

Epidemiological and clinical profile of irritable bowel syndrome in India: report of the Indian Society of Gastroenterology Task Force

Uday C Ghoshal, Philip Abraham, Chetan Bhatt, Gourdas Choudhuri, Shobna J Bhatia, K T Shenoy, N H Banka, Kalyan Bose, N P Bohidar, Karmabir Chakravartty, N Chandra Shekhar, Nutan Desai, Usha Dutta, Goutam Das, Sangeet Dutta, V K Dixit, B D Goswami, R K Jain, Sunil Jain, V Jayanthi, Rakesh Kochhar, Ajay Kumar, Govind Makharia, Shrikant V Mukewar, V G Mohan Prasad, Alok Mohanty, A T Mohan, B S Sathyaprakash, B Prabhakar, Mathew Philip, E Peda Veerraju, Gautam Ray, Ramesh Roop Rai, A K Seth, Atul Sachdeva, Shivaram Prasad Singh, Ajit Sood, Varghese Thomas, Shridhar Tiwari, Manu Tandan, R Upadhyay, J C Vij

Aims: To study the profile of irritable bowel syndrome (IBS), and the frequency of such symptoms among the general population, in India.

Methods: In this prospective, multi-center study, data were obtained from 2785 patients with chronic lower gastrointestinal symptoms (complainants) with no alarm feature and negative investigations for organic causes visiting physicians at 30 centers, and from 4500 community subjects (non-complainants), using separate questionnaires.

Results: Most complainants were middle-aged (mean age 39.4 years) and male (1891; 68%). The common symptoms were: abdominal pain or discomfort (1958; 70%), abdominal fullness (1951; 70%); subjective feeling of constipation (1404 of 2656; 53%), or diarrhea (1252 of 2656, 47%), incomplete evacuation (2134; 77%), mucus with stools (1506; 54%), straining at stools (1271; 46%), epigastric pain (1364; 49%) and milk intolerance (906; 32%). Median stool frequency was similar in patients who felt they had constipation or those who felt they had diarrhea. Information to subtype symptoms using standard criteria was available in 1301 patients; of these, 507 (39%) had constipation-predominant IBS (≤ 3 stools/week), 50 (4%) had diarrhea-predominant IBS (> 3 stools/day) and 744 (57%) had indeterminate symptoms. Among non-complainants, most subjects reported daily defecation frequency of one (2520 [56%]) or two (1535 [34%]). Among non-complainants, 567 (12.6%) reported abdominal pain, 503 (11%) irregular bowel, 1030 (23%) incomplete evacuation, 167 (4%) mucus and 846 (18%) straining at stools; a combination of abdominal pain or discomfort relieved by defecation, and incomplete evacuation was present in 189/4500 (4.2%) community subjects.

Conclusions: Most patients with IBS in India are middle-aged men, and have a sense of incomplete evacuation and mucus with stools. Abdominal pain or discomfort is frequent but not universal. Importantly, stool frequency was similar irrespective of whether the patients felt having constipation or diarrhea. Most (90%) non-complainant subjects had 1 or 2 stools per day; symptoms complex suggestive of IBS was present in 4.2% of community subjects.

Indian J Gastroenterol 2008 Jan-Feb; 27: 22-28.

See Commentary on page 3

Several attempts have been made to define diagnostic criteria for irritable bowel syndrome (IBS).¹⁻⁷ Each such attempt implies shortcomings in the previous ones.⁶ Further, most such criteria have been based on data from Western populations, and thus may not be applicable to

other populations, because of variation in perception of bowel habits and symptoms. Few attempts have been made to validate these criteria in populations from Asia.³

To define IBS in such populations, we need data on patients (complainants) who report with symptoms generally considered as compatible with IBS (chronic lower gastrointestinal [GI] complaints in the absence of

alarm features and normal investigative reports), and differentiate them from such symptoms in the general (non-complainant) population. Unlike the previous criteria, this approach uses the patient's perception as the defining force, which seems more appropriate for a condition that is subjective.

Several studies have dealt with the epidemiological and clinical profile of IBS in different parts of the world. However, there are only a few reports on small numbers of patients with IBS from India;^{3,8-16} also, data on the bowel patterns in the Indian population are scant.¹⁷

The Indian Society of Gastroenterology (ISG) therefore constituted a Task Force on IBS in 2003 with the following aims: (a) to study the profile of patients from different parts of the country who report with chronic lower GI symptoms with no alarm symptoms and negative investigations for organic causes; and (b) collect data on bowel patterns among people living in rural and urban communities in India.

