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Comparison of Stress Profiles among Individuals with and without Functional Dyspepsia

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Quantitative Study

Abstract

Background: Functional dyspepsia (FD) is defined as the presence of dyspeptic symptoms in the absence of an organic cause that readily explains them. Life stressors, individuals' perceptions, their coping responses, and social supports are linked and can affect the well-being of individuals. The aim of the current study was to assess the relationship between FD and life stressors, coping strategies, and social support.

Methods: In a cross-sectional study conducted in Isfahan Province, Iran, in 2013, the employees of Isfahan University of Medical Sciences, Isfahan, were evaluated. Symptoms of FD were measured using the modified ROME III questionnaire. The Stressful Life Event (SLE) Questionnaire, modified COPE scale, and Multidimensional Scale of Perceived Social Support (MSPSS) were used for assessing life stressors, coping strategies, and social support. Logistic regression analysis was applied to assess the crude and adjusted effects of each variable on FD.

Results: About 55.8% of participants were women and 79.3% were married. In total, 723 (15.2%) participants had FD, 457 (63.2%) of whom were women. The mean scores of perceived intensity and frequencies of all life stressors were significantly higher in patients with FD ($P < 0.05$). In addition, the mean score of social support in patients with FD was significantly lower ($P < 0.05$). Logistic regression analyses demonstrated that the frequency of stressors and perceived intensity of stressors were significantly associated with FD (OR = 1.08 and 1.025, respectively). Moreover, the acceptance coping strategy had a significant relationship with FD (OR = 0.85, 95% CI, 0.75-0.95). Among the socio-demographic factors, sex (OR = 1.65, 95% CI, 1.3-2.1) and education (OR = 0.6, 95% CI, 0.5-0.8) demonstrated significant relationships with FD.

Conclusion: FD was more common in those individuals who had a higher rate of stressors and lower social support.

Keywords: Functional dyspepsia, Life stressors, Coping strategies, Social support

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Introduction

One of the most common gastrointestinal (GI) disorders is functional dyspepsia (FD) (Chang, 2004) The main symptoms of FD include those of the upper GI tract such as early satiety, bothersome postprandial fullness, and epigastric pain or burning which had started within the previous 6 months and lasted for 12 or more weeks (Drossman, & Dumitrascu, 2006; Drossman et al., 2010; Drossman, 2006). There is no evidence of structural disease (including in upper endoscopy) that is likely to explain the symptoms in FD. The prevalence of FD in different studies has ranged between 3% and 40% (Vege, Locke, Weaver, Farmer, Melton, & Talley, 2004; Park, 2011; Li, Nie, Sha, & Su, 2002; Perez, & Youssef, 2007; Amini, Keshteli, Jazi, Jahangiri, & Adibi, 2012). Various studies have been conducted in this field to understand the behavior and pathophysiology of this disease. Their findings have shown that psychological factors may influence the development of FD (Koloski, Jones, Kalantar, Weltman, Zaguirre, & Talley, 2012; Pajala, Heikkinen, & Hintikka, 2012; De la Roca-Chiapas, Solis-Ortiz, Fajardo-Araujo, Sosa, Cordova-Fraga, & Rosa-Zarate, 2010). Therefore, A comprehensive understanding of life stressors, coping strategies, and social support leads to the determination of the severity of such a psychosomatic disease (Haug, 2002).

Different domains of life stressors in patients with FD have been studied. For instance, FD is more prevalent among patients with self-reported sleep disturbance (Vege et al., 2004). Moreover, the relationships of the prevalence and intensity of life stressors with FD have been investigated. The prevalence of stressors was higher in patients with FD compared with healthy volunteers (Pajala et al., 2012, Haug, 2002). Coping and life stressors are correlated. Given the relationship between coping responses and well-being, many diseases may be treated through appropriate adjustment, coping reactions, and flexibility (Wrzesinska, & Kocur, 2008; Cheng, Hui, & Lam, 1999). Moreover, the lower the frequency of stressors is, the higher the use of action-oriented coping strategies in controllable conditions and passive coping strategies in uncontrollable circumstances are (Wrzesinska, & Kocur, 2008; Cheng et al., 1999). Since the coping response of FD patients may be different from that of the healthy population, their stress levels might also be different (Cheng et al., 1999; Cheng et al., 2002; Grzyb, Wrzesiniska, Harasiuk, Chojnacki, & Kocur, 2007; Wrzesinska & Kocur, 2008). For example, patients with FD perceived stressors as less controllable, and thus, used less emotion-focused action and more direct action and/or avoidance-oriented coping strategies when handling stressful situations (Cheng, Hui, & Lam, 2002; Wrzesinska, & Kocur, 2008; Cheng et al., 1999).

