International Journal of Chemical and Biochemical Sciences
(ISSN 2226-9614)

Journal Home page: www.iscientific.org/Journal.html



# Knowledge, Attitude, and Practice Assessment About the Irritable Bowel Syndrome Amongst Health Care Workers in a City in Maharashtra, India

*Gayatri Gawade Maindad[1], Dadasaheb Maindad[2]*, Meghana K. Padwal[1], Prakash Doke[3]*

[1]*Department of Biochemistry, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune-411043, Maharashtra, India.*
[2]*Department of Gastroenterology, Bharati Vidyapeeth Deemed to be University Medical College, Pune-411043, Maharashtra, India.*
[3]*Department of Community Medicine, Bharati Vidyapeeth Deemed to be University Medical College, Pune-411043, Maharashtra, India.*

**Abstract**

There are fewer studies assessing the knowledge, attitude, and practice of healthcare workers regarding irritable bowel syndrome in the Indian Population. Findings from this study will complement existing knowledge on etiology, clinical presentation, treatment options, commonly used investigations, practice trends, attitude etc., with respect to irritable bowel syndrome. In our questionnaire-based study, we found a good score (80-100%) for knowledge, attitude, and practice questions, which might be due to the urban study population. The article is covering various aspects with respect to knowledge, attitude, and practice of health care workers regarding Irritable Bowel Syndrome so that some positive recommendations in future can be implemented if found generalizable.

**Keywords:** Irritable bowel syndrome, Knowledge, Attitude, Practice, Health care workers.
**Full-length article** *Corresponding Author, e-mail: dadasahebm98@gmail.com

## 1. Introduction

Irritable bowel syndrome (IBS) is one of the most common functional GI disorders, characterized by chronic abdominal pain or discomfort and altered bowel habits in the absence of organic disease [1,2] with multifactorial pathogenesis considered with both digestive and extraintestinal wide range of symptoms. [3] The pathogenic mechanisms include abnormal gut motility, visceral hyperreactivity, psychological factors, disturbances in the brain-gut axis, leaky gut, oxidative stress, etc. [4]. Irritable bowel syndrome (IBS) is traditionally diagnosed using a symptom-based criteria standard, the Rome diagnostic criteria, currently revised as the Rome IV criteria. [5] Due to the lack of specific laboratory or imaging tests, IBS diagnosis is mainly clinical and symptom-based. The exact etiologic mechanism of IBS is still unknown, and there is no specific marker for its identification [5]. Due to variations in symptoms, IBS diagnosis is not always easy, and, because of these uncertainties, IBS is a diagnosis of exclusion [6]. Due to the lack of definitive treatment for IBS and the presence of associated comorbidities, some patients constantly change their physician, which creates a condition called “doctor shopping” [7]. The patients present with physical symptoms such as abdominal pain, altered bowel habits, and flatulence, presenting themselves to a gastroenterologist, physician, or surgeon. Depression and/or anxiety are common comorbidities, and this can result in psychiatric consultations too [8,9] which makes it challenging to treat [10,11]. Not only the clinical presentation is vague and accurate diagnosis is challenging, but also the treatment is unsatisfactory and incomplete for IBS [12,13]. Patient is often subjected to a battery of investigations and a variety of treatment trials are given. IBS is an "awkward to tackle" disorder for patients as well as treating physicians [14]. Thus, a strong doctor–patient relationship is vital to successfully manage IBS [15]. However, IBS patients frequently report that the medical profession tends to be unsympathetic and hostile towards them, [16] and doctors are often characterized as being intolerant of IBS patients [17,18]. Recognition of the impact of medical views on patients, including an understanding of the significance of the label of ‘neurosis’ for IBS patients, is essential in building successful doctor–patient partnerships. [19]. Most IBS patients are either wrongly diagnosed by general practitioners or inadequately treated. To address the causes of wrong diagnosis and treatment of IBS by general practitioners [20] Mahmoudi et al. [21] reported possible contributors such as system failure in providing general practitioners proper training and medical education, an inability on the part of general practitioners to keep pace with the latest updates and variations in patient's history. Health care workers like nurses, interns, residents, general practitioners, and consultants associated with these patients' care, therefore, must be made aware of these practical problems and perceptions of this disorder so that proper

interventions can be done at appropriate times. Medical internship is the opportunity to explore the intricate and essential knowledge about this disorder. They work with various clinical departments during their internship. Delayed diagnosis, lengthy waiting periods for specialist review, over-investigation, and lack of clear diagnostic criteria, poor communication between specialists and referring doctors have been cited as reasons for a lack of confidence in an IBS diagnosis [22]. Knowing the level of knowledge, attitude, and practice (KAP) regarding common diseases amongst healthcare providers is essential so that appropriate need-based and effective training programs can be designed [23-27].

Several studies have been carried out in various countries to assess clinicians' understanding of the disease and symptoms of IBS. To the best of our knowledge, as per a literature search, there are very few studies evaluating the knowledge of healthcare workers regarding IBS in the Indian Population. Hence, with this background, the study was planned to assess the knowledge, attitudes, and practices (KAP) regarding IBS among healthcare workers in our population. Findings from this study will complement existing knowledge [28].

### *1.2. Aim and Objectives*

#### *1.2.1. Aim*

To study the knowledge, attitude, and practice about irritable bowel syndrome amongst the health care workers in the urban city.

#### *1.2.2. Objectives*

- To evaluate the knowledge about irritable bowel syndrome amongst healthcare workers regarding the etiology, pathogenesis, prevalence, and diagnosis of IBS.
- To assess the attitude towards the practice of irritable bowel syndrome amongst health care workers.
- To study the practice pattern trends about irritable bowel syndrome amongst healthcare workers

## 2. Material and Methods

### *2.1. Study Setting*

The study was conducted online by sharing the questionnaire link on Whats app at Bharati Vidyapeeth Medical College and Hospital, Pune, Maharashtra, India.

a) **Study Design**: Descriptive, Observational, Single-center Hospital-based, Questionnaire study
b) **Study Duration**: The study period was of 9 months duration, from July 2022 to March 2023.
c) **Study Population**: The healthcare workers in the categories of undergraduates, postgraduates, interns, general practitioners, nursing staff, physiotherapists, and technicians were included in the study.

### *2.2. Ethics Committee Approval*

The approval was sought from the institutional ethics committee before starting the actual research work (l.w.r.no. BVDUMC/IEC/24 – 25/4/2022).

### *2.3. Inclusion Criteria*

Healthcare workers willing to participate

### *2.4. Exclusion Criteria*

Not willing

### *2.5. Sample Size*

The sample size was estimated using the results from the study by Akula et al. [29], taking the good knowledge category as 48.5% and 5% significance level. The minimum required sample size obtained was 106. The questionnaire link was sent on WhatsApp of health care workers.