Methods

Pilot survey

Initially, 22 centers across the country were contacted to obtain a rough profile of patients with IBS. These centers were selected based on publications on IBS by them in indexed journals or as conference abstracts.

Collection of data from complainants

The Task Force prepared a detailed questionnaire for

collection of prospective data. It was made available on the websites of ISG and the *Indian Journal of Gastroenterology*, and published in May-June 2005 in the *Journal*. Members of the Society were invited to participate in the data collection by reproducing the questionnaire and filling it for every patient who reported to them with chronic lower GI symptoms with no alarm feature and negative investigations for organic causes.

The patients were classified into constipation- and diarrhea-predominant IBS based on perception of their bowel pattern. Subsequently, Western definitions of constipation (less than or equal to 3 stools/week)¹⁸ and diarrhea (more than 3 stools/day)¹⁹ were also applied; those who did not fit into either of these categories were classified into indeterminate category.¹⁶

Collection of data from non-complainants

To determine the bowel patterns and related abdominal symptoms in the community, another questionnaire was designed. These data were obtained from different regions of the country (Fig), and included academic centers, tertiary-care corporate hospitals as well as community practitioners from both rural and urban areas. The subjects included family members of patients attending the outpatient departments and wards, students and staff members of the participating centers, and consenting subjects from the general population enrolled in a door-to-door survey. Data so obtained were entered in a spreadsheet for analysis.

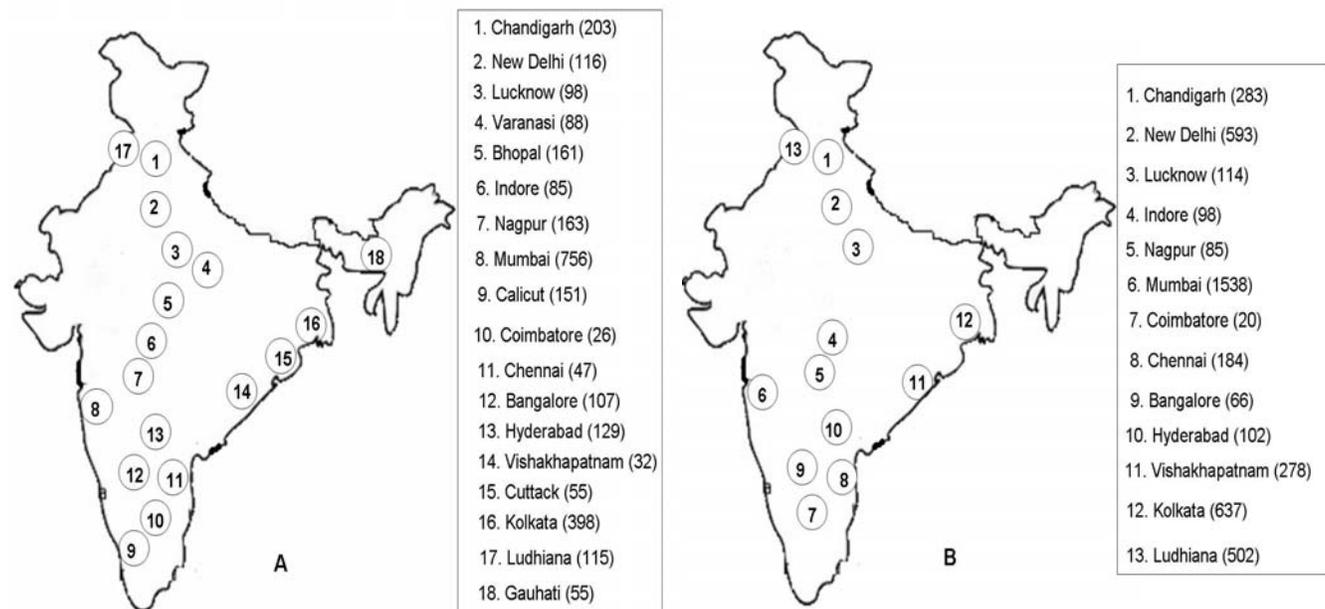


Figure: Map of India showing locations from where patients (A) and community subjects (B) were recruited (numbers recruited in brackets)

The study was approved by ethics committees of centers where these were available; for all other centers, permission was obtained from the Ethics Committee of the co-ordinating center (SGPGI, Lucknow). Consent was obtained from all the study subjects.

