined current depressive disorder (Lotrakul et al., 2008). 2) The 5-level EQ-5D version (EQ-5D-5L) (Janssen et al., 2013; Herdman et al., 2011) and the Short Form (36) Health Survey (SF-36), which were used to assess the patients' quality of life (Leurmarnkul & Meenam, 2005; Sakthong et al., 2015). The EQ-5D-5L contains five dimensions, i.e., mobility, self-care, usual activities, pain/discomfort, and anxiety/depression, which comprises five levels of impairment in each of the five dimensions. To get the utility score, the answers are transformed into the index score using a value set. The utility index according to the valuation study based on the data of Thai population was used to calculate the score (Pattanaphesaj et al., 2018). Higher scores indicate a higher quality of life. The SF-36 evaluates two main summary measures: the physical component summary (PCS) consists of physical functioning, role-physical problems, bodily pain, and general health; the mental component summary (MCS) consists of vitality, social functioning, role-emotional problems and mental health. The lower summation of these scores indicates a poorer quality of life.

### Data analyses

For all steps of the analyses we applied the IBM Statistical Package for the Social Sciences (SPSS; version 21). Descriptive statistics were used to characterize demographic data in all participants. For correlation analyses, we used Spearman's correlation coefficients and the Cohen's classification scheme for degree of association (Cohen, 1988). A p-value of less than 0.05 was considered statistically significant.

## Results

### Demographic data

The mean age of the participants was 54.4 years old (SD = 16.4), ranging from 18 to 95 years old. The sample largely consisted of females (132 out of 175 participants, 75.4%). Most of the participants (146 out of 175 participants, 83.4%) had one diagnosis of functional and gastrointestinal motility disorders, while 29 (16.6%) participants had more than one diagnosis of functional and gastrointestinal motility disorders (Table 1). The three most-commonly organs diagnosed functional and gastrointestinal motility disorders were esophagus, intestinal, and anorectal disorders, which the examples of the common diagnosis were shown in the table (Table 2). Means of age of onset and treatment duration of patients with functional and gastrointestinal motility disorders was 45 years (age range 6 – 80 years) and 6 years (duration range 1month – 31years), respectively (Table 1). Other characteristics, for example, onset and duration of disorders, family history etc., were shown in the Table 1.

**Table 1:** Demographic data of functional and gastrointestinal motility disorder participants

| Characteristics            | Number          | Percentage |
|----------------------------|-----------------|------------|
| Age (years), mean $\pm$ SD | 54.4 $\pm$ 16.4 |            |
| Gender: male/ female       | 43/ 132         | 24.6/ 75.4 |
| Marital status             |                 |            |
| Married                    | 100             | 57.1       |
| Separated/Divorced/Widowed | 25              | 14.3       |
| Single                     | 50              | 28.6       |
| Education level            |                 |            |
| No                         | 2               | 1.1        |
| Primary level              | 43              | 24.6       |
| Secondary level            | 36              | 20.6       |
| University degree          | 7               | 42.9       |

|  |                   |      |
|--|-------------------|------|
| Other  | 19                | 10.9 |
| Employment                                   | 94                | 53.7 |
| Income per month (US dollar)                 |                   |      |
| No   | 5                 | 2.9  |
| $\leq$ 500                                   | 97                | 55.4 |
| 501 – 1,000                                  | 30                | 17.1 |
| 1,001 – 1,667                                | 30                | 17.1 |
| $>$ 1,667                                    | 13                | 7.4  |
| Diagnosis                                    |                   |      |
| One disorder or diagnosis                    | 146               | 83.4 |
| More than one disorder or diagnosis          | 29                | 16.6 |
| Onset of disease (years), mean $\pm$ SD      | 45.36 $\pm$ 16.91 |      |
| Duration of treatment (years), mean $\pm$ SD | 6.35 $\pm$ 5.50   |      |
| Delayed treatment (years), mean $\pm$ SD     | 2.47 $\pm$ 5.84   |      |
| History of Familial GI disorders             | 34                | 19.4 |
| Underlying disease                           |                   |      |
| Psychiatric disorders                        | 114               | 65.1 |
| Substance use                                | 13                | 7.4  |
| Previous smoking                             | 37                | 21.3 |
| Current smoking                              | 4                 | 2.3  |

