Pychological Topics, 25 (2016), 1, 29-43

Original Scientific Paper – UDC – 159.942.072
616.34

The Role of Stress in IBS Symptom Severity

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Abstract

Irritable bowel syndrome is regarded as a biopsychosocial disorder, the result of a complex combination of predisposing, precipitating and perpetuating factors. Personality traits, affective status and stress are some of the relevant factors contributing to lower quality of life and symptom exacerbation in IBS patients. In order to examine the role of stress in IBS symptom exacerbation, the aims of this study were to explore the relationship of daily stressful events and symptom severity in a prospective manner and to explore the roles of neuroticism, anxiety, depression and stress in the vicious circle of symptom perpetuation.

A total of 49 patients with IBS reported their symptom severity and daily stressful events intensity each day for 14 consecutive days. They also completed the Big five personality inventory, the Beck Depression Inventory and the State-trait anxiety inventory.

Cross-correlation analyses were performed on the time series data for daily stress and symptom severity for each participant separately. Four different patterns of relationships were found in different subgroups of participants: positive cross-correlations of symptom severity and stress intensity on the same day; higher symptom severity on days following stressful days; lower symptom severity on days following stressful days; and lower stress intensity on days following severe symptoms. Using average scores for daily stress and symptom severity, as well as scores for neuroticism, anxiety and depression, we performed a path analysis to test a model of symptom exacerbation. It showed that, on the group level, average stress intensity predicts average symptom severity. Neuroticism and anxiety were not significant predictors of symptom severity, while depression showed a marginally significant relationship with symptom severity, mediated by stress intensity.

In conclusion, depression and daily stress seem to be important contributors to the vicious circle of IBS symptom perpetuation.

Keywords: irritable bowel syndrome, symptom severity, daily stress, depression

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This study was funded in part by the Ministry of Science, Education and Sport, Republic of Croatia, Grant Number 009-0092660-2655 and University of Rijeka, Grant Number 13.04.1.3.1.

Introduction

Irritable bowel syndrome (IBS), one of the most common functional gastrointestinal disorders, affects up to 10% of people and significantly impairs health-related quality of life (Ford et al., 2014). According to Rome III criteria, IBS is defined on the basis of the presence of recurrent abdominal pain or discomfort associated with altered bowel habits (Longstreth et al., 2006). IBS is characterized by its subjective symptom profile, heterogeneity among patients and the lack of a reliable biomarker (Keefer, Kiebles, & Taft, 2011).

There is no consensus on the aetiology of IBS but there is a general agreement that IBS is a biopsychosocial disorder which means that biological, psychological and social factors contribute to the onset, severity and course of the disorder (Labus, 2007; van Tilburg, Palsson, & Whitehead, 2013). Based on this assumption, integrative models of IBS have been proposed among which the biopsychosocial model is considered to be the most promising in understanding the complex aetiological processes found in IBS.

One of the biopsychosocial models, able to integrate biological and psychosocial domains of IBS and to offer an effective treatment, is the cognitive behavioural model (CBT) of IBS (Deary, Chalder, & Sharpe, 2007; Lackner et al., 2007). According to this model, physiological, cognitive and behavioural responses appear to be interdependent and responsible for maintaining the disorder (Kennedy et al., 2006). The CBT model of IBS retains the general structure proposed by Beck including predisposing, precipitating and perpetuating c*ognitive, behavioural, affective and physiological* factors (Deary et al., 2007). Predisposing factors, such as genetics, early experiences and personality traits, could be defined as those factors that increase an individual's susceptibility for developing a wide range of functional disorders. Precipitating factors are those which precede the onset of the illness such as stressful life events or affective disturbances, and perpetuating factors are those responsible for maintaining and perpetuating the illness symptoms such as sensitization, hormonal alterations as well as alterations in perception, cognitions, emotions and behaviour (Deary et al., 2007). The CBT model of IBS is a meta-model, providing a broad framework for all factors and their possible relationships that each patient presents, allowing for a unique combination of specific factors in each patient.