Statistical analysis

Completed questionnaires of both types were collected, and the data were entered into separate spreadsheets. These were then analyzed using SPSS version 10 (SPSS, Inc. Chicago, IL) or *EpiInfo* program (CDC, Atlanta, GA). Categorical and continuous variables were compared using the χ^2 test and the Student's *t* test, respectively. Two-tailed *p* values less than 0.05 were considered significant.

Results

Pilot survey

Eight of the 22 centers responded. Their responses indicated that most of their IBS patients were middle-aged (around 35 years), and that males outnumbered females 3:2. The common symptoms reported were: lower abdominal pain (median [range] frequency 70 [50-85]%),

relief of pain after defecation (80 [70-90]%), abdominal fullness (44 [5-88]%), incomplete evacuation (70 [56-90]%), mucus with stool (65 [28-80]%), diarrhea (36 [20-57]%), constipation (18 [2-52]%), digital evacuation (13 [2-35]%), ribbon-like stools (12 [5-40]%), straining at stools (12 [5-79]%), and use of enemas (3 [0-10]%).

Prospective study

Of the 2805 complainants and 4520 non-complainants who participated, 20 subjects in each group were excluded from analysis since their questionnaires were incomplete. Demographic characteristics of study subjects are shown in Table 1. The 'complainants' were older, more often male, and lived in urban areas.

Complainants

Symptoms in the 2785 complainants included pain or discomfort in the lower abdomen (1958, 70%), lower abdomen fullness (1951, 70%), mucus with stools (1506, 54%), subjective feeling of constipation (1404 of 2656; 53%), subjective feeling of diarrhea (1252 of 2656, 47%), milk intolerance (906, 32%) and upper abdominal pain or discomfort (1364, 49%). A combination of abdominal pain or discomfort or lower abdominal fullness relieved by defecation, was reported by 2493 (90%) of 2785 complainants. Two thousand one hundred thirty four (77%) reported feeling of incomplete evacuation.

Though 1404 complainants reported constipation, only 507 of them could be classified as having constipation by Western criteria (stool frequency <3/week).^{18,19} Similarly, of 1252 complainants who reported diarrhea, only 50 fulfilled Western criteria for diarrhea (>3 stools/day).²⁰ Straining to pass stools (1271, 46%), digital evacuation (323, 12%), ribbon-like stools (410, 15%) and use of enema (105, 4%), symptoms suggesting fecal evacuation disorders,²¹ were also reported.

Extra-intestinal features: Of the 2785 complainants, 1872 (67%), 1282 (46%), 1273 (46%) 482 (17%) and 250 (9%) reported tiredness, headache, backache, urinary difficulty and sexual difficulty, respectively. In addition, 475 of 2648 (18%) reported unhappy family life, 600 of 2257 (27%) were not happy with their income, and 518 of 2169 (24%) were not happy with their jobs; 1667 (60%) reported anxious or depressed mood, and 1084 (39%) reported disturbed sleep.

Clinical subtypes

Data needed to subtype the disease by standard criteria^{18,19} were available in 1301 patients; of them, 507 (39%) reported constipation-predominant symptoms, 50

Table 1: Demographic and personal characteristics of patients and community subjects

Parameter	Patients (n=2785)	Community (n=4500)
Age (mean [SD]) (years)*	39.4 (13.6)	34.9 (14.5)
Gender (male)**	1891 (68)	2520 (56)
Residence (urban)***	1883 (68)	3277 (73)
Marital status		
Unmarried or single	576 (21)	1073 (24)
Married	2128 (76)	3296 (73)
Separated	11 (0.4)	15 (0.3)
Widow or widower	51 (1.8)	91 (2)
Education#		
Primary	902 (37)	1372 (40.5)
Secondary	546 (23)	662 (19.6)
Graduate	469 (19.5)	618 (18)
Post-graduate or above	437 (18.1)	618 (18)
Illiterate	57 (2.4)	111 (3.3)
Water supply##		
Tap water	2217 (80)	3653 (83)
Well	482 (17)	636 (14)
Spring	42 (1.5)	80 (1.8)

Data are as n (%)

Continuous and categorical data are compared using Student's *t* test and chi-squared test, respectively.