**Table 2:** Diagnosis, number and percentage of functional and gastrointestinal motility disorders participants classified by organ and number of diagnosis

| Diagnosis   | Number | Percentage |
|---|--------|------------|
| <b>One disorder or diagnosis (N = 146)</b>  |        |            |
| <b>Esophageal Disorders</b><br>(example, Functional dysphagia, Esophageal dysmotility, Gastroesophageal reflux disease)                                       | 69     | 39.4       |
| <b>Gastroduodenal disorders</b><br>(example, Functional dyspepsia)  | 5      | 2.9        |
| <b>Intestinal (bowel) disorders</b><br>(example, Irritable bowel syndrome, Functional constipation)   | 55     | 31.4       |
| <b>Anorectal disorders</b><br>(example, Anal hypersensitivity, Functional Anorectal pain, Dysynergic defecation)  | 16     | 9.1        |
| <b>More than 1 disease or diagnosis</b><br>(example, functional dyspepsia with constipation, Functional dyspepsia with IBS, GERD and functional constipation) | 29     | 16.6       |

**Prevalence of depression and health-related quality of life**

Of the 175 participants, 43 (24.5%) participants of patients with functional and gastrointestinal motility disorders had depression (PHQ-9 score  $\geq 9$ ). The average PHQ-9 score was  $5.68 \pm 4.45$ . Regarding the medical records, 15 (8.57%) participants had psychiatric comorbidities under current treatment, including 7 participants diagnosed with mood disorders, 3 participants

diagnosed with insomnia and anxiety disorders, 2 participants diagnosed with obsessive compulsive disorder (OCD) and major neurocognitive disorder, and 1 participants diagnosed with dysthymia with generalized anxiety disorder (GAD).

To get each domains' utility score, the descriptive answers form the EQ-5D of each response are transformed into the index score using the value sets for EQ-5D-5L that have been generated. The participants' mean scores of pain (0.068), mood (0.044), and mobility (0.045) were quite poor, while activities (0.027) and self-care (0.014) were better (Table3).

Using the SF-36, the mean scores that evaluated quality of life in functional and gastrointestinal motility disorders patients were  $59.28 \pm 20.87$  for the physical component and  $66.10 \pm 19.12$  for the mental component (Table3).

**Correlation of depression and health-related quality of life in patients with functional and gastrointestinal motility disorders**

Table 3 shows the correlation between the health-related quality of life assessments and depression scores. The higher PHQ-9 scores were significantly correlated with decreased self-rated health status and decreased utility index. A small correlation was also observed for patients with functional and gastrointestinal motility disorders in mobility ( $r = 0.224$ ,  $p = 0.003$ ), activities ( $r = 0.160$ ,  $p = 0.035$ ), and pain ( $r = 0.226$ ,  $p = 0.003$ ). A strong correlation was observed for mood dimension ( $r = 0.457$ ,  $p < 0.001$ ).

Table 3 also demonstrates that a number of parameters were variably correlated between the SF-36 and the EQ-5D-5L dimensions, except for the self-care dimension. Physical functioning had a small correlation with mobility, activities, and pain ( $r = -0.294$ ,  $-0.156$ ,  $-0.263$ , respectively). Social functioning only had a small correlation with the mood dimension ( $r = -0.202$ ). The PHQ-9 depression scores were inversely correlated with all parameters of the SF-36. The strongest significant correlations were MCS and mental health from the SF-36, where Spearman's coefficients were 0.638 and -0.653, respectively.

**Table 3: Correlation between health-related quality of life, using the SF-36 and the EQ-5D-5L, and the PHQ-9 depression scores**