Among the predisposing factors, personality traits seem to be important but their role is still unclear. Neuroticism is one of the few personality traits that has been consistently found to be increased in IBS patients compared to controls (Tanum & Malt, 2001; Tkalčić, Hauser, & Štimac, 2010) and it is associated with increased depression and anxiety (Coen et al., 2011; Tang, Lin, & Zhang, 2013) which are considered as the main psychological precipitating and/or perpetuating factors, respectively. Anxiety and depression are more frequent and more intense in IBS patients (Creed et al., 2006; Sugaya & Nomura, 2008) and they are associated with more severe gastrointestinal symptoms and quality of life impairment (Cho et al.,

2011). We can assume that highly neurotic persons who tend to interpret events in a negative manner experience more stressful events and as a consequence they are more prone to develop various disorders (Rey & Talley, 2009; Yousfi, Matthews, Amelang, & Schmidt-Rathjens, 2004). Previous research has shown that IBS symptoms are often triggered or exacerbated during periods of stress (Myers & Greenwood-Van Meerveld, 2009).

The effects of stress on IBS symptoms are well recognized by patients and clinicians (van Tilburg et al., 2013). For example, IBS patients report more stressful events than healthy control (Blanchard et al., 2008) and show greater reactivity to stress (Mayer, Naliboff, Chang, & Coutinho, 2001). Research has also focused on daily stressful events and their role in symptom exacerbation (Hertig, Cain, Jarrett, Burr, & Heitkemper, 2007; Whitehead, Crowell, Robinson, Heller, & Schuster, 1992). Blanchard et al. (2008) found significant correlations among stress levels measured in different time points as well as between stress levels and gastrointestinal symptoms measured at the same time. Similar results have been previously shown in Whitehead et al.'s research (1992). Hertig et al. (2007) showed that daily stress was significantly related to symptom severity but after controlling for levels of anxiety and depression this relation was not significant. It seems plausible to conclude that anxiety and depression could moderate and/or mediate the relationship between stress and gastrointestinal symptoms.

The core concept of the CBT model is a vicious circle, the hypothesis that a self-perpetuating interaction among the factors previously described, maintains symptoms, distress and disability (Deary et al., 2007). Therefore it is hypothesized that precipitating events, usually stressful life events, trigger the onset of symptoms which are then interpreted by the patient, sometimes leading to erroneous attributions and other dysfunctional cognitions. If that occurs, it can consequently result in affective disturbances, primarily anxiety and depression, especially in those patients who express higher levels of neuroticism (Hauser, Pletikosić, & Tkalčić, 2014). After the onset of IBS, it is common for anxiety and symptom exacerbation to appear simultaneously. Their concurrent occurrence along with their reciprocal self-perpetuating relationship in the vicious circle (i.e. anxiety can exacerbate symptoms, and symptoms can lead to increased anxiety) makes it difficult, if not impossible, to determine which is the antecedent and which is the consequence.

Based on the key concepts of the CBT model and the proposed vicious circle, the aims of this study were to explore the relationship of daily stressful events and symptom severity in a prospective manner on the intra-individual level and to test the possible mediating effect of neuroticism, anxiety and depression on the stress-symptom relationship within the vicious circle model of symptom perpetuation.

Method

Participants

A total of 49 IBS patients, 11 men and 38 women, age range 18 to 69 (*M*=45.11, *SD*=14.01) participated in the study. They were all outpatients of the Gastroenterology Department of the Clinical Hospital Centre in Rijeka. The majority of participants (71.4%) had a high school education, over a half of them were married (53.1%) and employed (57.1%). The duration of the disorder had a range of 1 to 51 years (*M*=9.62, *SD*=11.98). The study was conducted in three parts, and although all 49 patients participated in all three parts of the study, the number of measurement points in the second part of the study varies from patient to patient.

Questionnaires

Big Five Personality Inventory (BFI; John & Srivastava, 1999; Kardum, Gračanin, & Hudek-Knežević, 2006) consists of 44 items based on adjectives prototypical for the five personality factors: Neuroticism, Extraversion, Conscientiousness, Agreeableness, and Openness. The participants respond on a 5-point Likert type scale. The total score for each scale is obtained by adding up responses on items making up each of the factors or scales. Previous research on Croatian samples has replicated the original structure of the questionnaire, with Cronbach alpha coefficients ranging from .72 to .82 (Kardum et al., 2006). For the purposes of this study, only Neuroticism data was used.