p*<0.001, *p*<0.0001, ****p*<0.0001. ##Tap water versus combined well and spring water, *p*=0.003

#Data on Education were available in 2411 patients and 3383 community subjects

Table 2. Demographic and clinical parameters of subtypes of chronic functional lower GI disorders based on stool frequency

Parameter	Constipation	Diarrhea	Indeterminate	P value
Number	507	50	744	
Symptom duration (median [range]; months)	42 (3-876)	36 (3-240)	48 (3-852)	<0.05
Incomplete evacuation	437 (86)	49 (98)	637 (85)	<0.05
Digital evacuation	93 (18)	8 (16)	121 (16)	ns
Mucus with stool	284 (56)	35 (70)	438 (59)	ns
Lower abdominal discomfort or pain	381 (75)	40 (80)	581 (78)	ns
Effect of defecation on pain*				ns
Less	305 (84.5)	29 (80.5)	449 (82.4)	
More	31 (8.6)	2 (5.5)	41 (7.5)	
No change	25 (7)	5 (14)	55 (10.1)	
Lower abdominal fullness	383 (75)	40 (80)	589 (79)	ns
Straining to pass stools	312 (61)	30 (60)	438 (59)	ns
Ribbon-like stools	67 (13)	8 (16)	135 (18)	ns
Use enema	15 (3)	0	43 (6)	0.01
Stool frequency/week (median [range])	2 (0-2)	30 (28-35)	14 (5-21)	0.01
Milk intolerance	138 (27)	17 (34)	266 (35)	0.006
Upper abdominal discomfort	283 (56)	33 (66)	400 (53)	ns
Heartburn	166 (32)	20 (40)	297 (40)	0.03
Chest pain	132 (26)	13 (26)	184 (25)	ns
Urinary difficulty	72 (14)	11 (22)	155 (21)	0.009
Headache	250 (49)	22 (44)	396 (53)	ns
Tiredness	357 (70)	36 (72)	539 (72)	ns
Sexual difficulty	32 (6)	2 (4)	69 (9)	ns
Back pain	241 (47)	27 (54)	360 (48)	ns

Data are as n (%). Diarrhea: >3 loose stools/day, constipation: <3 stool/ week, and indeterminate: between ≥ 3 /week and ≤ 3 /day. *Data on Effect of defecation on pain were available for 361 patients with constipation, 36 patients with diarrhea and 545 patients with indeterminate symptoms

(4%) had diarrhea-predominant symptoms and 744 (57%) had indeterminate type of symptoms. Table 2 shows the clinical parameters in these three groups.

Table 3. Symptoms of patients with various subtypes of chronic functional lower GI disorders based on subjective feeling of the patients (n=2656)

Parameters	Constipation (n=1404)	Diarrhea (n=1252)
Incomplete evacuation#	1266 (90.2)	887 (70.8)
Mucus with stool	774 (55.1)	704 (56.2)
Lower abdominal symptoms		
Discomfort or pain#	1083 (77.1)	917 (73.2)
Fullness#	1108 (79)	874 (70)
Effect of defecation on pain*,#		
Less	779 (82)	592 (78.6)
More	82 (8.6)	62 (8.2)
No change	89 (9.4)	99 (13.2)
Straining to pass stools#	887 (63.2)	469 (37.5)
Stool frequency/week**	14 (0-21)	14 (7-35)

Data are as n (%). **Stool frequency is as median (range)

**Data on Effect of defecation on pain were available for 950 patients in constipation and 753 patients in diarrhea group; #p<0.05 (χ^2 test)

Patients with diarrhea-predominant disease more often reported a sense of incomplete evacuation. Only patients with constipation-predominant and indeterminate types used enemas. Patients with diarrhea-predominant and indeterminate types more often reported milk intolerance and heartburn than those with constipation-predominant disease. Median stool frequency of patients who felt that they were constipated and those who felt that they had diarrhea was not different (Table 3).

Treatment: 1947 (70%) patients had consulted other doctors previously. These patients were more often anxious or depressed than the non-consultors (1236/1947 [64%] vs. 375/686 [54%], p <0.0001). The drugs they had received included ispaghula husk (1030, 37%), anti-depressants (957, 34%), mebeverine (703, 25%), tegaserod (575, 21%), proton pump inhibitors (472, 17%), lactulose (250, 9%), loperamide (263, 9%) and probiotics (221, 8%).