### *2.6. Questionnaire design*

#### *2.6.1. Questionnaire development*

The questionnaire consists of various aspects such as knowledge, attitude, and practice of irritable bowel syndrome. With the literature search, the questionnaire we used was prepared by modifying the earlier few similar studies[30]. The questionnaire was pre-validated and discussed with the experts for its content and relevance, and the necessary changes were incorporated in the final one. This KAP questionnaire consists of 22 questions, of which 07 are demographic, 08 are related to knowledge, 03 questions are related to attitude, and 04 questions are related to practice aspects. The first part elicited demographic information (Gender, age, food habits, sleeping pattern, family history, etc.). The second part addressed two main domains: knowledge of IBS and attitudes towards IBS. The domain of knowledge addressed the following specific areas: epidemiology and natural history; etiology; symptoms, investigations, diagnosis, and treatment. Within attitudes and concerns about IBS, the ability of the medical system to address patient needs was addressed. To design this questionnaire, we sought the advice of experts, and each question was evaluated for its simplicity and understandability by experts. Questions were handed out to four experts, and they were asked to rate each item based on its relevance or for any modifications. For each question, the scores were summed and divided by the total number of experts. The content validity of the questionnaire was established by literature review and expert opinion. Excellent content validity of each item was considered by the value of higher than 0.8331. In this process, one question from the questionnaire was changed for responses due to nonrelevance and for better understanding.

### *2.7. Content validity procedure [30]*

The following steps of content validation were followed up.

***a) Preparing the content validation form***

***b Selecting the panel of experts***

The experts were selected based on selection criteria such as number of years of teaching experience over 15 years, number of publications as more than ten, and designation as associate professor and above. A total of four experts were included in the study.

***c)Conducting content validation***

The content validation form with the questionnaire tool was mailed to the experts for their review. The reviews were collected and entered in the chart for domain analysis.

***d) Reviewing domain and items***

***e) Providing score for each item***:(Refer table no 1)

***f) Calculating CVI (Content Validity Index)*** (Refer table no.2)

### *2.8. Tools of data collection*

The data was recorded in the Google Forms format of the Google platform. The questionnaire, in the form of a link, was posted on social media platforms like WhatsApp. The responses were extracted in an excel sheet and checked

for errors. Duplicate responses were deleted. The collected data was utilized for statistical analysis.

## 3. Results and discussions

The results of the present study are given in tables 1-4 and figures 1-10. A total of 151 participants participated in the study. (Out of which 77.1% were females and 21.6 % were males.) 8.5% of respondents reported response as a family history of IBS, and 22.9 % responded that either some relative or friend had IBS. 47.7 % of respondents reported that IBS is a commonly underestimated problem in India. The most common age group, 40.6 %, who was involved in giving responses was from the age group of less than 20 years. The statistically significant responses were noted for questions related to family history of IBS, whether you have found IBS in friends and relatives, is IBS a common underestimated problem in India. Our study results showed that respondents had good score of (80-100%) about knowledge, Attitude, and Practice about IBS. The response given for the prevalent food habit included mixed types of food habits. 51 % of the participants gave a response as mixed dietary food habits. The most common response got for sleep patterns from the participants was regular. 15.7 % of participants gave a response as history of irregular sleeping patterns, and 7.2 % gave response as with the shift duty-related sleeping issues.

### *3.1. Knowledge Domain*

There were eight questions included in this domain. The most common response got from the participants involved all of the above, with frequency of 56.2 %. This response indicates that there might be less knowledge about the IBS etiology, or the logical answer was attempted. The most common response given by participants for common presenting symptoms in IBS was all of the above 50.3 %, with the second most common being abdominal discomfort and pain, 22.9%. History taking, physical examination, clinical examination, and investigations was the most common response got from participants, with 47.1%. All of the above,46.4 % was the most common response got from the participants for the question on different investigations done in IBS. All of the above, 36.6 % and the do not know, 33.3 %, were the most common response got for the question addressing the knowledge component about the drug groups commonly used in IBS. The nutritional deficit,34.6 %, and colon cancer 33.3 % were the most frequent responses received for the risk of conditions IBS Patients can develop question. There was "no" as the most frequently got response, with 56.9% for the question addressing the awareness about the FODMOP diet. 56.9 % of respondents were not aware of the FODMAP diet's role in IBS, and 21.6 % respondents were not knowing about the FODMAP diet. The role of Cognitive Therapy in Treating IBS question got the most common response as "do not know" with 46.4 %. and 6.5 % of respondents gave response as there is no role of cognitive therapy in treating IBS. This cross-sectional study was carried out among 151 healthcare workers, out of which 77.1% (n= 118) were females and 21.6 % (n= 33) were males, who participated over the period of 9 months showed that the knowledge, attitude, and practice score as good (80-100%) as per Akula et al. [29] classification (2020). 8.5% of respondents reported that family history has a role in of IBS, and 22.9 % that either some relative or friend had IBS, indicating the widespread presence of IBS. 47.7 % of respondents reported that IBS is a common underestimated problem in India, which indicates that the healthcare workers do understand the magnitude of the problem with respect to IBS and the tip of the iceberg nature of the disorder. There is a great need for awareness about this disorder among healthcare workers dealing with IBS patient care. Knowledge, Attitude, and Practices (KAP) studies are quantitative methods (predefined questions formatted in standardized questionnaires) that provide access to quantitative and qualitative information, revealing misconceptions or misunderstandings that might be obstacles to implementation and potential barriers to behavior change. The present study was focused on evaluating the knowledge, attitude, and practice level of IBS amongst healthcare workers who are involved in providing care to IBS patients. Studied aspects illustrating the behavioral domains are knowledge, attitude, and practice. It is commonly known that a person's prevention practice is driven by his knowledge and attitude on certain topics, thus the need to assess [32].

Gwee et al. [33] studied that the Rome diagnostic criteria are inappropriate for Asia. They suggested that a move away from the old psychosomatic model to a more encompassing, mechanism-based, multifactorial, more sophisticated disease model needs to be developed to build our own diagnostic criteria. The NICE (National Institute for Health and Care Excellence) guideline (CG61 2008) emphasized establishing a positive diagnosis by identifying symptoms that require prompt referral but avoiding unnecessary investigations and referrals and working in partnership with the person with IBS using shared decision-making to aid symptom control [34]. Yale et al. (2008) [35] reported that diagnosis in primary care might be problematic as only a small proportion of IBS cases, as recorded in medical records, met case definition criteria. A study done by Al-Hazmi about the KAP of Primary Care Physicians about IBS in Northern Saudi Arabia found that although physicians had a suitable attitude toward IBS, they lacked knowledge, and their practices toward this condition were inappropriate. [36] A study done by Lacy et al. among family physicians, general practitioners, and gastroenterologists showed that attitudes and practice patterns of physicians toward patients with IBS differ depending on practice specialty, with family physicians having lesser scores [37]. Bijkerk et al. (2003) reported that patients and GPs share similar views on etiology and symptomology but differ in treatment approaches [38].

Training programs can add to the knowledge, which is shown by a study done by Longstreth and Burchette among primary practitioners in the UK which showed initial poor KAP. After a 3-month health educational intervention, the same study showed increased knowledge; however, the attitude and practice remained the same [39]. Dixon- Woods and Critchley (2000) reported that GPs can hold hostile views about patients with IBS who are frequent attenders and do not improve [40]. Singh et al. 41 suggested that the prevalence of sleep disturbances in people with IBS ranges from 7.1 % to 73.9 %, possibly linked to a higher severity of gastrointestinal symptoms. There was a positive relationship between the severity of IBS symptoms and sleep disruptions and specific patient characteristics, as sleep disturbances cause visceral hyperalgesia, which heightens the impression of gastrointestinal symptoms in patients, and the endophenotypic features related to stress vulnerability could play a role studied using IRT analysis [42].