State-Trait Anxiety Inventory (STAI-T; Spielberger, 2000) consists of 20 items. The participants respond on a 4-point scale, marking how often they feel a certain way, in general. The final score is calculated by adding up responses for each item. A higher score indicates a higher proneness to anxiety. Cronbach alpha for this questionnaire is quite high (.91) (Spielberger, 2000).

Beck Depression Inventory – II (BDI-II; Beck, Steer, & Brown, 2011) consists of 21 items mostly referring to psychological symptoms of depression, and they measure the severity of depressive symptoms. The participants respond on a scale from 0 to 3, assessing the frequency and the intensity of the listed symptoms. The Inventory has high reliability coefficients (Cronbach $\alpha = .90$ for student samples, and .93 for clinical samples) (Beck et al., 2011).

Descriptive data for Neuroticism (BFI), State-Trait Anxiety Inventory and Beck Depression Inventory-II obtained on this sample is presented in Table 1.

Table 1. *Means, Standard Deviations, Ranges and Reliability Coefficients for Neuroticism (BFI), STAI-T and BDI-II*

Scale	*N*	*M*	*SD*	Obtained	Cronbach α
Neuroticism	49	24.73	4.92	16-35	.71
STAI-T	49	37.94	10.82	20-59	.92
BDI-II	49	8.61	6.46	0-24	.81

In order to measure patients' symptom severity, the *IBS Symptom Severity Scale* was constructed based on the Gastrointestinal Symptom Diary (Blanchard, 2001). The scale contains 8 symptoms from the Gastrointestinal Symptom Diary (abdominal pain, abdominal tenderness, constipation, diarrhoea, bloating, nausea, flatulence, belching), and the participants are asked to mark the severity of each symptom on a scale from 0 (absent) to 4 (debilitating).

The IBS Symptom Severity Scale was used in the prospective part of the study, and the participants completed the scale three times a day for two weeks. *Average symptom severity* was obtained by dividing the sum of marked severities of all symptoms with the number of symptoms, for each measurement time point.

In order to measure daily stressful events which the participants experience, *the daily stressful events scale* was constructed. It has seven questions formulated on the basis of the stressful events classification from the Manual for coding interviews via the Daily Inventory of Stressful Events (DISE; Almeida, 1997). Each of the questions refers to a different type of stressful event. The participants completed the scale once a day, before bedtime, and their task was to mark whether they experienced any of the seven types of stressful events (related to e.g. health, finances, family relationships), how many such events they experienced per type, and for each type to mark how stressful it was from 1 (*slightly stressful*) to 4 (*very intensely stressful*). *Average stress intensity* was calculated by dividing the sum of all marked intensities in one day with the number of listed stressful events.

Group means and standard deviations of intra-individual descriptive data for measures of stress and symptom severity are presented in Table 2.

Table 2. *Means and Standard Deviations of Intra-Individual Descriptive Data for Average Symptom Severity and Average Stress Intensity*

Variables		*M*	*SD*
Average Symptom Severity	*M*	1.43	0.50
	SD	0.38	0.20
	Range	0.60-2.05	0.23-1.15
Average Stress Intensity	*M*	1.18	1.17
	SD	0.76	0.54
	Range	0.00-3.27	0.00-2.51

From Table 2 we can see that the group mean of average symptom severities was 1.43, which would reflect a moderate level of symptom severity. However, if we look at the intra-individual data, we see that mean symptom severity ranges from 0.60 in some participants, to 2.05 in others. Similarly, the group mean of average stress intensities is 1.18, with a group standard deviation of 1.17, but we see some participants had no stressful events at all (mean ranging from 0.00) and some had no variability (standard deviation range also spans from 0.00).