Of the 2785 patients, 1237 (44%) had previously received treatment with metronidazole, with temporary improvement in 672 (24%) of them. Responders to metronidazole (314/672 [47%]) more often reported milk

intolerance than the non-responders (178/565 [31%], $p < 0.001$).

Non-complainants

The reported average frequency of defecation among 4500 community subjects was as follows: >3 stools per day (167 subjects; 3.7%), 3 per day (242; 5.4%), 2 per day (1535; 34%), 1 per day (2520; 56%) and <3 per week (43; 1%).

Of the 4500 non-complainants, 567 (12.6%) subjects reported lower abdominal pain at some time during the past 12 mo, 503 (11%) irregular bowel habits, 124 (2.7%) liquid stools, 846 (18%) straining during defecation, 1030 (23%) incomplete evacuation (sometimes in 830 and most of the time in 200) and 167 (4%) mucus with stools. A combination of abdominal pain or discomfort relieved by defecation, and incomplete evacuation was present in 189/4500 (4.2%) community subjects, including 109 of 2520 (4.3%) male subjects and 80 of 1980 (4%) female subjects ($p = ns$). Of these 4500 subjects, 1615 (36%) had consulted a doctor within the past 12 months, including 556 (12%) who had consulted a doctor for these gastrointestinal symptoms. Consultation during the past 12 months was less frequent in subjects from rural areas (458 of 1223) than in those from urban areas (1122 of 3277; $p < 0.05$).

Complainants who had consulted a doctor before the index visit were more often male than non-complainants who had consulted a doctor previously for gastrointestinal symptoms (1363/1947 [70%] vs. 310/556 [44%], $p < 0.00001$), more often belonged to higher and middle than lower socioeconomic class (340 [18%], 1135 [60%] and 409 [22%] of 1884, respectively, vs. 68 [16%], 223 [51%] and 146 [33%] of 437, respectively; $p < 0.00001$).

Discussion

In this prospective multi-center study from India, using standard Western criteria to define constipation and diarrhea, indeterminate type was the commonest symptom subtype among patients presenting with chronic functional lower GI symptoms, though most of them complained of predominant constipation (53%) or diarrhea (47%). Interestingly, median stool frequency was similar in those reporting constipation or diarrhea. Abdominal pain or discomfort was not a universal complaint. Males outnumbered females among complainants. In the community study, 10%-20% of subjects reported symptoms that are generally attributed to chronic functional

large bowel disorders (irregular bowels, incomplete evacuation, straining at stools), and 4.2% had symptoms complex identified as IBS. Although we termed the subjects in the community study as "non-complainant", about a third of them had previously consulted doctors for GI complaints.

IBS is more common in women than in men in most parts of the world.^{22,23,24} In India, IBS is reported more often in males.¹¹ These studies^{3,9,14,15,16} were hospital-based, and a possibility of male patients consulting doctors more often than females because of socio-cultural reasons could not be excluded. In the present study, symptoms suggesting IBS among non-complainants was present somewhat more often or as frequently among males than females, suggesting that the male preponderance with chronic functional lower GI symptoms in India is real.

Abdominal pain or discomfort, which is an essential criterion in the Rome III criteria¹⁹ and the earlier Rome criteria for IBS, was frequent but not universal in Indian patients; this has been documented in previous Indian studies as well.¹¹ Therefore, there is a need to modify the criteria for diagnosis of IBS in India.

An important finding in our study was the wide mismatch between patient perception of constipation and diarrhea, and physician's rating based on standard Western criteria. Moreover, median stool frequency of patients who felt constipated or had diarrhea was not different (Table 3). For this reason, and with variation in bowel frequencies among subjects who describe themselves as constipated with feeling of incomplete evacuation (Table 2), with differences in normal bowel frequencies among Indians as compared to the West (see below), and with overlap in bowel patterns among complainants and non-complainants, we recommend that physician-determined definitions of IBS, constipation and diarrhea should be more appropriately replaced by patient-determined definitions, at least in the context of chronic functional bowel disorders. Lack of adequate agreement between constipation based on physician definition and patient-reported constipation has been previously reported.²⁵ In clinical practice, it is common to see patients who are constipated but repeatedly visit the toilet in an attempt to evacuate bowel completely; such patients will report high frequency of bowel movement and so may wrongly be diagnosed as having diarrhea. In fact, the importance of the current data is evidenced by the fact that the recent Rome III classification, which were published while the current data were being ana-

lyzed, considered stool frequency as a supportive diagnostic criterion rather than an important criterion as proposed in the Rome II classification.¹⁹ Studies have shown that stool frequency is within normal range for most patients with IBS.^{26,27}