**Content Validation Form for Knowledge, attitude, and practice about the irritable bowel syndrome**

Dear Experts,

Knowledge, attitude, and practice about irritable bowel syndrome amongst the health care workers questionnaire contain a total of 22 questions, out of which are Demographic:07, Knowledge: 08, Attitude:03 and Practice: 04 questions. We need your expert judgment on the relevance and any modification required in the same. Please be as objective and constructive as possible in your review. Kindly send the certificate soft copy of the same signed and stamped.

**Table 1:** Scores for the questions and corresponding decisions for inclusion

| | |
|---|---|
| **Score of 4** | The question was retained as the original |
| **The score of 3 by at least three experts** | The question was retained as original |
| **Score ≤ 2 by any of the experts** | Question or response options were modified as per reviewer suggestions |

**Table 2:** Calculation of CVI (Content Validity Index)

| Item no. | Expert no 1 | Expert no 2 | Expert no 3 | Expert no 4 | Experts in Agreement | I CVI= Experts in Agreement/Total no of experts | Universal Agreement (ua) |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **2** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **3** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **4** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **5** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **6** | 1 | 0 | 1 | 0 | 2 | 0.5 | 0 |
| **7** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **8** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **9** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **10** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **11** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **12** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **13** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **14** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **15** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **16** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **17** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **18** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **19** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **20** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **21** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **22** | 1 | 1 | 1 | 1 | 4 | 1 | 1 |
| **Total Score=** | 22 | 21 | 22 | 21 | | Scale CVI Average=0.9772 | |
| **Proportion CVI= Total score/no of items** | 22/22=1 | 21/22= 0.95 | 22/22=1 | 21/22= 0.95 | | | |
| **Proportion CVI average=** | 1+0.95+1+0.95= 3.9/4=0.975 | | | | | | **Scale CVI universal Agreement Average=21/22=0.9545** Must be above:0.83 |
| **Proportion CVI average= 0.975 Scale CVI Average=0.9772 So, both scores are equal. Must be above:0.83** | | | | | | | |

**Table 3:** Demographics of Healthcare Workers Participated in the Study (N =151)

| Sr. No. | Category of Responses | Frequency % |
|---|---|---|
| 1 | **Gender** | |
| | Female | **77.**1(%) (n=118) |
| | Male | 33 (%)21.6 (n=33) |
| 2 | **Age in yrs** | |
| | **Less Than 20** | 40.6 (%) (n=62) |
| | **21-30** | 16.4 (%) (n=25) |
| | **31-40** | 16.9 (%) (n=28) |
| | **41-50** | 16.9 (%) (n=26) |
| | **51-60** | 6.5(%) (n=10) |
| 3 | **Food Habits** | |
| | Mixed | 51.0 (%) (n=78) |
| | Nonvegetarian | 17.0 (%) (n=26) |
| | Vegetarian | 30.7 (%) (n=47) |
| 4 | **4. Sleeping Pattern** | |
| | Excess sleepiness | 0.7 (%) (n=1) |
| | Insomnia | 1.3(%) (n=2) |
| | Irregular | 15.7(%) (n=24) |
| | **Regular** | 73.9(%) (n=113) |
| | Shift duty-related sleep issues | 7.2(%) (n=11) |
| 5 | **5. Family History of IBS (irritable bowel syndrome)** | |
| | Do not know | 6.5(%) (n=10) |
| | No | 83.7(%) (n=128) |
| | Yes | 8.5(%) (n=13) |
| 6 | **6. Have you found IBS in friends and relatives** | |
| | Do not know | 20.9(%) (n=32) |
| | No | 52.3(%) (n=80) |
| | Not related | 2.6(%) (n=4) |
| | Yes | 22.9(%) (n=35) |
| 7 | **7. Is IBS a common underestimated problem in India** | |
| | Do not know | 34.0(%) (n=52) |
| | No | 17.0(%) (n=26) |
| | Yes | 47.7(%) (n=73) |

**Table 4.** List of common medications (n = 151)

| Sr No | Drug groups commonly used to treat IBS are | Frequency % |
|---|---|---|
| 1 | Antidepressants | 0.7(%) (n=1) |
| 2 | Antidiarrheal agents | 10.5(%) (n=16) |
| 3 | Antiflatulent drugs | 2.6(%) (n=4) |
| 4 | Antispasmodics | 3.3(%) (n=5) |
| 5 | Chloride channel activators | 1.3(%) (n=2) |
| 6 | Serotonin agonists and antagonists | 2.0(%) (n=3) |
| 7 | Stool bulking agents | 5.9(%) (n=9) |
| 8 | All of the above | 36.6(%) (n=56) |
| 9 | Do not know | 33.3(%) (n=51) |
| 10 | None of the above | 2.6(%) (n=4) |
| | **Total** | **151** |