Procedure

The data was collected from January 2012 to October 2013 in the Clinical Hospital Centre in Rijeka. The participants completed the study in small groups which varied from 2 to 7 participants. For each group the study had three parts: the first and the third part of the study required them to complete a set of questionnaires (general information, BFI and STAI-T in the first part, and BDI-II in the third part) at the Clinical Hospital Centre, while the second part of the study was carried out individually by each participant and lasted two weeks. During those two weeks participants kept a symptom diary three times a day: within two hours upon waking, between 16 and 18 hours in the afternoon and within two hours before bedtime. Daily stressful events were recorded once each day, before bedtime. Participants were reminded about each measurement point via SMS.

Results

The Relationship of Daily Stress and Symptom Severity

In order to test if participants' reported stress levels were related to their levels of reported symptom severity on an intra-individual level, cross-correlation analyses were performed for each participant's time series data. The time series for stress intensity had 14 measurements (one for each day) so only the third daily measurement was used for symptom severity in order to form an equally long time series.

The cross-correlation analysis was carried out with -1, +1, and zero lags. Cross-correlations of time series with zero lag mean that the two time series are synchronized in time, lag -1 means that the second time series is leading the first one by 1 point in time (in this case, 1 day), while lag of +1 means that the second series is lagging behind the first one by 1 point in time. Cross-correlation analyses were performed on data from 44 participants. Five participants had more than 10% of missing values and their data was excluded. The results obtained from cross-correlations, presented in Table 3, show high variability among participants.

Table 3. *Average Cross-Correlations Between Average Stress Intensity and Average Symptom Severity, for Different Time Lags*

	Lag	Average Symptom Severity		
		$M_{\text{cross-correlation}}$	$SD_{\text{cross-correlation}}$	Range
Average	-1	.05	.25	-.53 to .61
Stress	0	.10	.27	-.41 to .69
Intensity	1	-.02	.24	-.47 to .50

Mean cross-correlations are extremely low which could lead to the conclusion that stress intensity and symptom severity are not related at all. The wide range of cross-correlations among participants points to a notable heterogeneity of the entire group. In fact, all patterns of relationships between stress intensity and symptom severity (positive and negative cross-correlations at all three time lags) could be found throughout the group, and for some participants more than one type of cross-correlation could be identified. This could, at least in part, lead to the observed low mean scores. In other words, opposite patterns of relationships in smaller subgroups of patients would result in zero mean cross-correlations for the entire group. In order to isolate the cross-correlations which are, in essence, close to zero, we split the cross-correlations at each time lag based on their absolute average (averages calculated regardless of correlation direction; .20 for all time lags). That way, by taking into account correlation direction, for each time lag we identified three types of relationships: above average positive correlation (high positive), above average negative correlation (high negative) and below average cross-correlation (zero). That means that each participant presented with one of 27 possible combinations (e.g. high positive correlations at all three time lags). Of those 27 combinations, 4 subgroups that exhibit the following patterns of stress-symptom relationships can be identified: zero cross-correlations at all three lags (n=12); only negative cross-correlations, with no positive correlations at any time lag (n=7); only positive cross-correlations, with no negative correlations at any time lag (n=15); both positive and negative cross-correlations at one of the time lags (n=10).

For the majority of participants it seems that the greater the symptom severity the higher the stress intensity or vice versa. Another subgroup shows a reverse pattern – higher stress intensity accompanied by lower symptom severity (or vice versa). In the third subgroup no relationship was observed between stress intensity and symptom severity. And the final subgroup shows a mixed type of relationships, both positive and negative correlations between stress and symptoms. The relationship between stress intensity and symptom severity seems quite different in these subgroups of participants, further supporting the findings of their heterogeneity.

Stress-Related Symptom Perpetuation Model

In order to test the predictive value of anxiety, depression, neuroticism and stress for the patients' symptom severity, as well as account for possible relations between the predictors themselves, we performed path analyses. Anxiety, depression and neuroticism were all measured once per each participant, while for symptom severity and stress intensity we calculated 14-day averages for each participant. Due to too many missing values, data from 3 participants had to be excluded which left us with data from a total of 46 participants.

Table 4 shows correlations of all measures used in the following analyses.