On the other hand, social support determines the amount of assistance an individual receives from others. The relationships of individuals with their family, friends, and society largely affect their health perceptions. Individuals with stronger social support, received more assistance and had lower symptoms severity, and consequently, better health status (Alemi, Stephens, Llorens, Schaefer, Nemes, & Arendt, 2003; Grassi, Rasconi, Pedriali, Corridoni, & Bevilacqua, 2000; Hefner, & Eisenberg, 2009; Karukivi et al., 2011; Rabinovitch, Cassidy, Schmitz, Joober, & Malla, 2013). It has been demonstrated that patients with FD use fewer social supports when dealing with life stressors (Cheng et al., 1999) Thus, life stressors, social supports, the individual's perceptions, and his/her coping responses are interrelated and together could substantially shape the psychological and somatic well-being of the individual (De la Roca-Chiapas et al., 2010). This study aimed to compare these important interrelated psychosocial variables among individuals with and

without FD in a university based community.

Methods

The current investigation was a cross-sectional study carried out in Isfahan Province, Iran, in 2013. The methodology of the study has been explained in details in the Study on the Epidemiology of Psychological, Alimentary Health, and Nutrition (SEPAHAN) (Adibi, Hassanzadeh Keshteli, Esmaillzadeh, Afshar, Roohafza, & Bagherian-Sararoudi, 2012). In brief, information on the goals of the research and the study design were provided for the employees of 50 centers of Isfahan University of Medical Sciences across Isfahan Province. The participants were selected from among about 10500 non-academic healthy personnel. In total, 4763 of the 6239 participants who received the questioner returned it. Subjects who were aged 18 years or older and able to comply with the protocol of the study were selected. The exclusion criterion was the presence of any medical or psychiatric condition that required long-term drug use. Different phases of the study were continuously monitored by the principal investigator. The detailed information of this study have been previously published (Adibi et al., 2012).

This study was approved by the Medical Research Ethics Committee (project number 189069, 189082, and 189086). All participants signed written consent forms.

Presence or absence of different symptoms of FD including early satiety, bothersome postprandial fullness, and epigastric pain or burning were evaluated using ROME III questionnaire and its scoring system (Drossman, 2006; Song et al., 2013). Furthermore, ROME III criteria were used to define the disorders (Drossman, & Dumitrascu, 2006). FD was diagnosed based on the questionnaire which was completed individually.

The frequency and perceived intensity of different stressors of daily life were assessed using the Stressful Life Event (SLE) Questionnaire. The SLE Questionnaire consists of 44 items in the 11 stress domains of home life, financial problems, social relations, personal conflicts, occupational conflicts, educational concerns, occupational security, loss and separation, sexual life, daily life, and health concerns. Each item was scored on a 5-point Likert scale (never = 0, mild = 1, moderate = 2, severe = 3, and very severe = 4). Total intensity score indicated the total perceived intensity of stressors; the higher the score, the higher the perception of stress intensity. Moreover, the frequency of each stressor and the total stress frequency were calculated (Roohafza, Ramezani, Sadeghi, Shahnam, Zolfagari, & Sarafzadegan, 2011; Sali, Roohafza, Sadeghi, Andalib, Shavandi, & Sarrafzadegan, 2013). The questionnaire's reliability was verified using Cronbach's alpha coefficient ($\alpha = 0.81$).

Coping strategies applied to cope with stressful life events were evaluated using the modified COPE Scale, a multi-component self-administered coping strategies questionnaire (Carver, Scheier, & Weintraub, 1989). The modified COPE Scale is composed of 23 items classified into the 5 subscales of positive reinterpretation and growth, problem engagement, acceptance, seeking support, and avoidance. The questionnaire's reliability was verified using Cronbach's alpha coefficient ($\alpha = 0.84$). Its items were scored using 3-point Likert scales (never = 0, sometimes = 1, and often = 2). Higher scores obtained on this scale indicate more frequent use of the related coping strategies (Roohafza et al. 2014).