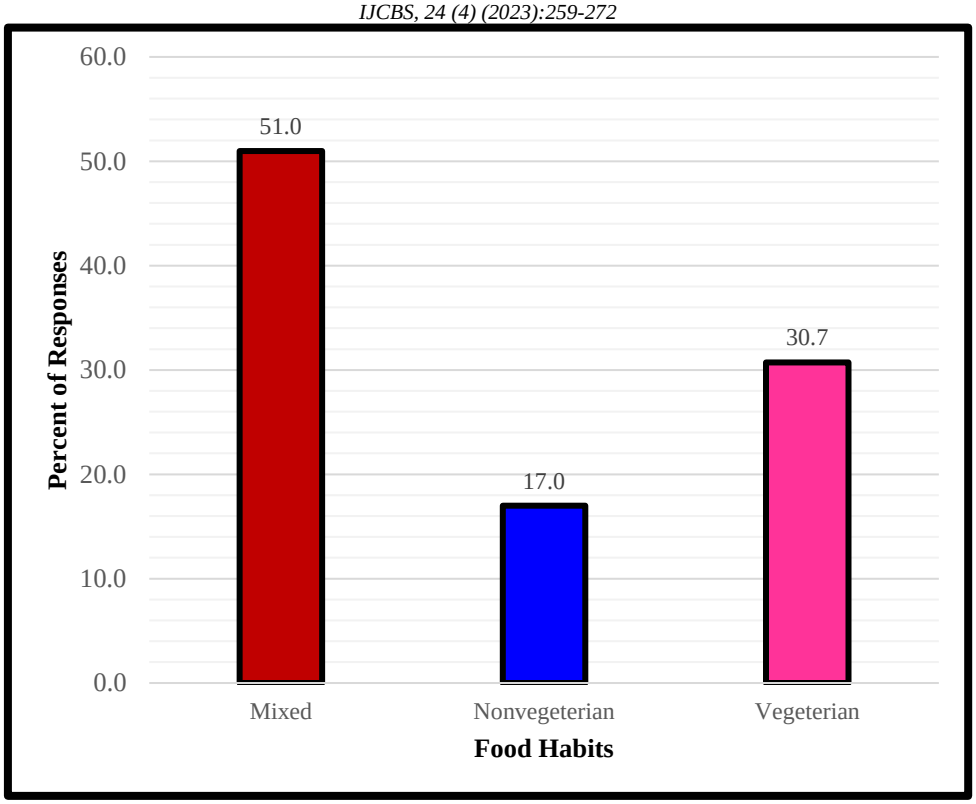


**Figure 1:** Responses for Question on Prevalent Food Habits

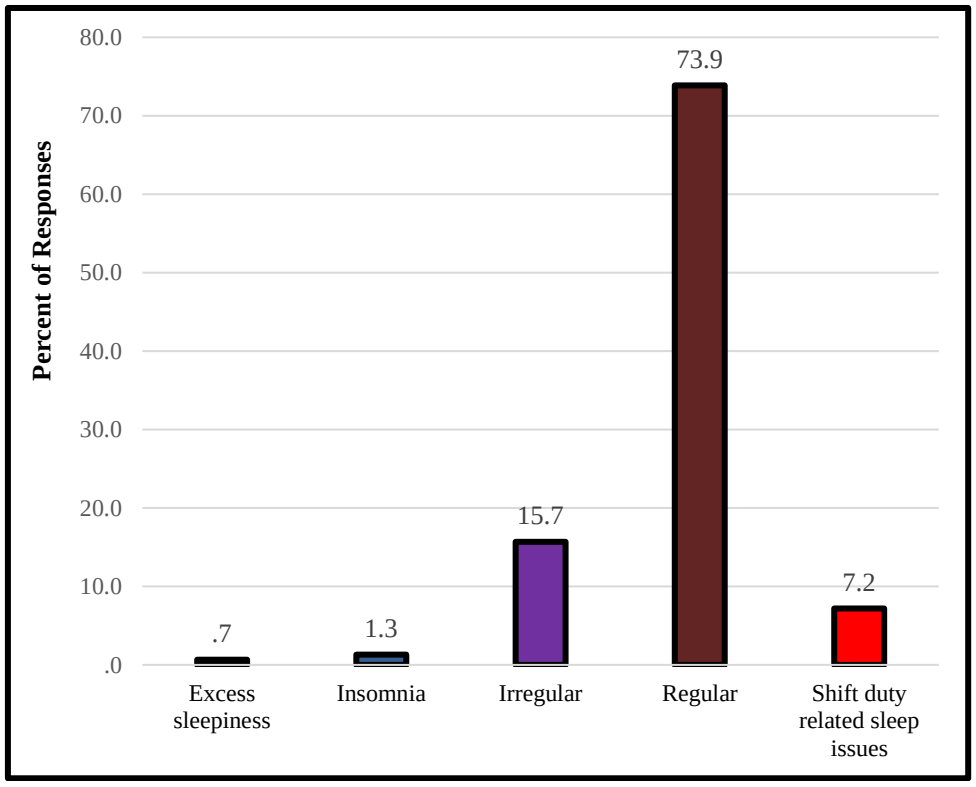


**Figure 2:** Responses for Question on sleep pattern

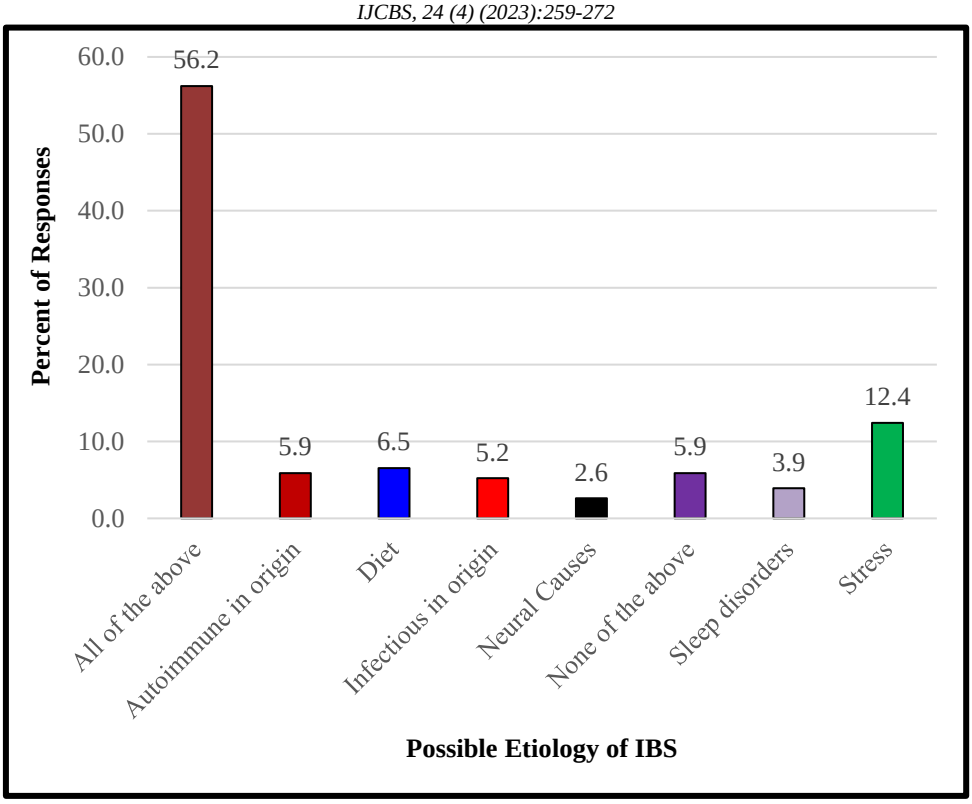


**Figure 3:** Responses for Question on Etiology of IBS,

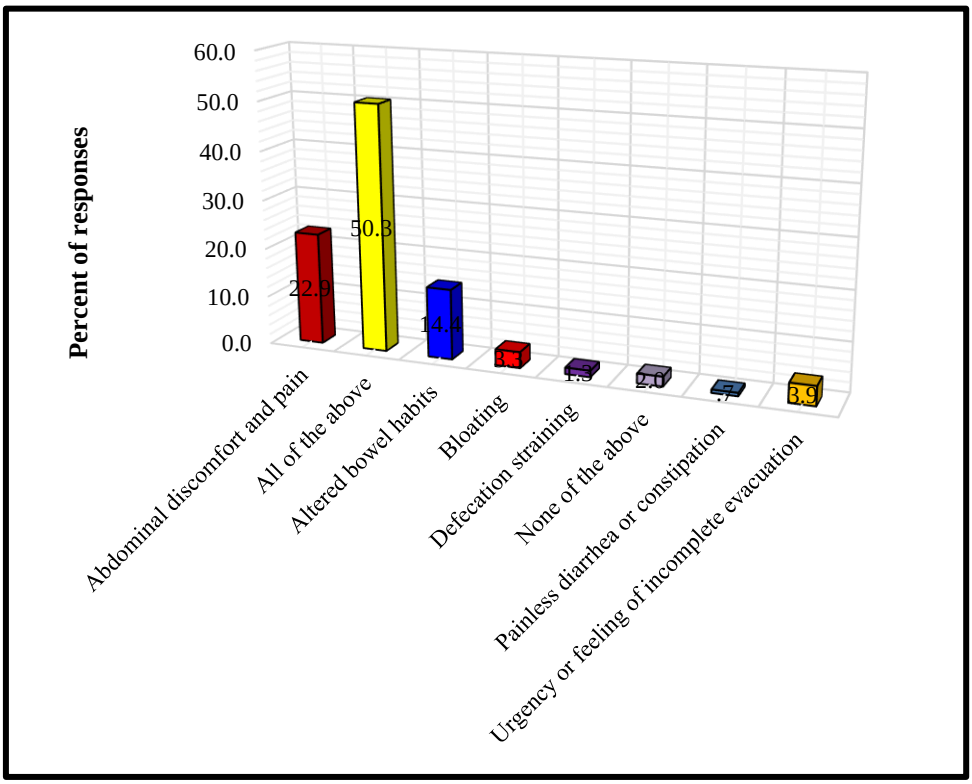


**Figure 4:** Responses for Question on Common Presenting symptoms in IBS

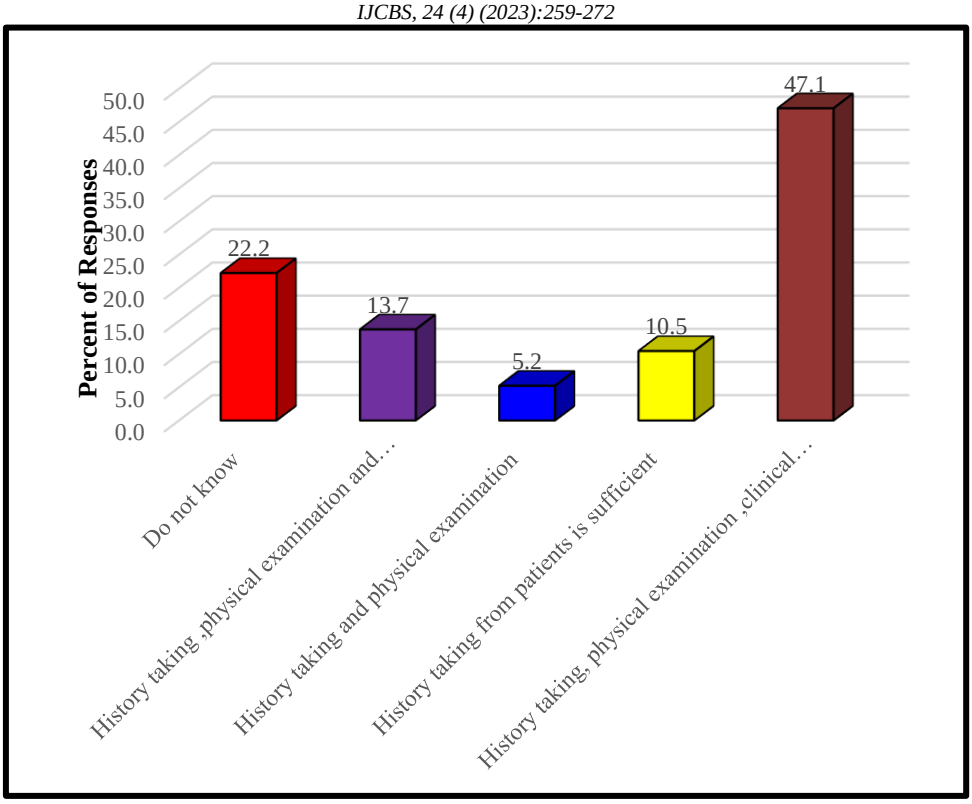


**Figure 5:** Responses for Question on Main IBS Diagnostic Modality Options**,**

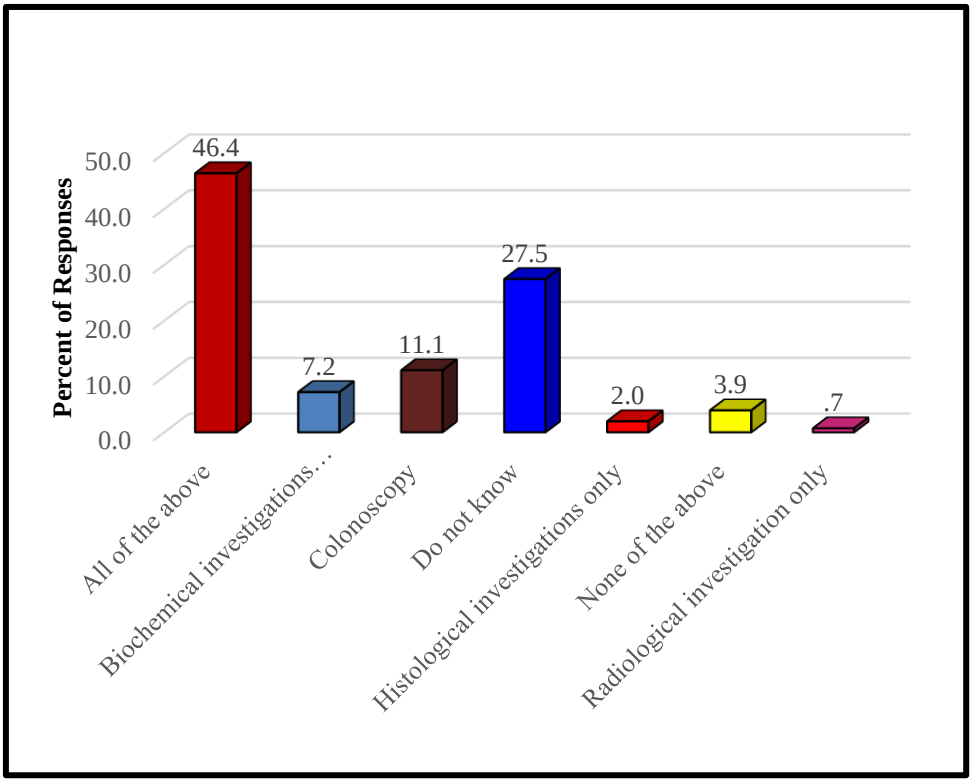


**Figure 6:** Responses for Questions on Investigations Done in IBS

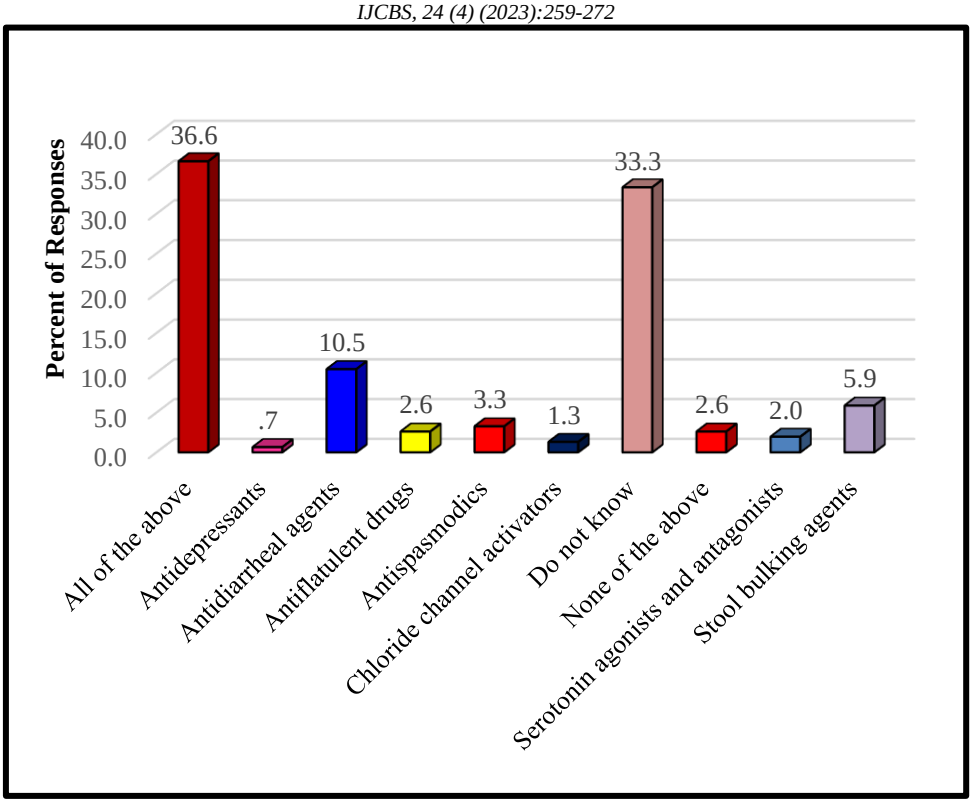


**Figure 7:** Responses for Question on Drug Groups Commonly Used to Treat IBS**,**

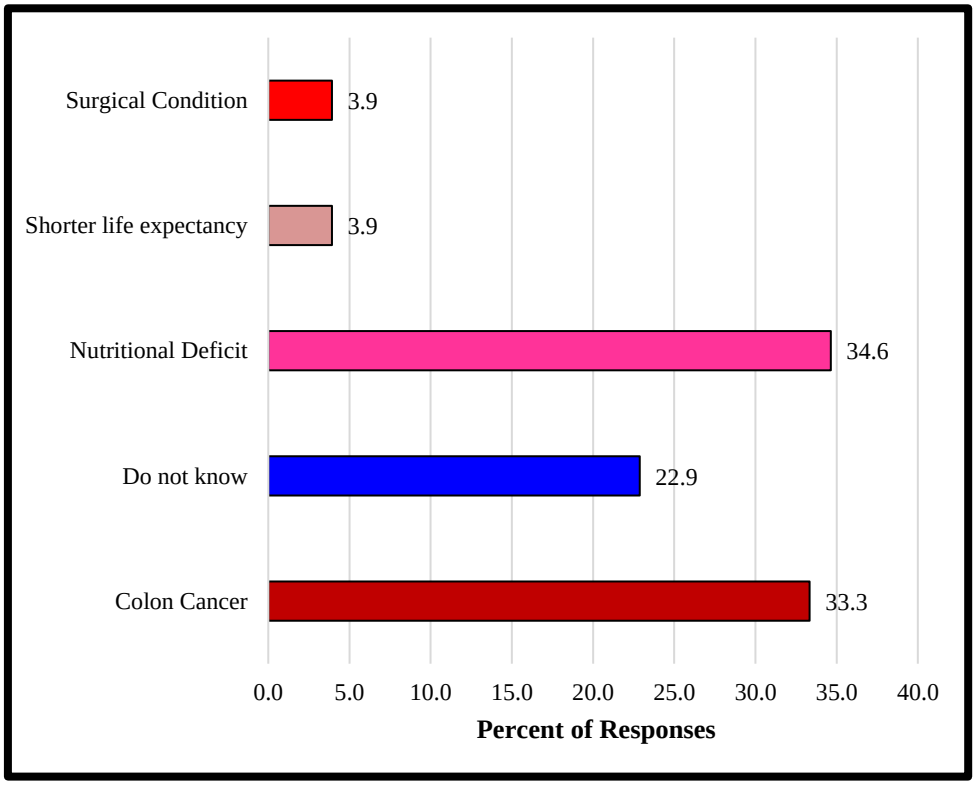


**Figure 8:** Responses for Question on Risk of Conditions IBS Patients can Develop

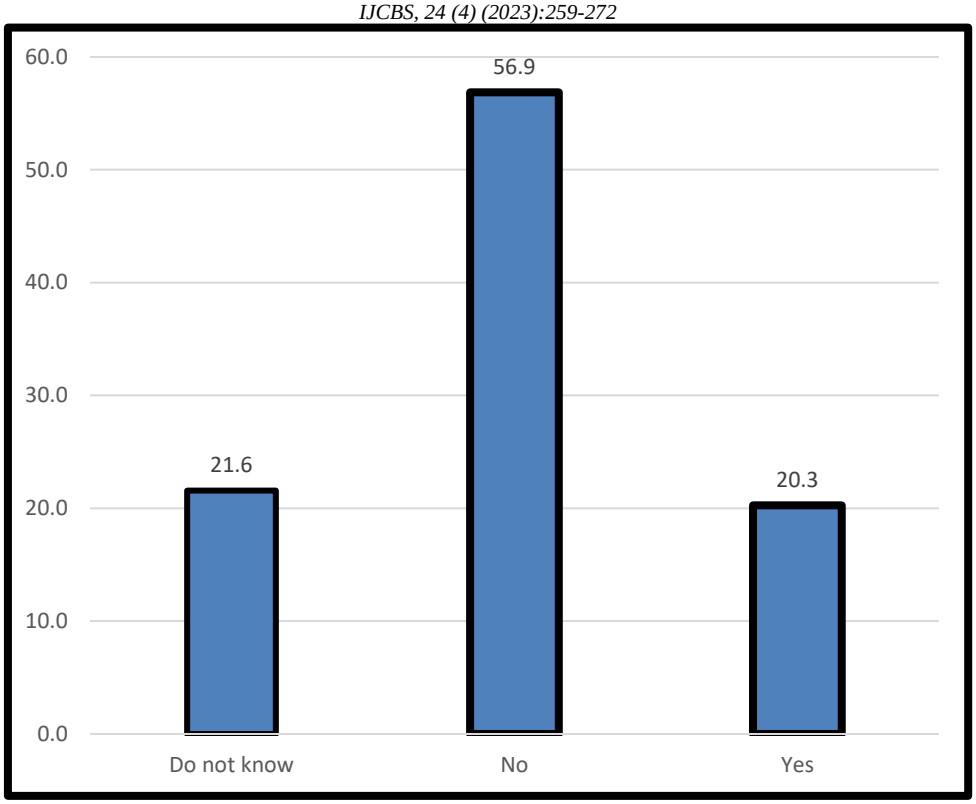


**Figure 9:** Responses for Question on Awareness about FODMAP Diet,

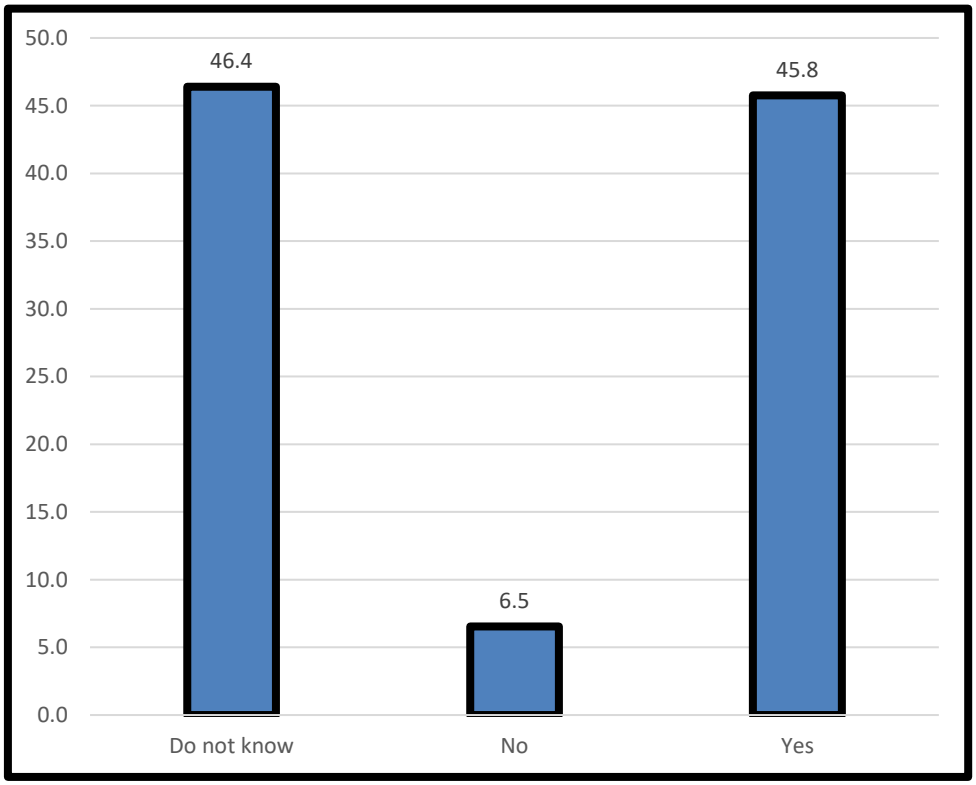


**Figure 10:** Responses for Questions on Knowledge about the Role of Cognitive Therapy in Treating IBS

The level of knowledge about the responses we got about the etiology of IBS, diagnostic modality, investigations done, and drug groups used in treatment were all of the above, indicating the respondents have tried to give inclusive answers and which are opt as per the respective answers. Due to the expectation that physicians should have more knowledge about IBS to treat their patients effectively, undergraduate, and postgraduate medical school students specializing in medicine need more training and education about IBS and FGIDs in general, so this topic must be given priority in the syllabus with respect to its separate and distinct existence.