Table 4. *Correlations Between Neuroticism, Anxiety, Depression, Average Stress Intensity and Average Symptom Severity*

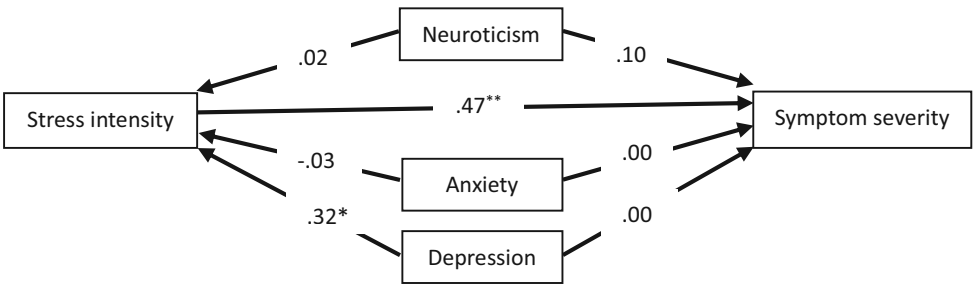
Variables	2.	3.	4.	5.
1. Neuroticism	.52*	.37*	.17	.12
2. STAI-T		.55*	.14	.16
3. BDI-II			.19	.31*
4. Symptom Severity				.49*
5. Stress Intensity				-

*$p<.05$.

As expected, neuroticism was positively correlated with anxiety and depression. Stress intensity was also positively correlated with symptom severity and depression.

It was hypothesized that symptom severity will be predicted by stress intensity, neuroticism, anxiety and depression, as depicted in Figure 1. Also, it was hypothesized that stress intensity would be predicted by neuroticism, anxiety and depression. Figure 1 shows the obtained path coefficients.

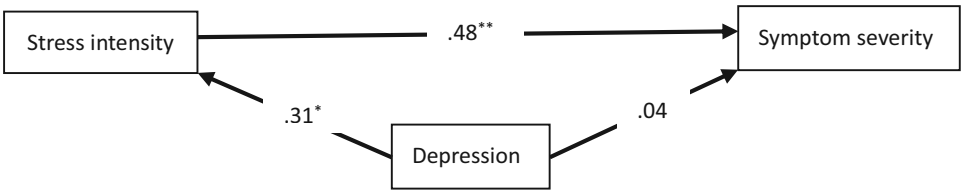
Figure 1. *Path Model of IBS Symptom Perpetuation*



*$p<.05$; **$p<.01$.

The above described model was a just-identified (or saturated) model, thus the goodness-of-fit indices are not presented. This model explained 24% and 10% of symptom severity and stress intensity variance, respectively. The model had several non-significant pathways (see Figure 1) and was trimmed accordingly. A simpler model (shown in Figure 2) was fitted instead. The second model is a simple mediation model, with both direct and indirect effects of depression on symptom severity.

Figure 2. *Mediation Model of IBS Symptom Severity*



*p<.05; **p<.01.

The second model fitted the outcome variables equally well (symptom severity R^2=.24; stress intensity R^2=.10) as the first model. Given that the difference between these two models cannot be statistically tested based on goodness-of-fit, and that they fit the data equally well, the simpler model is to be preferred.

It appears that depression has quite a small direct effect (.04) and a somewhat greater indirect effect (.15; through stress intensity) on symptom severity. The statistical significance of this mediation effect was tested with the Sobel method. Even though the formal level of statistical significance wasn't reached (Z=1.85, p=.06), considering the relatively small sample size (N=46), a complete mediation could be implied.