A few recent studies have shown improvement in symptoms of IBS following treatment with antibiotics.^{28,29,30} These may be instances of post-infectious IBS or of small intestinal bacterial overgrowth (SIBO), which has been described to be associated with IBS.³¹ In the present study, 44% of patients with chronic functional lower GI symptoms had received treatment with metronidazole, a practice common in India,^{32,33} often with a mistaken diagnosis of "chronic amebiasis".^{12,13,34} Of these patients, 24% reported temporary improvement in their symptoms, which also has been reported earlier from India.³² Interestingly, milk intolerance was more common among metronidazole-responders than among non-responders. An earlier study had shown that SIBO may be associated with milk intolerance.³⁵

Extra-intestinal symptoms were common in our patients. This is in agreement with literature from other countries.³⁶ In fact, some studies showed that symptoms such as sexual dysfunction are often underreported by patients.^{37,38,39} Such symptoms can also be a source of anxiety, which might aggravate symptoms in functional disorders, with non-response to treatment and repeated consultation with physicians.

Among 4500 community subjects, most subjects (90%) passed stools once or twice a day. This frequency is higher than in the Western population where three or more movements per week is considered normal.⁴⁰ This difference may be related to higher fiber intake and faster gut transit among Indians.^{17,41,42}

The frequency of functional lower GI symptoms in the general population all over India has not been studied earlier. In a study evaluating dyspepsia in the general population in Mumbai, of the 2549 healthy adults surveyed, 110 (4.3%) reported gastrointestinal or dyspeptic symptoms and 80 (3%) reported having only chronic lower GI symptoms.¹¹ In another study, 22 (14%) of 154 inmates of a leprosy rehabilitation home reported chronic functional lower GI symptoms.¹²

In conclusion, a majority of patients who present with chronic functional lower GI symptoms in India are middle-aged men, and have incomplete evacuation and mucus with stools. Abdominal pain or discomfort is frequent but not universal. A majority of Indians have 1

or 2 stools per day; a combination of symptoms generally identified as IBS were present in about 4.2% of community subjects. IBS and related terms (constipation, diarrhea) may need to be defined by patient perception rather than physician-determined criteria and may vary in different parts of the world.

References

1. Boyce PM, Koloski NA, Talley NJ. Irritable bowel syndrome according to varying diagnostic criteria: are the new Rome II criteria unnecessarily restrictive for research and practice? *Am J Gastroenterol* 2000;95:3176-83.
2. Chey WD, Olden K, Carter E, Boyle J, Drossman D, Chang L. Utility of the Rome I and Rome II criteria for irritable bowel syndrome in U.S. women. *Am J Gastroenterol* 2002;97:2803-11.
3. Banerjee R, Choung OW, Gupta R, Tandan M, Lakhtakia S, Rao GV, et al. Rome I criteria are more sensitive than Rome II for diagnosis of irritable bowel syndrome in Indian patients. *Indian J Gastroenterol* 2005;24:164-6.
4. Dogan UB, Unal S. Kruis scoring system and Manning's criteria in diagnosis of irritable bowel syndrome: is it better to use combined? *Acta Gastroenterol Belg* 1996;59:225-8.
5. Hammer J, Talley NJ. Diagnostic criteria for the irritable bowel syndrome. *Am J Med* 1999;107:5S-11S.
6. Longstreth GF, Thompson WG, Chey WD, Houghton LA, Mearin F, Spiller RC. Functional bowel disorders. *Gastroenterology* 2006;130:1480-91.
7. Lea R, Hopkins V, Hastleton J, Houghton LA, Whorwell PJ. Diagnostic criteria for irritable bowel syndrome: utility and applicability in clinical practice. *Digestion* 2004;70:210-3.
8. Rana SV, Mandal AK, Kochhar R, Katyal R, Singh K. Lactose intolerance in different types of irritable bowel syndrome in north Indians. *Trop Gastroenterol* 2001;22:202-4.
9. Malhotra S, Rana SV, Sinha SK, Khurana S. Dietary fiber assessment of patients with irritable bowel syndrome from northern India. *Indian J Gastroenterol* 2004;23:217-8.
10. Singh RK, Pandey HP, Singh RH. Correlation of serotonin and monoamine oxidase levels with anxiety level in diarrhea-predominant irritable bowel syndrome. *Indian J Gastroenterol* 2003;22:88-90.
11. Shah SS, Bhatia SJ, Mistry FP. Epidemiology of dyspepsia in the general population in Mumbai. *Indian J Gastroenterol* 2001;20:103-6.
12. Sinha P, Ghoshal UC, Choudhuri G, Naik S, Ayyagari A, Naik SR. Does *Entamoeba histolytica* cause irritable bowel syndrome? *Indian J Gastroenterol* 1997;16:130-3.
13. Anand AC, Reddy PS, Saiprasad GS, Kher SK. Does non-dysenteric intestinal amoebiasis exist? *Lancet* 1997;349:89-92.
14. Mazumdar TNL, Prasad KVS, Bhat PV. Formulation of a scoring chart for irritable bowel syndrome (IBS): a prospective study. *Indian J Gastroenterol* 1988;7:101-2.
15. Kapoor KK, Nigam P, Rastogi CK, Kumar A, Gupta AK. Clinical profile of irritable bowel syndrome. *Indian J Gas-*