In the Indian scenario, Khanna S. et al. (2020) [43] suggested that currently, there are very few validated questionnaires available to assess KAP regarding IBS in India amongst healthcare workers. This tool focuses on the etiopathogenesis, risk factors, symptoms, diagnosis, and management of IBS in the Indian population. This KAP questionnaire will also help us generate valuable data and plan for mass awareness and patient educational programs at the community level.

### *4.1. Strengths of Study*

- The study participants were healthcare workers, so we could get honest, practical opinions from them.
- The IBS is considered as a problem of the Urban population mainly due to following the Western lifestyle. Our study population is mainly from the urban area, which might reflect the real-world problem.

### *4.2. Limitation of study*

- The study employed the KAP questionnaire that was not psychometrically tested.
- A larger sample size would make the results more generalizable.

## 4. Conclusion

The questionnaire assesses knowledge, attitudes, and practices regarding IBS in Indian patients among healthcare workers in our setting. Larger sample size multicentric studies are required for its implementable actions.

## 6. Recommendations

- We recommend setting up and planning of more educational programs across the medical community in health conferences and medical discussions so that everyone understands the iceberg nature of the problem. "IBS Bulletin" involving patients' experiences with IBS can be started so that mass awareness can be achieved.
- Setting up IBS clinics in Hospitals providing primary health care to the patients along with offering screening investigations and routine care like diabetes and hypertension clinics.

**Acknowledgments**

We thank all the participants who contributed to this study. We also thank the experts who contributed to the questionnaire development and statisticians for analysis. We thank Central Research Publication Unit (CRPU)team of our hospital for providing continuous support.