Various perceived social supports were assessed using the Multidimensional Scale of Perceived Social Support (MSPSS). Its reliability was assessed using Cronbach's alpha coefficient ($\alpha = 0.88$). The scale includes 12 items scored on 3-point Likert scales (never = 0, sometimes = 1, and often = 2). It assesses the sufficiency of social support received from the 3 sources of family, friends, and significant others. Each source is evaluated through 4 items. Higher scores on the MSPSS indicate higher rates of received social support (Zimet, Powell, Farley, Werkman, & Berkoff,

1990; Bagherian-Sararoudi, Hajian, Ehsan, Sarafraz, & Zimet, 2013).

Data analyses were carried out in SPSS software (version 15, SPSS Inc., Chicago, IL, USA). Two-tailed P values of less than 0.05 were considered significant. Continuous variables were presented as mean ± standard deviation (SD). Student t-test was applied to analyze continuous variables. The prevalence of FD according to sex, age, education, marital status, life stressors, coping strategies, and social supports were calculated and are presented in this paper. Associations of FD with different variables, such as age, sex, education, marital status, life stressors, coping strategies, and social supports, were studied. Univariate logistic regression analysis was applied to assess the crude effects of each variable on outcome (FD). Total frequency of life stressors and mean scores of perceived intensity of life stressors were used as the indices of life stressors. Total score of social support was employed as an index of all types of social supports. Different types of coping strategies were studied separately. Multivariate regression analyses were applied to evaluate the relative contributions of stressors, social support, coping strategies, age, sex, marital status, and educational level in the development of FD. In model 1, total frequency of life stressors, total score of social support, different types of coping strategies, and age, sex, marital status, and education were entered. In model 2, a similar process was repeated by replacing the total frequency of life stressors with the mean score of perceived intensity of life stressors. The odds ratios (OR) and the 95% confidence intervals (CI) were calculated in the logistic regression analysis. Odds ratios (95% CI) of higher than 1 indicate that the individual with the corresponding variable(s) is more likely to suffer from FD. Odds ratios (95% CI) of less than 1 indicate that the individual with the corresponding variable(s) is less likely to suffer from FD. The 10% significance level was considered for exclusion from the model.

Results

Of all the participants, 2106 (44.2%) subjects were men and 3776 (79.3%) were married. About 2874 (69.3%) individuals were over 40 years old and 2650 (55.6%) had graduate degrees. Furthermore, 723 participants (15.2%) were diagnosed with FD. Among the FD group, 266 individuals (36.8%) were men, 578 employees (80%) were married, 449 (62.1%) were aged 40 years and older, and 365 subjects (50.5%) had graduate degrees.

The frequency and perceived intensity of life stressors were calculated and their relationships with FD were evaluated (Table 1). Of the 11 evaluated stress domains in the SLE Questionnaire, 10 revealed significantly higher mean scores in patients with FD ($P < 0.05$). The mean ± SD of the perceived intensity score of all stressors was 29 ± 20. The frequencies of stressors among patients with FD in all items of the SLE Questionnaire were significantly higher than among patients without FD ($P < 0.05$). The mean ± SD frequency of all stressors in the SLE Questionnaire was 12.5 ± 7.0.

The relationships of the total scores of stressors, coping strategies, and social supports with FD were evaluated (Table 2). The only coping strategy that had no significant relationship with FD status in either sex was avoidance. The mean scores of all kinds of social supports in all subjects with FD both in men and women were significantly lower than in individuals without FD ($P < 0.001$).

The results of univariate and multivariate logistic regression analyses in the total study population are summarized in table 3. Univariate analyses showed the significant association of all independent factors with FD, except avoidance coping strategy. In addition, model 1 and model 2 demonstrated that only frequency of stressors (OR = 1.08, 95%CI, 1.06-1.095) and perceived intensity of stressors (OR = 1.025, 95%CI, 1.02-1.03) had significant associations with FD, respectively. Among the socio-demographic factors, the only variables that revealed significant relationships with FD in models 1 and 2 were

Table 1. Differences in the frequency and perceived intensity of life stressors between patients with functional dyspepsia (n = 723) and those without functional dyspepsia (n = 4097) using t-test and chi-square test