| Health-related quality of life dimension (EQ-5D-5L) | r (p-value)              |                          |                         |                   |                         |                          |                          | PHQ-9                   |
|---|--------------------------|--------------------------|-------------------------|-------------------|-------------------------|--------------------------|--------------------------|-------------------------|
|   | Self-rated Health status | Utility index            | Mobility                | Self-care         | Activities              | Pain                     | Mod                      |                         |
| <b>PHQ-9</b>  | -0.428*<br>( $<0.001$ )  | -0.350**<br>( $<0.001$ ) | 0.224**<br>(0.003)      | 0.027<br>(0.727)  | 0.160*<br>(0.035)       | 0.226**<br>(0.003)       | 0.457**<br>( $<0.001$ )  | 0.457**<br>( $<0.001$ ) |
| Health-related quality of life dimension            | r (p-value)              |                          |                         |                   |                         |                          |                          | PHQ-9                   |
| Self-rated Health                                   | Utility index            | Mobility                 | Self-Care               | Activities        | Pain                    | Mod                      | PHQ-9                    |                         |
| <b>PCS</b>  | 0.418**<br>( $<0.001$ )  | 0.377**<br>( $<0.001$ )  | -0.278*<br>( $<0.001$ ) | -0.042<br>(0.584) | -0.270*<br>( $<0.001$ ) | -0.380**<br>( $<0.001$ ) | -0.261**<br>( $<0.001$ ) | 0.571**<br>( $<0.001$ ) |
| <b>Physical Functioning</b>                         | 0.260**<br>( $<0.001$ )  | 0.234**<br>( $<0.001$ )  | -0.294*<br>( $<0.001$ ) | -0.027<br>(0.72)  | 0.156*<br>(0.041)       | 0.263**<br>( $<0.001$ )  | 0.036<br>(0.65)          | 0.334**<br>( $<0.001$ ) |

|                           |                         |                         |                         |                   |                    |                          |                          |                          |
|---------------------------|-------------------------|-------------------------|-------------------------|-------------------|--------------------|--------------------------|--------------------------|--------------------------|
| <b>Role - Physical</b>    | 0.270**<br>( $<0.001$ ) | 0.271**<br>( $<0.001$ ) | -0.178*<br>(0.020)      | -0.013<br>(0.866) | -0.251*<br>(0.01)  | -0.266**<br>( $<0.001$ ) | -0.251**<br>( $<0.001$ ) | -0.275**<br>( $<0.001$ ) |
| <b>Bodily Pain</b>        | 0.246**<br>( $<0.001$ ) | 0.276**<br>( $<0.001$ ) | -0.275*<br>( $<0.001$ ) | -0.079<br>(0.304) | 0.249*<br>(0.01)   | 0.448**<br>( $<0.001$ )  | 0.234**<br>( $<0.002$ )  | 0.345**<br>( $<0.001$ )  |
| <b>General Health</b>     | 0.522**<br>( $<0.001$ ) | 0.271**<br>( $<0.001$ ) | -0.173*<br>(0.023)      | 0.057<br>(0.460)  | -0.946<br>(0.043)  | -0.282**<br>( $<0.001$ ) | -0.272**<br>( $<0.001$ ) | -0.573**<br>( $<0.001$ ) |
| <b>MC S</b>               | 0.346**<br>( $<0.001$ ) | 0.261**<br>( $<0.001$ ) | -0.108<br>(0.154)       | -0.027<br>(0.722) | -0.155*<br>(0.042) | -0.230**<br>( $<0.002$ ) | -0.403**<br>( $<0.001$ ) | -0.338**<br>( $<0.001$ ) |
| <b>Vitality</b>           | 0.365**<br>( $<0.001$ ) | 0.262**<br>( $<0.001$ ) | -0.202*<br>(0.008)      | -0.027<br>(0.727) | -0.125<br>(0.101)  | -0.276**<br>( $<0.001$ ) | -0.203**<br>( $<0.001$ ) | -0.365**<br>( $<0.001$ ) |
| <b>Social Functioning</b> | 0.265**<br>( $<0.001$ ) | 0.095<br>(0.950)        | 0.108<br>(0.155)        | 0.115<br>(0.155)  | 0.099<br>(0.999)   | -0.456<br>(0.009)        | -0.202**<br>( $<0.008$ ) | -0.310**<br>( $<0.001$ ) |
| <b>Role</b>               | 0.1                     | 0.1                     | -                       | -                 | -                  | -                        | -                        | -                        |