Discussion

Cross-correlation analyses of symptom severity and stress intensity show large differences among patients, and no general pattern can be established. For the majority of them however, symptom severity and stress intensity have relatively high positive correlations, whether measured in the same day, or when stress precedes or follows symptom severity. Previous research by Suls, Wan, & Blanchard (1994) and Levy, Cain, Jarrett, & Heitkemper (1997) found positive correlations between symptom severity and daily stress measured in the same day, in around 50% of participants. Using structural equation modelling on weekly averages of daily diary data, Blanchard et al. (2008) also reported strong concurrent effects of stress on IBS symptoms and vice versa. Levy et al. (1997) found that the correlation between symptom severity and daily stress was even higher when symptom severity was

correlated with the average of same-day and previous-day stress levels. We should note that such a correlation of concurrently measured stress and symptoms might simply be a result of symptom overestimation on highly stressful days. This issue is especially prominent in retrospective measurement, but cannot be completely eliminated in prospective diary measurement either (Levy et al., 1997). Some previous findings support a positive relationship between stress and symptom severity in later time points. Whitehead et al. (1992) collected data retrospectively in three-month intervals, however other studies report similar findings for prospective data. Blanchard et al. (2008) found effects of average weekly stress on average weekly symptoms measured in the following two weeks. It would seem that stress could have both a contemporaneous and a delayed effect on symptom severity, which could account for the results obtained by Levy et al. (1997) that correlations of stress and symptoms increase when using the average of same-day and previous-day stress levels instead of simple same-day stress levels. It can be argued that the contemporaneous and delayed effects of stress on symptom severity are summated in this manner, resulting in a cumulative effect. Blanchard et al. (2008) also found evidence of delayed effects of IBS symptoms on stress. That, in addition to the findings of delayed effects of stress on IBS symptoms, as well as contemporaneous effects of stress on symptoms and vice versa, supports a reciprocal relationship between stress and symptoms, rather than a causal one. The data from our subgroup of participants that presented with both contemporaneous and lagged positive correlations between stress and symptom severity is in line with those findings. It would seem that stress can lead to symptom exacerbation in IBS patients, but IBS symptoms can also be a source of stress (Mayer et al., 2001) and lead to a higher perceived stress intensity.

On the other hand, findings regarding the three remaining subgroups of participants of this study, who either showed no correlations, showed negative correlations between stress intensity and symptom severity, or showed both positive and negative relationships, are not in line with previous research. It is possible that in some patients stress does not lead to symptom exacerbation, and/or that their symptoms are primarily the result of other perpetuating factors, such as micro-inflammation, autonomic dysfunction or altered gut microbiota (Hauser et al., 2014). For participants who show a negative correlation between stress and symptom severity we could assume that some sort of contrast effect is taking place, in other words that participants tend to underestimate stress or symptoms on very stressful or painful days (or after such days). It is important to point out that in their study, Blanchard et al. (2008) explored the relationship between stress and different clusters of symptoms, and found significant relationships only for some symptom clusters. Specifically, they found that only abdominal pain, discomfort and bloating have significant effects on stress, while stress had significant effects on all of the above-listed symptoms and additionally on diarrhoea and constipation. In this study we used one measure of composite symptom severity, without examining individual

symptoms. It is possible that a different or a more detailed approach to symptom analysis would yield different results.

Analyses performed on the inter-individual level also point to a significant relationship between stress intensity and symptom severity. The results of the path analyses show that neither neuroticism nor anxiety has any effect on symptom severity. The only significant direct predictor of symptom severity was stress intensity, while stress intensity was predicted by depression. Regardless of the similar method used for measuring stress and symptom severity, which in itself could account for their correlation, the significance of their relationship is also supported by cross-correlation analyses on the intra-individual level. The fact that average stress intensity is predicted by depression also supports the validity of the measures used. Moreover, it would seem that depression has an indirect effect on symptom severity, meaning that participants with higher depression scores report higher stress intensity as well as more severe symptoms. Numerous studies (summarized in Mazure, 1998) show a significant relationship between stressful life events and the onset of depression, which is the most common way of approaching that relationship. There are, however, indications that depression contributes to experiencing more stressful events, in other words that this is a two-way relationship (Hammen, 2005). Persons who score higher on depression are prone to negative cognitions and negative mood, and tend to interpret events as negative (Beck et al., 2011). Depressive persons seem to experience more stressful events which are related to specific interpersonal content and dependent on their condition. In addition, considering that high exposure to stressful events is a predictor of further depressive episodes it would seem that depression and stress have a self-maintaining relationship (Hammen, 2005).

