

Original Research Article

Significant perceived stressors in irritable bowel syndrome: a stress interventional module analysed

Sanjay Gupta*, Nitesh Kumar Singh, Vinod Verma

Department of Psychiatry, Institute of Medical Sciences, BHU, Varanasi, Uttar Pradesh, India

Received: 15 May 2020

Accepted: 20 May 2020

***Correspondence:**

Dr. Sanjay Gupta,

E-mail: guptavaranasi@hotmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Psychological stress is an important factor for the development of irritable bowel syndrome (IBS). More and more clinical and experimental evidences are showing that IBS is a combination of irritable bowel and irritable brain. As IBS is a stress sensitive disorder, its treatment should focus on managing stress and stress-induced responses.

Methods: This is a hospital based longitudinal study. 72 patients fulfilling the Rome IV criteria for irritable bowel syndrome were enrolled into the study. Perceived stress was assessed using student stress dimension questionnaire (SSDQ) while IBS severity was assessed using IBS severity scoring system (IBS-SSS). The stress interventional module (SIM) consist of specific domain targeted psychological interventions given to the patients weekly based on the stress domain mapping. The effectiveness of these interventions on reducing stress as well as IBS severity was assessed at baseline, and weeks 2, 4 and 6 follow-ups.

Results: Of the studied IBS patients, most had SPS in multiple life domains while familial and interpersonal domains were affected in 78%. Also, total stress load in form of mean cumulative stress load at baseline was 451.1 which decreased significantly to 274.4 over 6 weeks. This SIM brought about a reduction in mean irritable bowel syndrome severity score from 27.5 to 20.6 in 6 weeks. This reduction in IBS severity score overtime was significant ($p=0.001$).

Conclusions: Patients of irritable bowel syndrome show significant stress in multiple domains of life, which require proper assessment and management. Authors propose that individual-specific interventions aimed at reducing stress in all psychosocial life domains are efficacious and should be an integral part of managing IBS.

Keywords: Cumulative stress load, Irritable bowel syndrome, Psychological stress, Student stress dimension questionnaire

INTRODUCTION

Irritable bowel syndrome (IBS) is a functional bowel disorder that commonly presents with array of symptoms including abdominal discomfort and altered bowel habit. It is estimated that between 11 and 14% of the Indian population suffers from IBS.¹ Psychological stress is an important factor not for the development of irritable bowel syndrome (IBS) but also for exacerbations of symptoms. More and more clinical and experimental evidences are showing that IBS is a combination of

irritable bowel and irritable brain. The relationship between psychological stress and visceral hypersensitivity has been studied and well described by various researchers.^{2,3} Disturbance of the bidirectional brain-gut axis is recognized as a conceptual model of IBS pathophysiology, involving abnormal function in the enteric, autonomic and/or central nervous systems.⁴

As stress can result in over activity or under activity along the hypothalamic-pituitary-adrenal (HPA) axis and of the autonomic nervous (ANS), metabolic, and immune

systems, it can alter brain-gut interactions, ultimately affecting different physiological functions of the gastrointestinal tract.⁵ Life stresses not only contribute to symptom onset but also in exacerbation in the majority of patients with irritable bowel syndrome.⁶ IBS is a stress sensitive disorder, therefore, the treatment of IBS should focus on managing stress and stress-induced responses.