**Financial support and sponsorship:**

Nil

**Conflicts of interest:**

All authors declare that there are no conflicts of interest.

**Authors' contributions**

Dr. MKP was the major contributor to writing the manuscript and assisted in the questionnaire and study design. Dr. DGM was the senior gastroenterologist, providing guidance and contributed significantly to the manuscript writing, helped to develop figures and Tables and interpretation of the results with respect to clinical practice. Dr. GCG was the principal investigator for this study, contributed to the manuscript writing, analysis and interpretation of results, and overall design. Dr. Doke had contributed intellectually to the final manuscript draft. All authors read and approved the final manuscript. All authors equally contributed to the final draft of the manuscript.

## References

[1] S.A. Leong, V. Barghout, H.G. Birnbaum, C.E. Thibeault, R. Ben-Hamadi, F. Frech, J.J. Ofman. (2003). The economic consequences of irritable bowel syndrome: a US employer perspective. Archives of Internal Medicine. 163(8): 929-35.

[2] E.J. Videlock, L. Chang. (2007). Irritable bowel syndrome: current approach to symptoms, evaluation, and treatment. Gastroenterology Clinics of North America. 36(3): 665-85.

[3] M. Peruhova, A. Mihova, I. Altankova, T. Velikova. (2022). Specific immunoglobulin E and G to common food antigens and increased serum zonulin in IBS patients: a single-Center Bulgarian study. Antibodies. 11(2): 23.

[4] I.M. Balmus, O.D. Ilie, A. Ciobica, R.O. Cojocariu, C. Stanciu, A. Trifan, M. Cimpeanu, C. Cimpeanu, L. Gorgan. (2020). Irritable bowel syndrome between molecular approach and clinical expertise—searching for gap fillers in the oxidative stress way of thinking. Medicina. 56(1): 38.

[5] S. Salim. (2014). Oxidative stress and psychological disorders. Current Neuropharmacology. 12(2): 140-7.