Based on the symptom perpetuation model evaluated in this study, we can conclude that depression is an important element in the vicious circle experienced by IBS patients. Not only does it predict higher stress intensity experienced by IBS patients, but it also indirectly predicts symptom exacerbation. It is important to point out that the reversed direction of relationships is also plausible. Specifically, the symptoms themselves represent a source of stress (Mayer et al., 2001), adding to the perception of stress intensity, as shown in the cross-correlation analyses. The perceived stress, in return, increases the negative or depressed mood of the patient and exacerbates the symptoms. This way the vicious circle is closed and can maintain the symptoms for long periods of time.

Conclusions drawn from this study should take into account several limitations. First of all, IBS is diagnosed exclusively based on the patients' subjective report due to the lack of a specific biological marker. Also, one of the characteristics of IBS is the heterogeneity of symptoms among patients and over time, which could lead to additional limitations when dealing with samples as small as the one used in our study. Finally, all performed analyses are based on correlations, which prevents us from drawing any causal conclusions.

In order to further examine the vicious circle of IBS symptom perpetuation, it is necessary to include measures of its other relevant factors, such as cognitions (e.g. pain catastrophizing) and behaviours (e.g. avoidance).The most useful approach to understanding the underlying mechanisms would be grouping the patients based on predisposing factors or the observed relationships between perpetuating factors and illness outcomes. For example, as the results of this study have pointed to very diverse patterns of the stress-symptom relationship, it would be very informative to observe each of the subgroups of participants in more detail. However, the main limitation of this study, the number of participants, prevents us from performing more complex analyses which would lead to broader conclusions. Nevertheless, the cognitive-behavioural framework seems to fit the obtained data well, and should be further expanded on in order to fill in the gaps in understanding the mechanisms of IBS.

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Papel del estrés en la intensidad de los síntomas SII

Resumen

Síndrome del intestino irritable se considera un trastorno biopsicosocial, el resultado de la combinación compleja de factores predisponentes, precipitantes y perpetuos. Rasgos de personalidad, estado afectivo y estrés son algunos de los factores relevantes que contribuyen a la calidad de vida más baja y la exacerbación sintomática de los pacientes con SII. Para examinar el papel del estrés en la exacerbación sintomática de SII, el objetivo de este estudio era explorar la relación entre los acontecimientos cotidianos estresantes y la intensidad de los síntomas de forma prospectiva, tanto como explorar los papeles del neuroticismo, ansiedad, depresión y estrés en el círculo vicioso de perpetuación de los síntomas.

Todos los 49 pacientes con SII informaron sobre la intensidad de los síntomas y la intensidad de los acontecimientos cotidianos estresantes cada día durante 14 días consecutivos. Además, completaron el Test de personalidad de los cinco grandes, Inventario de depresión de Beck e Inventario de ansiedad estado-rasgo.

En los datos de series temporales se hizo el análisis de correlación cruzada para la intensidad del estrés diario y de los síntomas para cada participante por separado. Se encontraron cuatro patrones de relación diferentes en diferentes subgrupos de participantes: correlación cruzada positiva de la intensidad de los síntomas y del estrés el mismo día; intensidad de los síntomas más alta en los días después de los días estresantes; intensidad de los síntomas más baja en los días después de los días estresantes e intensidad del estrés más baja en los días después de los síntomas graves. Usando resultados promedios para el estrés diario y la intensidad de los síntomas, tanto como resultados para el neuroticismo, ansiedad y depresión, realizamos un análisis del camino para examinar el modelo de la exacerbación de los síntomas. Mostró que, al nivel de grupo, la intensidad del estrés promedia predice la intensidad de los síntomas promedia. Neuroticismo y ansiedad no eran predictores significativos de la intensidad de los síntomas, mientras que la depresión demostró una relación marginalmente significante con la intensidad de los síntomas, mediada por la intensidad del estrés.

En conclusión, la depresión y el estrés diario parecen ser contribuidores importantes al círculo vicioso de la perpetuación de los síntomas SII.

Palabras claves: síndrome del intestino irritable, intensidad de los síntomas, estrés diario, depresión

Received: November 20, 2015