Banerjee A et al, studied fifty patients of IBS between 18 and 65 years of age and compared with fifty age and sex matched healthy controls, for the presence of anxiety and depression using Hamilton rating scale for anxiety (HAMA) and Hamilton rating scale for depression (HAMD), respectively. The patient group scored higher than controls ($p < 0.001$) in both HAMA and HAMD scores.⁷ Kabra N et al, from Mumbai found the prevalence of depression and anxiety disorder 37.1% and 31.4% respectively in IBS patients.⁸ There is paucity of studies on stress in irritable bowel disorder. Stress is defined in the text as 'any circumstances that threatens or is perceived to threaten one's well-being and that thereby tax one's coping ability'.⁹ Researchers have discovered that minor/micro stresses (daily hassles), like experiencing changes in household responsibilities, conflicts with other people, etc., can add up to be as stressful as a major traumatic event like a divorce or disaster; the cumulative nature of stress'.⁹ The experience of feeling stressed depends largely on associated cognitive processes; meeting new person is exciting for some, terrifying for others. People's appraisals of events are very subjective, and influence the psychological effect of the event on the person. So, stress is highly subjectively perceived, multidimensional and cumulative. Further, stress can be difficult to detect as it can affect multiple life domains at the same time, like physical, personal, social, interpersonal, mood and thought, etc.

Aims of this study

- To ascertain individual specific perceived stressors (ISPSs) across various life domains in patients of IBS
- To consequently assess impact of specific non pharmacological interventions focusing on the detected ISPSs (delivered through a stress interventional module) on IBS severity over time.

Authors hypothesized that the majority of IBS subjects would have significant perceived stress loads across various domains of their life. In addition, these would lead to a cumulative stress load of far greater intensity, with the multi-domain stresses adding up to significant proportions to adversely affect them and lead to, or help in the maintenance of, the disorder.

METHODS

This was a hospital based longitudinal study done at department of psychiatry, Institute of Medical Sciences, Banaras Hindu University, Varanasi, a tertiary health care

center with large catchment area consisting of Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh.

Inclusion criteria

- Patients fulfilling the Rome IV criteria for irritable bowel syndrome¹⁰
- Both male and female aged between 18-45 years
- Patients on treatment for at least 3 months and still having IBS severity score more than 17¹¹
- Patient giving written informed consent and willing to come for follow-up.

Exclusion criteria

- Age below 18 years and above 45 years
- Those having Hamilton depression rating scale (HAM-D) score more than 20¹²
- Those having Hamilton anxiety rating scale (HAM-A) score more than 25¹³
- Those having any other co-morbid physical, organic or severe psychiatric disorder
- Patients with medically unstable conditions
- Patients not giving written informed consent.

Stress was assessed using student stress dimension questionnaire (SSDQ); IBS severity was assessed using IBS severity scoring system (IBS-SSS).^{14,15} Based on individual stress domain mapping, domain specific psychological interventions like relaxation exercises, life style modification, cognitive coping strategies etc., were given to the patients weekly. The effectiveness of interventions on reducing stress, in form of Cumulative stress Load (CSL) was reassessed at 2, 4- and 6-weeks follow-up.¹⁶ Patients were also reassessed for IBS severity over 2, 4- and 6- weeks. Standard medication (proton pump inhibitors, anxiolytics) which was prescribed to the patients before enrollment in the study was continued during the period of study. Statistical analyses were conducted using statistical package for the social sciences (SPSS version 23) software. The statistical significance was defined at $p < 0.01$.

Stress interventional module

As authors have seen that stress is highly subjective affecting various life domains of a person and common daily stressor can add up together to give greater cumulative load, authors have utilized the student stress dimension questionnaire (SSDQ) which is highly effective for detecting the above.

Student stress dimension questionnaire (SSDQ)

It is a 93 item validated and reliable measure of capturing troubling life stressors across multiple domains of a person's life physical (Phy), personal (P), interpersonal (IP), social (SD), behavioral (BD), familial (FD), stress

coping (SC), physical and sexual abuse (AB), mood and thought (MT) and educational (ED) domains giving it a multidimensional, holistic nature (Figure 1). Each item on scale is scored as '0' '1' and '2' format (where 0=never, 1=sometimes, 2=very often or frequently).