Life stressors (number of items)	Functional dyspepsia	Perceived intensity of stressors (Mean ± SD)	P-value	Frequency of stressors (Mean ± SD)	P-value
Home life (7 items)	No	3.5 ± 3.0	0.03*	0.6 ± 0.9	0.03*
	Yes	4.7 ± 3.8		1.0 ± 1.3	
Financial problems (5 items)	No	8.1 ± 5.2	0.03*	2.8 ± 1.8	0.02*
	Yes	9.9 ± 5.4		3.3 ± 1.6	
Social relations (4 items)	No	4.8 ± 3.1	0.01*	1.7 ± 1.3	0.04*
	Yes	6.0 ± 3.5		2.1 ± 1.3	
Personal conflicts (5 items)	No	4.0 ± 3.1	0.03*	1.1 ± 1.2	0.03*
	Yes	5.1 ± 3.7		1.5 ± 1.4	
Occupational conflicts (4 items)	No	4.3 ± 3.0	0.03*	0.7 ± 1.0	0.03*
	Yes	5.8 ± 3.5		0.95 ± 1.1	
Educational concerns (4 items)	No	3.6 ± 2.5	0.03*	1.6 ± 1.2	0.02*
	Yes	4.4 ± 3.0		2.1 ± 1.2	
Occupational security (5 items)	No	4.9 ± 3.3	0.02*	1.5 ± 1.2	0.02*
	Yes	6.1 ± 3.6		1.9 ± 1.2	
Loss and separation (4 Items)	No	2.8 ± 1.8	0.03*	0.5 ± 0.7	0.04*
	Yes	3.3 ± 2.2		0.7 ± 0.8	
Sexual life (4 items)	No	2.8 ± 1.7	0.75	0.2 ± 0.5	0.38
	Yes	2.8 ± 1.6		0.4 ± 0.6	
Daily life (2 items)	No	2.4 ± 1.4	0.04*	0.5 ± 0.7	0.02*
	Yes	3.1 ± 1.6		0.9 ± 0.7	
Health concerns (2 items)	No	2.0 ± 1.3	0.04*	0.4 ± 0.5	0.02*
	Yes	2.6 ± 1.7		0.7 ± 0.6	

*P < 0.05

sex (OR = 1.65, 95%CI, 1.3-2.1) and education (OR = 0.6, 95%CI, 0.5-0.8), respectively.

Logistic regression analyses demonstrated the crude and adjusted effects of evaluated variables on FD (Table 3). Model 1 included frequency of life stressors, social support, and coping strategies, whereas model 2 involved perceived intensity of life stressors, social support, and coping strategies. Both models were adjusted based on socio-demographic factors (age, sex, marital status, and education).

Table 2. The relationships of total picture of stressors, coping strategies, and social supports with Functional dyspepsia using t-test

Variables	Functional dyspepsia (n = 723)	No Functional dyspepsia (n = 4097)	P-value
Perceived intensity of all life stressors	39.4 ± 23.2	26.8 ± 18.5	< 0.001
Frequency of all life stressors	15.7 ± 7.2	11.8 ± 6.6	< 0.001
Total social supports	6.8 ± 3.8	7.8 ± 3.6	< 0.001
Coping strategies			
Problem engagement	9.4 ± 2.2	9.7 ± 2.1	< 0.001
Social support coping	9.6 ± 3.1	10.0 ± 3.1	< 0.001
Positive reinterpretation and growth	6.2 ± 1.6	6.5 ± 1.5	< 0.001
Avoidance	3.5 ± 1.8	3.4 ± 1.7	0.100
Acceptance	2.9 ± 1.0	3.0 ± 1.0	< 0.001

Table 3. Logistic regression analyses of the crude and adjusted effects of evaluated variables on functional dyspepsia

Variables	Crude effect	Multivariate analysis	
		Model 1	Model 2
Frequency of stressors	1.09 (1.07-1.1)	1.08 (1.06-1.095)	
Perceived intensity of stressors	1.029 (1.025-1.032)		1.025 (1.02-1.03)
Social support	0.93 (0.91-0.95)	0.99 (0.96-1.02)	0.99 (0.96-1.025)
Coping strategies			
Problem engagement	0.935 (0.9-0.97)	0.99 (0.94-1.05)	0.99 (0.94-1.05)
Support seeking	0.965 (0.94-0.99)	1.003 (0.96-1.04)	0.99 (0.96-1.04)
Positive reinterpretation and growth	0.875 (0.83-0.92)	0.96 (0.89-1.04)	0.97 (0.89-1.05)
Avoidance	1.03 (0.99-1.08)	1.05 (0.985-1.1)	1.05 (0.985-1.1)
Acceptance	0.835 (0.77-0.9)	0.9 (0.8-1.006)	0.9 (0.8-1.004)

Model 1 included frequency of life stressors, social support, and coping strategies, whereas model 2 involved perceived intensity of life stressors, social support, and coping strategies. Both models were adjusted based on age, sex, marital status, and education.