[6] L. Mahmoudi, M. Shafiekhani, H. Dehghanpour, R. Niknam. (2019). Community pharmacists' knowledge, attitude, and practice of irritable bowel syndrome (IBS): the impact of training courses. Advances in Medical Education and Practice. 427-36.

[7] V. Santschi, A. Chiolero, A.L. Colosimo, R.W. Platt, P. Taffé, M. Burnier, B. Burnand, G. Paradis. (2014). Improving blood pressure control through pharmacist interventions: a meta-analysis of randomized controlled trials. Journal of the American Heart Association. 3(2): e000718.

[8] R. Upadhyay, A. Singh. (2013). Irritable bowel syndrome: The Indian scenario. Prevalence. 10(20): 4-2. Available from: http://www.apiindia.org/medicine_update_2013/chap56.pdf. [Last cited on 20 Jan 2013].

[9] D. Hulisz. (2004). The burden of illness of irritable bowel syndrome: current challenges and hope for

the future. Journal of Managed Care Pharmacy. 10(4): 299-309.

[10] E.A. Mayer. (2008). Symptoms of IBS (or other related functional gastrointestinal symptoms) frequently date back to childhood; the estimated prevalence of IBS in children is similar to that in adults. 8 The female-to-male ratio is 2: 1 in most population-based samples and is higher among those who seek health care. 4 IBS-like symptoms develop in approximately 10% of adult patients after bacterial or viral enteric infections. New England Journal of Medicine. 358: 1692-9.

[11] Y.H. Shen, R. Nahas. (2009). Complementary and alternative medicine for treatment of irritable bowel syndrome. Canadian Family Physician. 55(2): 143-8.

[12] A. Agrawal, P.J. Whorwell. (2006). Irritable bowel syndrome: diagnosis and management. British Medical Journal.332: 280- 3.

[13] J.A. Spanier, C.W. Howden, M.P. Jones. (2003). A systematic review of alternative therapies in the irritable bowel syndrome. Archives of Internal Medicine. 163(3): 265-74.

[14] A. Lavekar, S. Chandran, D. Ram, A. Sadar, K.S. Manjari. (2018). Awareness about Irritable Bowel Syndrome among Interns of Medical College. Age. 24 (134): 67-0.