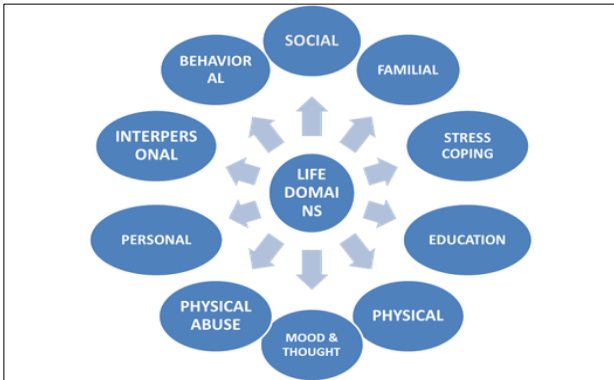


Figure 1: Multi domain life stressors.

This comprehensive tool captures common daily life stressors across ten domains, giving it a multidimensional, holistic nature. Stress score in the different domain of a person’s life is added up to give cumulative stress load (CSL).

Formula for calculation of stress in a domain

$$\text{stress in a domain} = \frac{\text{score obtained in a particular domain}}{\text{Maximum score in a particular domain}} \times 100$$

CSL is calculated by addition of scores of various individual domains.

Stress domain mapping

Individual scores on all 10 stress domains is graphed together (Figure 2). This provides a quick method to identify the stress areas with higher scores. Based on which interventions can be planned to target the particular domain. Stress map provide a visual aid for counseling subject about his stress areas and reduction in stress over time with intervention can monitored.

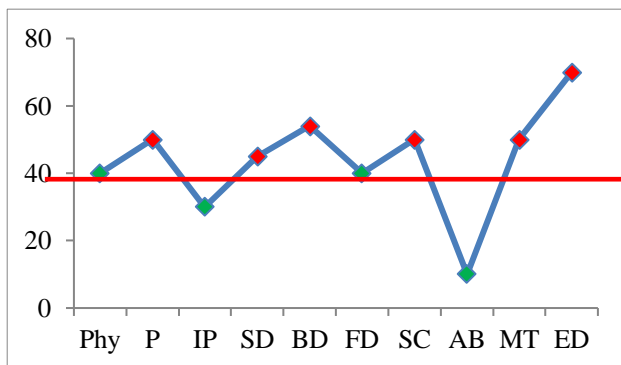


Figure 2: Stress domain mapping.

IBS severity scoring system (IBS-SSS)

This scale evaluates primarily the intensity of IBS symptoms during a 10-day period: abdominal pain, distension, stool frequency and consistency, and interference with life in general. The IBS-SSS calculates the sum of these 5 items each scored on a visual analog scale from 0 to 10. The IBS-SSS is also responsive to treatment.

RESULTS

Of the 72 Patients fulfilling Inclusion criteria enrolled into the study, 12 patients were lost to follow up and dropped out from the study. 60 patients completed their follow up and were included in final analysis.

Table 1: Socio-demographic status of subjects.

Socio-demographic status of subjects			
		N	%
Sex	Male	44	73%
	Female	16	27%
Family type	Nuclear	36	60%
	Joint	24	40%
Marital status	Married	35	58.4%
	Unmarried	25	41.6%
Domicile	Urban	44	73.3%%
	Rural	16	26.7%%
Religion	Hindu	54	90%
	Muslim	6	10%
Education	Illiterate	0	0%
	Primary	2	3.3%
	Highschool	13	21.6%
	Intermediate	12	20%
	Graduation	18	30%
Occupation	Post graduate	15	25%
	Unemployed	11	18.3%
	House maker	11	18.3%
	Student	14	23.3%
	Semi-skilled	5	8.3%
	Government	13	21.6%
	Self-employed	4	6.6%
Socioeconomic status	Professional	2	3.3%
	Upper	0	0%
	Upper middle	27	45%
	Lower middle	30	50%
	Upper lower	3	5%
Lower	0	0%	

Of 60 IBS patients who completed follow up, 44 (73%) were male and 16 (27%) female. Ages ranged between 18 and 43 years, with an average age of 31±7.47. Majority of participants were married Hindu from Urban area. Majority of patients were either graduate or postgraduate. Most of the patients belonged to middle socio-economic status (Table 1). Most of patients had significant stress in

multiple life domains. 78% subjects in this study scored significant stress in familial and interpersonal domain (Table 2).