- troenterol* 1985;4:15-6.
16. Gupta D, Ghoshal UC, Misra A, Choudhuri G, Singh K. Lactose intolerance in patients with irritable bowel syndrome from northern India: A case-control study. *J Gastroenterol Hepatol* 2007;22:2261-5.
 17. Tandon RK, Prasad N, Gupta MC, Tandon BN. Stool weights and transit time in north Indians. *J Assoc Physicians India* 1976;24:807-10.
 18. Hinton JM, Lennard-Jones JE. Constipation: definition and classification. *Postgrad Med J* 1968;44:720-3.
 19. Videlock EJ, Chang L. Irritable bowel syndrome: Current approach to symptoms, evaluation, and treatment. *Gastroenterol Clin North Am* 2007;36:665-85.
 20. Jeejeebhoy KN. Symposium on diarrhea. 1. Definition and mechanisms of diarrhea. *Can Med Assoc J* 1977;116:737-9.
 21. Ghoshal UC. Review of pathogenesis and management of constipation. *Trop Gastroenterol* 2007;28:91-5.
 22. Barbezat G, Poulton R, Milne B, Howell S, Fawcett JP, Talley N. Prevalence and correlates of irritable bowel symptoms in a New Zealand birth cohort. *NZ Med J* 2002;115:U220.
 23. Baretic M, Bilic A, Jurcic D, Mihanovic M, Sunic-Omejc M, Dorosulic Z, et al. Epidemiology of irritable bowel syndrome in Croatia. *Coll Antropol* 2002;26 (Suppl):85-91.
 24. Boekema PJ, van Dam van Isselt EF, Bots ML, Smout AJ. Functional bowel symptoms in a general Dutch population and associations with common stimulants. *Neth J Med* 2001;59:23-30.
 25. Garrigues V, Galvez C, Ortiz V, Ponce M, Nos P, Ponce J. Prevalence of constipation: agreement among several criteria and evaluation of the diagnostic accuracy of qualifying symptoms and self-reported definition in a population-based survey in Spain. *Am J Epidemiol* 2004;159:520-6.
 26. Longstreth GF, Thompson WG, Chey WD, Houghton LA, Mearin F, Spiller RC. Functional bowel disorders. *Gastroenterology* 2006;130:1480-91.
 27. Bharucha AE, Seide BM, Zinsmeister AR, Melton LJ 3rd. Insights into normal and disordered bowel habits from bowel diaries. *Am J Gastroenterol* 2008;103:692-8.
 28. Van Citters GW, Lin HC. Management of small intestinal bacterial overgrowth. *Curr Gastroenterol Rep* 2005;7:317-20.
 29. Lin HC. Small intestinal bacterial overgrowth: a framework for understanding irritable bowel syndrome. *JAMA* 2004;292:852-8.
 30. Cuoco L, Salvagnini M. Small intestine bacterial overgrowth in irritable bowel syndrome: a retrospective study with rifaximin. *Minerva Gastroenterol Dietol* 2006;52:89-95.
 31. Spiller RC. Inflammation as a basis for functional GI disorders. *Best Pract Res Clin Gastroenterol* 2004;18:641-61.
 32. Nayak AK, Karnad DR, Abraham P, Mistry FP. Metronidazole relieves symptoms in irritable bowel syndrome: the confusion with so-called 'chronic amebiasis'. *Indian J Gastroenterol* 1997;16:137-9.
 33. Nanda R, Baveja UK, Anand BS. *Entamoeba histolytica* cyst passers: clinical features and outcome in untreated subjects. *Lancet* 1983;i:301-3.
 34. Anand AC. Is it curtains for chronic amebiasis? *Indian J Gastroenterol* 1997;16:127-9.