[15] D.A. Drossman, W.G. Thompson. (1992). The irritable bowel syndrome: review and a graduated multicomponent treatment approach. Annals of Internal Medicine. 116(12_Part_1): 1009-16.

[16] C.P. Dancey, S. Backhouse. (1993). Towards a better understanding of patients with irritable bowel syndrome. Journal of Advanced Nursing. 18(9): 1443-50.

[17] P.R. Maxwell, M.A. Mendall, D. Kumar. (1997). Irritable bowel syndrome. Lancet. 350(9092): 1691-5. doi: 10.1016/s0140-6736(97)05276-8. PMID: 9400529.

[18] M. Dixon-Woods, S. Critchley. (2000). Medical and lay views of irritable bowel syndrome. Family Practice. 2000 Apr;17(2):108-13. doi: 10.1093/fampra/17.2.108. PMID: 10758070.

[19] C. Butler, M. Evans. (1999). The 'heartsink' patient revisited. British Journal of General Practice. 49: 230–233.

[20] A.T. Masood, F.A. Baig, T.U. Khan, N.U. Shah, M.A. Nazir, W.A. Khan. (2021). Understanding of Irritable Bowel Syndrome among General Practitioners in the Periphery of Lahore. Pakistan Journal of Medical and Health Sciences 15: 1776-8.

[21] L. Mahmoudi, M. Shafiekhani, H. Dehghanpour, R. Niknam. (2019). Community pharmacists' knowledge, attitude, and practice of irritable bowel syndrome (IBS): the impact of training courses. Advances in Medical Education and Practice. 19: 427-36.

[22] E.C. Linedale, J.M. Andrews. (2017). Diagnosis and management of irritable bowel syndrome: a guide for the generalist. Medical Journal of Australia. 207(7): 309-15.

[23] G. Mehralian, N. Yousefi, F. Hashemian, H. Maleksabet. (2014). Knowledge, attitude, and practice of pharmacists regarding dietary supplements: a community pharmacy-based survey in Tehran. Iranian journal of pharmaceutical research. 13(4): 1457.

[24] V. Santschi, A. Chiolero, A.L. Colosimo, R.W. Platt, P. Taffé, M. Burnier, B. Burnand, G. Paradis. (2014). Improving blood pressure control through pharmacist interventions: a meta-analysis of randomized controlled trials. Journal of the American Heart Association. 3(2): e000718.

[25] M.Y. Siaw, Y. Ko, D.C. Malone, K.Y. Tsou, Y.J. Lew, D. Foo, E. Tan, S.C. Chan, A. Chia, S.S. Sinaram, K.C. Goh. (2017). Impact of pharmacist-involved collaborative care on the clinical, humanistic, and cost outcomes of high-risk patients with type 2 diabetes (IMPACT): a randomized controlled trial. Journal of Clinical Pharmacy and Therapeutics. 42(4): 475-82.

[26] L.B. Olafsdottir, H. Gudjonsson, H.H. Jonsdottir, J.S. Jonsson, E. Bjornsson, B. Thjodleifsson. (2012). Irritable bowel syndrome: physicians' awareness and patients' experience. World Journal of Gastroenterology: 18(28):3715.

[27] G.F. Longstreth, R.J. Burchette. (2003). Family practitioners' attitudes and knowledge about irritable bowel syndrome: effect of a trial of physician education. Family Practice. 20(6): 670-4.

[28] F. Abusageah, A. Hakami, B. Zogel, S. Zaalah, S. Alfaifi, S. Shubayli, K. Hakami, E. Qadah, S. Aldharman, F. Hakami, M. Alqasemi. (2022). A Cross-Sectional Study about Knowledge, Attitude, and Practices among Primary Health Care Physicians in Jazan Province, Saudi Arabia, Regarding Rome IV Criteria for Diagnosis of Irritable Bowel Syndrome. Medicina. 58(12): 1811.

[29] Y. Akalu, B. Ayelign, M.D. Molla. (2020). Knowledge, Attitude, and Practice Towards COVID-19 Among Chronic Disease Patients at Addis Zemen Hospital, Northwest Ethiopia. Infection and Drug Resistance. 13: 1949-1960.

[30] A. Lavekar, S. Chandran, D. Ram, A. Sadar, K.S. Manjari. (2018). Awareness about Irritable Bowel Syndrome among Interns of Medical College. Age. 24(134): 67-0. Available at: https://youtu.be/ThVSvFf05ps, assessed on 22.6.2023

[31] A.S. Kasa, A. Minibel, G.M. Bantie. (2019). Knowledge, attitude and preventive practice towards tuberculosis among clients visiting public health facilities. BMC research notes. 12(1): 1-6. Available at: https://doi.org/10.1186/s13104-019-4292-2.

[32] K.A. Gwee, C.L. Lu, U.C. Ghoshal. (2009). Epidemiology of irritable bowel syndrome in Asia: something old, something new, something borrowed. Journal of Gastroenterology and Hepatology. 24(10): 1601-7.

[33] National Institute for Health and Clinical Excellence: NICE clinical guideline 61: irritable bowel syndrome in adults: diagnosis and management of irritable bowel syndrome in primary care. London: NICE; 2008.

[34] S.H. Yale, A.K. Musana, A. Kieke, J. Hayes, I. Glurich, P.H. Chyou. (2008). Applying case definition criteria to irritable bowel syndrome. Clinical Medicine & Research. 6(1): 9-16.

[35] A.H. Al-Hazmi. (2012). Knowledge, attitudes, and practices of primary care physicians about irritable bowel syndrome in Northern Saudi Arabia. Saudi Journal of Gastroenterology: Official Journal of the Saudi Gastroenterology Association. 18(3): 173.

[36] B.E. Lacy, J. Rosemore, D. Robertson, D.A. Corbin, M. Grau, M.D. Crowell. (2006). Physicians' attitudes and practices in the evaluation and treatment of irritable bowel syndrome. Scandinavian journal of gastroenterology. 41(8): 892-902.

[37] C.J. Bijkerk, N.J. de Wit, W.A. Stalman, J.A. Knottnerus, A.W. Hoes, J.W. Muris. (2003). Irritable bowel syndrome in primary care: the patients' and doctors' views on symptoms, etiology and management. Canadian Journal of Gastroenterology and Hepatology. 17: 363-8.

[38] G.F. Longstreth, R.J. Burchette. (2003). Family practitioners' attitudes and knowledge about irritable bowel syndrome: effect of a trial of physician education. Family Practice. 20(6): 670-4.

[39] M. Dixon-Woods, S. Critchley. (2000). Medical and lay views of irritable bowel syndrome. Family practice. 17(2): 108-13.

[40] S.P. Singh. (2006). Hepatitis B Eradication Day: It's never too late!! Hepatitis B Annual. 3(1): 11.

[41] V. Basharat, A.A. Asiri, A.H. Almutlaq, K.H. Almutairi, M.A. Alshehri, A.M. Alqhtani, A.S. Thabet, A.J. ALHashim, R.S. Almuidh, A.A. Alshehri, M.A. Jali. (2022). Association between Irritable Bowel Syndrome and sleep quality. Bahrain Medical Bulletin. 44(2).

[42] S. Khanna, A. Khaliq, J. Kewlani, S. Gupta, S. Kumar. (2020). Validation of a questionnaire for the assessment of knowledge, attitude, and practices in patients with irritable bowel syndrome. International Journal of Advances in Medicine. 7: 1347-54.