Table 2: Stress in different domain at baseline.

Domain	N=60	%
Physical	41	68%
Personal	39	65%
Interpersonal	47	78%
Social	41	68%
Behavioural	34	56%
Familial	47	78%
Physical sexual	4	7%
Stress coping	40	67%
Mood and thought	39	65%
Edu and Occ	35	58%

Table 3: CSL score overtime.

At interval	CSL Mean	SD
Baseline	451.1	53.2
2 weeks	379.2	41.7
4 weeks	325.4	41.1
6 weeks	274.4	43.4

Table 4: IBS score overtime.

At interval	IBSS Mean	SD
Baseline	27.5	5.8
2 weeks	25.0	6.0
4 weeks	22.0	5.8
6 weeks	20.6	5.7

Table 5: Change in IBS score overtime.

	Mean difference of IBS-SS	SD	T	P value
IBSSb-IBSS2	2.5	1.8	10.2	0.001
IBSS2-IBSS4	2.7	1.9	11.2	0.001
IBSS4-IBSS6	1.6	1.7	7.0	0.002
IBSSb-IBSS6	6.8	2.8	18.5	0.001

Mean cumulative score at baseline was 451.1 which decreased to 274.4 in 6 weeks (Table 3). Mean irritable bowel syndrome severity score also reduced from 27.5 to 20.6 in 6 weeks (Table 4). Reduction in IBS severity score overtime was significant (Table 5).

DISCUSSION

Researchers advocate consideration of a biopsychosocial model towards managing IBS. Studies report increased co morbid anxiety and depression in IBS patients and associate them with lower socioeconomic status as well as lower average per capita income.¹⁷ Authors assessed the individual's significant perceived stressors (SPS) across various life domains in IBS patients and attempted

to intervene on the cumulative stress loading caused by them. Individual's SPS assessment was vital for this study. For this, authors could have used the holmes rahe stress inventory.¹⁸ However, since it has preassigned fixed scores for each micro stressor, the individual-specific stress perception assessment would not be possible keeping in mind that the perception of the different events is individual specific i.e. some events may be taken as more stressful by one individual than another. Other stress scales have similar shortcomings. For this purpose, the SSDQ was the most befitting scale, fulfilling all our needs and, thus, was chosen.

In this study, majority of patients (74%) were male. Globally the prevalence of IBS in women is approximately 1.5 to 3-fold higher than those seen in men.¹⁹ In Asia, most studies showed no gender difference.²⁰ Less number of females in this study could be due to stigma associated and hence reluctance to seek treatment from psychiatrists. It could also be due to a lack of regard for, or lack of concern for, the overall health of the wife in these families.

Majority of IBS patients had stresses in multiple domains at the base line. Stress in interpersonal and familial domain was seen in highest number (78%) of patients. Domain specific interventions were planned according to the individual's stress domain mapping. Effectiveness of this stress intervention module was evident with the reduction of cumulative stress score over time during the follow up. SSDQ proved to be useful tool to identify stress in multiple domains quickly and planning psychological intervention effectively according to affected domains.

This study findings are in line with Konturek et al, who reported a significant increase in stressor score just before progression from IBS non-patient to IBS patient and Chang et al, who demonstrated that early adverse life events (EALs) are associated with the prevalence of IBS.^{5,21} High prevalence of stressor in multiple domains in this study subjects strongly, and clearly, suggests that psychological or psychosocial stressors determine the development of IBS. At baseline, cumulative stress score and IBS severity scores were correlated (Pearson $r=0.29$). Cumulative stress loading decreased significantly (176.7 ± 61) in follow up after domain specific psychological intervention. Along with the reduction in CSL, IBS severity also decreased significantly as evident by reduction in IBS severity score (6.8 ± 2.8) in 6 weeks. This study findings are similar to findings of Whitehead et al i.e. the experience of psychosocial stress and exacerbation of GI symptoms in IBS patients show higher correlation than that in healthy individuals.²² This Longitudinal follow up study with good sample size not only helped to see the correlation between stress and IBS severity over time, it also showed the impact and efficacy of individual specific stress reduction techniques in management of IBS. There were few limitations like Absence of control group is a limitation which other

studies may take note of patients also continued pharmacological treatment as prescribed from gastroenterologist before enrollment in the study.