 35. Pimentel M, Kong Y, Park S. Breath testing to evaluate lactose intolerance in irritable bowel syndrome correlates with lactulose testing and may not reflect true lactose malabsorption. *Am J Gastroenterol* 2003;98:2700-4.
 36. Chang L. Review article: epidemiology and quality of life in functional gastrointestinal disorders. *Aliment Pharmacol Therap* 2004;20 (Suppl 7):31-9.
 37. Fass R, Fullerton S, Naliboff B, Hirsh T, Mayer EA. Sexual dysfunction in patients with irritable bowel syndrome and non-ulcer dyspepsia. *Digestion* 1998;59:79-85.
 38. Talley NJ, Fett SL, Zinsmeister AR. Self-reported abuse and gastrointestinal disease in outpatients: association with irritable bowel-type symptoms. *Am J Gastroenterol* 1995;90:366-71.
 39. Irwin C, Falsetti SA, Lydiard RB, Ballenger JC, Brock CD, Brenner W. Comorbidity of posttraumatic stress disorder and irritable bowel syndrome. *J Clin Psychiatry* 1996;57:576-8.
 40. Adibi P, Behzad E, Pirzadeh S, Mohseni M. Bowel habit reference values and abnormalities in young Iranian healthy adults. *Dig Dis Sci* 2007;52:1810-3.
 41. Ghoshal UC, Ghoshal U, Ayyagari A, Ranjan P, Krishnani N, Misra A, et al. Tropical sprue is associated with contamination of small bowel with aerobic bacteria and reversible prolongation of orocecal transit time. *J Gastroenterol Hepatol* 2003;18:540-7.
 42. Ghoshal UC, Gupta D, Kumar A, Misra A. Colonic transit study by radio-opaque markers to investigate constipation: Validation of a new protocol for a population with rapid gut transit. *Natl Med J India* 2007;20:169-73.
-
- Dr. U C Ghoshal, Lucknow was the coordinator of the Task Force, and collated and analyzed the data and wrote the manuscript. Prof. P Abraham (who also edited the manuscript), Mumbai and Dr. C Bhatt, Mumbai chaired the Task Force. Prof. G Choudhuri, Lucknow, Prof. S J Bhatia, Mumbai and Prof. K T Shenoy, Thiruvananthapuram were other core group members of the Task Force. All other members are listed as authors in alphabetical order.
- Author addresses: Bangalore: B S Sathyaprakash, N Chandra Shekhar; Calicut: V Thomas; Chandigarh: R Kochhar, U Dutta, A Sachdeva; Chennai: V Jayanthi, A T Mohan; Coimbatore: V G Mohan Prasad; Cuttack: SP Singh; Delhi: A Kumar, G Makharria, A K Seth, R Upadhyay, J C Vij; Gauhati: B D Goswami, S Dutta; Hyderabad: B Prabhakar, M Tandan; Indore: R K Jain, S Jain; Jaipur: R R Rai; Kochi: M Philip; Kolkata: N P Bohidar, K Bose, K Chakravarty, G Das, Alok Mohanty, G Ray; Lucknow: S Tiwari; Ludhiana: A Sood; Mumbai: N H Banka, N Desai; Nagpur: S V Mukewar; Varanasi: V K Dixit; Visakhapatnam: E Peda Veerraju
- Correspondence to:** Dr Ghoshal, Coordinator; Department of Gastroenterology, SGPGI, Lucknow 226 014
E-mail: ghoshal@sgpgi.ac.in
- Acknowledgments:** The activities of the Task Force were supported by an unconditional grant from Dr. Reddy's Laboratories, Hyderabad, India. The authors thank Ms Lakshmi Narsimhan and Mr PV Sankar Dass (Dr Reddy's Laboratories). The authors also thank Mr. Sourav Vikas (Lucknow) for help in data management.