|                      |                                 |                                 |                           |                           |                          |                                |                                |                                |
|----------------------|---------------------------------|---------------------------------|---------------------------|---------------------------|--------------------------|--------------------------------|--------------------------------|--------------------------------|
| <b>- Emotional</b>   | 81<br>*<br>(0.019)              | 86<br>*<br>(0.014)              | 0.0<br>98<br>(0.200)      | 0.0<br>05<br>(0.200)      | 0.1<br>28<br>(0.92)      | 0.1<br>64<br>(0.031)           | 0.2<br>88<br>(0.001)           | 0.4<br>67<br>(0.001)           |
| <b>Mental health</b> | 0.3<br>96<br>**<br>( $<0.001$ ) | 0.2<br>78<br>**<br>( $<0.001$ ) | -<br>0.0<br>89<br>(0.245) | -<br>0.0<br>42<br>(0.245) | -<br>0.0<br>99<br>(0.94) | -<br>0.2<br>50<br>( $<0.001$ ) | -<br>0.5<br>30<br>( $<0.001$ ) | -<br>0.6<br>53<br>( $<0.001$ ) |

PHQ-9; Patient Health Questionnaire (PHQ-9)  
 EQ-5D-5L; 5-level EQ-5D version  
 SF-36; Short Form (36) Health Survey: PCS; the physical component summary and MCS; the mental component summary  
 \* P-value  $<0.05$ , \*\* P-value  $<0.01$

### Discussions

The prevalence of psychiatric comorbidities in patients with functional and gastrointestinal motility disorders has been studied extensively. The inconsistent data may be a result of different populations, measurements and clinical settings. However, depression disorders are known to be the most common psychiatric problems (Fond et al, 2014; Mak et al, 2012; Wu, 2011). The causal relationship between psychological disorders and functional and gastrointestinal motility disorders was still inconclusive. Some studies believed it was not a direct effect; however, further studies that are specific to a specific population should be performed.

Regarding health-related quality of life, our study confirmed the impact of functional and gastrointestinal motility disorders on life impairment. Patients with depression have a poor health-related quality of life. According to the EQ-5D-5L, even though the patients had pain, negative mood, their daily activities and self-care were still intact. Corresponding with the SF-36, the results also showed good physical and social functioning, whereas other physical components (role-physical, bodily pain, general health) and mental components (vitality, role-emotional,

mental health) were quite impaired. This finding was similar to a previous study that physical and social functioning showed the least impairment in SF-36 (Jeong et al., 2008). This result emphasized the association between depression and all domains of health-related quality of life.

### Limitations and Future Studies

To our knowledge, the present study is one of the few studies that examine the correlation between depressive symptoms and health-related quality of life in patients with functional and gastrointestinal motility disorders in a motility clinic which all participants had already been investigated to exclude organic gastrointestinal diseases. We focused on two measures assessing health-related quality of life to ensure the reliability. However, the present study has several points of concern. The first was the lack of gastrointestinal severity assessment, as the severity of functional and gastrointestinal motility disorders could affect the mood and health-related quality of life. Some of the participants also had psychiatric comorbidities or received psychotropic medications. Thus, we could not determine if the quality of life is due to functional and gastrointestinal motility disorders, or psychiatric disorders, or the results of the treatment. Further studies should collect these related factors to determine the quality of life in functional and gastrointestinal motility disorders. According to the health-related quality of life, the utility score from the EQ-5D-5L was generated based on the specific population which might be different in socioeconomic and cultural across countries. We further emphasize that the results should be considered with regards to the fact that our data was collected in a special clinic and the participants were heterogeneous group.

### Conclusion

Depressive was prevalent among patients with functional and gastrointestinal motility disorders. The depressive score was inversely correlated with self-rated health status and utility index of quality of life. Functional gastrointestinal disorder patients should have their moods and psychiatric symptoms evaluated during follow-up for appropriate psychological management and better

health-related quality of life. Further studies may help to better determine the relationship, and including assessment of psychosocial factors could reveal prognostic predictors of the disease.

Functional and gastrointestinal motility disorders are one of the models of complex disorders with psychological aspects affect their courses and outcomes. Depression is prevalent among patients with these disorders. Clinicians and psychologists should evaluate their moods symptoms during

### Declaration of interest statement

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No potential conflict of interest was reported by the authors.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Siriraj Institutional Review Board, Faculty of Medicine Siriraj Hospital, Mahidol University and with the 1964 Helsinki declaration and its later amendments (COA. No. Si 053/2017). Informed consent was obtained from all individual participants included in the study.

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follow-up their physical symptoms for improvement of health-related quality of life.

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