Management of irritable bowel syndrome is a very big clinical enigma. The patient go to multiple specialists, undergoes multiple costly and time-consuming investigations for multiple years without much improvement. SSDQ is unique and fast method which not only assesses perceived stress in multiple life domains, it also provides us with a STRESS MAP of the subject through which a specifically tailored SIM can be formulated. Not only is detection of stress difficult, the inability to detect the stress factors operating in an individual are fraught with disastrous consequences. Stress factors are highly individual specific and studies have shown that often people incorrectly detect stress issues in others as their individual perceptual differences creep in which adds many confounding variables to routine interviewing, rendering it not only ineffective, but often faulty, driving the management in wrong directions.²³ Management of stress is particularly important as extended periods of stress can cause destructive changes in the body such as heart disease, cancer, stroke, ulcers, back pain, headaches, raised blood pressure, indigestion, and a variety of other psychological problems.²⁴ Chronic stress is also linked with changes in brain areas like reduction in volume of pre-frontal cortex and limbic system. Chronic stress changes neuronal plasticity due to dendritic atrophy with reduction in spine density.²⁵ The consequences of these alterations in a brain region cause cognitive, emotional and behavioral dysfunctions that are commonly associated with chronic stress which may increase vulnerability to psychiatric disorders. If the distressing stimulus persists, the HPA axis kicks in to sustain the immediate reaction mediated by the centrally activated peripheral systems. In a situation of chronic stress, the neuro immune axis gets over stimulated and breaks down, thus causing neuroendocrine/immune imbalances that can establish a state of chronic low-grade inflammation, a possible prelude to irritable bowel syndrome.

CONCLUSION

Psychological stress is an important factor for the development of irritable bowel syndrome (IBS). This study showed high stress in different life domains in IBS patients. SSDQ proved to be time efficient tool to map stress in different domain in IBS patients. Intervention targeted toward reducing stress in impaired domain resulted in significant reduction in IBS severity overtime. More and more clinical and experimental evidences are showing potential role of psychological stress in the pathogenesis of IBS and providing comprehensive approaches to its management is imperative. IBS is a stress sensitive disorder; therefore, the holistic treatment of IBS should focus on identifying and managing stress for greater efficacy and reduce unnecessary health care utilization and economic burden in patients.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Rahman MM, Mahadeva S, Ghoshal UC. Epidemiological and clinical perspectives on irritable bowel syndrome in India, Bangladesh and Malaysia: a review. *World J Gastroenterol.* 2017;23(37):6788-801.
2. Musial F, Häuser W, Langhorst J, Dobos G, Enck P. Psychophysiology of visceral pain in IBS and health. *J Psychosom Res.* 2008;64:589-97.
3. Larauche M, Mulak A, Taché Y. Stress-related alterations of visceral sensation: animal models for irritable bowel syndrome study. *J Neurogastroenterol Motil.* 2011;17(3):213-34.
4. Karantanos T, Markoutsaki T, Gazouli M, Anagnou NP, Karamanolis DG. Current insights in to the pathophysiology of irritable bowel syndrome. *Gut Pathog.* 2010;2:3.
5. Konturek PC, Brzozowski T, Konturek SJ. Stress and the gut: pathophysiology, clinical consequences, diagnostic approach and treatment options. *J Physiol Pharmacol.* 2011;62:591-9.
6. Surdea-Bлага T, Băban A, Dumitrascu DL. Psychosocial determinants of irritable bowel syndrome. *World J Gastroenterol.* 2012;18:616-26.
7. Banerjee A, Sarkhel S, Sarkar R, Dhali GK. Anxiety and depression in irritable bowel syndrome. *Indian J Psychol Med.* 2017;39:741-5.
8. Kabra N, Nadkarni A. Prevalence of depression and anxiety in irritable bowel syndrome - a clinic based study from India. *Indian J Psychiatry.* 2013;55:77-80.
9. Lazarus RS, Folkman S. *Stress, appraisal and coping.* Springer; New York: 1984. Available at: <https://pdfs.semanticscholar.org/5bef/cc8f5b1f19b3e8411d1f00add4c49e42f87e.pdf>. Accessed on 25th March 2020.
10. Lacy BE, Patel NK. Rome criteria and a diagnostic approach to irritable bowel syndrome. *J Clin Med.* 2017;6(11):99.
11. Drossman DA, Chang L, Bellamy N, Gallo-Torres HE, Lembo A, Mearin F, et al. Severity in irritable bowel syndrome: a rome foundation working team report. *Am J Gastroenterol.* 2011;106(10):1749-59.
12. Hamilton M. A rating scale for depression. *J Neurol Neurosurg Psych.* 1960;23(1):56.
13. Hamilton M. The assessment of anxiety states by rating. *Br J Med Psychol.* 1959;32:50-5.
14. Gupta S. Development and validation of students stress dimension questionnaire (SSDQ). *Indian J Applied Res.* 2016;6(7):90-6.
15. Francis CY, Morris J, Whorwell PJ. The irritable bowel severity scoring system: a simple method of monitoring Irritable Bowel Syndrome and its