Discussion

Stress is experienced when real or perceived demands exceed the resources and imposing the organism's homeostasis imbalance (Richter, 1991). Mean scores of perceived intensity of 10 stressors in subjects with FD were significantly higher than the corresponding scores in subjects without FD. On the other hand, mean scores of social supports in subjects with FD were significantly lower than in subjects without FD. In other words, employees with FD had higher stress levels and lower social supports. Social support acts as a stress buffering process. Moreover, 5 different mechanisms have been proposed in the improvement of patient outcomes through social support. They included improvement in quality of life (QOL), higher rates of access to health care, better immune system function, increased compliance with medications, and decreased depressive affect (Alemi et al., 2003; Grassi et al., 2000; Hefner & Eisenberg, 2009; Karukivi et al., 2011; Rabinovitch et al.,2013). Mean scores of the 3 coping strategies of problem engagement, acceptance, and positive reinterpretation and growth in employees with FD were significantly lower than the corresponding mean scores in employees without FD. It has been shown that patients with FD, besides controllability of stressors, may adopt action-oriented coping strategy that may provoke anxiety when applied consistently for all stressors (Cheng et al., 1999; Folkman, Lazarus, Gruen, & DeLongis, 1986; Miller, Brody, & Summerton, 1988; Polman, Borkoles, & Nicholls, 2010). Both strategies of acceptance, and positive reinterpretation and growth are among the emotion-focused coping strategies. This means the stressor must be tolerated and cannot be resolved or eliminated through direct action. The abovementioned findings regarding higher stress, lower social support, and immature coping strategies were consistent with other studies showing the imbalance between stressors, social support, and coping strategies in patients with FD (De la Roca-Chiapas et al., 2010; Cheng et al., 1999; Cheng et al., 2002; Grzyb et al., 2007; Wrzesinska & Kocur, 2008; Bennett, Piesse, Palmer, Badcock, Tennant, & Kellow, 1998; Drossman, Creed, Olden, Svedlund, Toner, & Whitehead, 1999;. Quartero, Post, Numans, de Melker, & de Wit, 1999; Filipovic et al., 2013; Whitehead, 1996 Cheng, Yang, Jun, & Hutton, 2007). This implies that the clinical management of FD necessities more effective approaches towards training discriminative coping strategies for stressors with different controllability through methods such as cognitive reforming.

In univariate analyses, 4 coping strategies (problem engagement, support seeking, acceptance, and positive reinterpretation and growth) had significant relationships with FD. However, in the hierarchical analysis of total population, when they were added into the regression equation at the final step, they

failed to illuminate the variance on adjustment beyond the 0.05 significance level. In the hierarchical analysis of employees with high stress index, only acceptance strategy remained significant (analysis was not shown). This meant that FD was more strongly associated with the frequency of stressors and their perceived intensity than was coping strategies. In clinical practice, this would be translated into a more efficient approach by FD patients towards altering their stress appraisal.

There were some limitations in the current study. First, the generalization of the conclusions is limited by potential selectivity bias, in that all subjects were employees of Isfahan University of Medical Sciences and less than half of the sample completed both waves of the questionnaires. Lack of information of non-responders may limit the external validity of the study. Second, the diagnosis of FD was based on the questionnaire that was completed individually by the participants. In other words, the diagnosis of FD was not confirmed by a physician. Third, due to the cross-sectional design of the study, directional influence of variables cannot be claimed. Additional research using a multivariable prospective design would be helpful to more closely assessing the temporal association of different stressors and FD. Effective treatment approaches require a better understanding of more specific relationships of stressors and coping strategies. Another study limitation was the lack of data on the psychological profile of the subjects which was relevant to this study.

In conclusion, the findings of the present study were consistent with other literature regarding the result that individuals with FD had more frequent and higher perception of intensity of stressors and lower levels of social supports.

Conflict of Interests

Authors have no conflict of interests.

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