- progress. *Aliment Pharmacol Ther.* 1997;11:395-402.
16. Gupta S, Singh NK, Verma V. Management of dissociative disorders: the stress loading hypothesis and utility of students stress dimension questionnaire (SSDQ). *Int J Health Sci Res.* 2019;9(7):1-11.
 17. Silvernale C, Kuo B, Staller K. Lower socioeconomic status is associated with an increased prevalence of co morbid anxiety and depression among patients with Irritable Bowel Syndrome: results from a multicenter cohort. *Scand J Gastroenterol.* 2019;54(9):1070-4.
 18. Holmes TH, Rahe RH. The social readjustment rating scale. *J Psychosom Res.* 1967;11:213-8.
 19. Lovell RM, Ford AC. Effect of gender on prevalence of irritable bowel syndrome in the community: systematic review and meta-analysis. *Am J Gastroenterol.* 2012;107:991-1000.
 20. Gwee KA, Lu CL, Ghoshal UC. Epidemiology of irritable bowel syndrome in Asia: something old, something new something borrowed. *J Gastroenterol Hepatol.* 2009;24:1601-7.
 21. Chang L. The role of stress on physiologic responses and clinical symptoms in irritable bowel syndrome. *Gastroenterol.* 2011;140:761-5.
 22. Whitehead WE, Crowell MD, Robinson JC, Heller BR, Schuster MM. Effects of stressful life events on bowel symptoms: subjects with irritable bowel syndrome compared with subjects without bowel dysfunction. *Gut.* 1992;33:825-30.
 23. Koolhaas JM, Bartolomucci A, Buwalda B, de Boer SF, Flugge G, Korte SM, et al. Stress revisited: a critical evaluation of the stress concept. *Neurosci Biobehav Rev.* 2011;35(5):1291-301.
 24. Glaser R, Kiecolt-Glaser JK. Stress-induced immune dysfunction: implications for health. *Nat Rev Immunol.* 2005;5(3):243-51.
 25. Lucassen PJ, Pruessner J, Sousa N, Almeida OF, Van Dam AM, Rajkowska G, et al. Neuropathology of stress. *Acta Neuropathol.* 2014;127(1):109-35.

Cite this article as: Gupta S, Singh NK, Verma V. Significant perceived stressors in irritable bowel syndrome: a stress interventional module analysed. *Int J Res Med Sci* 2020;8:2431-6.