

Irritable Bowel-Type Symptoms in HMO Examinees

Prevalence, Demographics, and Clinical Correlates

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A study of irritable bowel-type symptoms in 1264 health examinees using a self-administered questionnaire and psychological tests revealed they are common throughout adulthood. Of affected subjects 68% were female, and those with the more severe type (≥ 3 Manning criteria) were predominantly female (80%). Fewer Asians than other racial/ethnic groups had these symptoms. Nongastrointestinal symptoms, physician visits, incontinence, laxative use, a stress effect on bowel pattern and abdominal pain, abdominal surgery, hysterectomy, childhood abuse, use of mind-altering drugs, depression, and anxiety were correlated with irritable bowel-type symptoms. Regression analysis found some of the clinical correlates were independent markers for irritable bowel-type symptoms and that sexual abuse was related to nongastrointestinal symptoms and abdominal surgery independent of irritable bowel-type symptoms. More severe irritable bowel-type symptoms were especially associated with nongastrointestinal symptoms, stress effects, sexual abuse, use of sedatives and oral narcotics, and a past alcohol problem. There are important demographic and clinical correlates with irritable bowel-type symptoms.

KEY WORDS: irritable bowel syndrome; sexual abuse; depression; anxiety; drug use; alcohol.

The irritable bowel syndrome (IBS) is a common functional bowel disorder (1-10). Community surveys of nonpatient populations have estimated the prevalence of IBS-type symptoms to be about 15-20% and have described details of the bowel dysfunction (2-8). However, the populations studied have been somewhat limited in age range (3, 8) and racial/ethnic diversity (4-7).

Symptom criteria are required for the diagnosis of IBS, and there are various nongastrointestinal clinical correlates. The Manning symptom criteria are

widely used in the diagnosis (11, 12): (1) abdominal pain relieved by bowel movement, (2) loose stools associated with the pain, (3) more frequent stools associated with the pain, (4) abdominal distension, (5) mucus in the stool, and (6) a sense of incomplete evacuation. Even though IBS is diagnosed often, the majority of people with IBS-type symptoms do not seek care for them (4-6, 8, 13-16). Psychosocial factors strongly influence health care seeking (8, 13-16), and chronic illness behavior is common in IBS patients (8, 13, 17). A history of childhood sexual (18, 19) or physical (18) abuse is common in patients with functional bowel disease. The nongastrointestinal correlates of IBS are multisystemic (6, 8, 20-26), and there is a predisposition to surgery in patients with IBS (6, 27-29). Most of the information on the various clinical correlates with IBS has been obtained from patients seeking care for gastrointestinal symptoms (18-29) rather than from

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nonpatient surveys. Furthermore, data on psychosocial features, abuse history, and clinical correlates have not been compared in groups of people with IBS-type symptoms who are further categorized by the number of Manning criteria present.

Because the previous surveys were demographically limited and few data on some clinical correlates have been obtained from people with IBS-type symptoms not seeking care, we surveyed IBS-type symptoms and clinical features in a varied group of people having a routine health examination. Our aims were to provide a broad clinical profile of the population and to compare the demographic and clinical features in examinees without bowel dysfunction, people with painful IBS-type symptoms and at least three Manning criteria, and subjects with less severe IBS-type symptoms. This study is important because it investigated clinical factors that predispose individuals from the increasingly diverse U.S. population to IBS-type symptoms.

MATERIALS AND METHODS

Subjects and Data Collection. The subjects were members of a large health maintenance organization (HMO) who underwent a routine health appraisal examination. It was conducted at their request without physician referral. The health assessment consisted of multiphasic screening tests and a physical examination by a nurse practitioner or physician assistant under physician supervision. When further evaluation or treatment was indicated, the members were referred to their primary physician or the appropriate specialist. At the check-in area, the subjects were asked to complete a forced-choice, self-administered questionnaire that included psychological tests. An accompanying letter explained the purpose of the study, that participation was voluntary, and that responses would be anonymous, as identifying data were not requested. The participants had the choice of returning the paperwork to the check-in desk before leaving or mailing it in an addressed, stamped envelope, which was included.

Questionnaires were distributed to 1956 subjects. They were returned by 1264 (64.6%). The age of the respondents was 51.8 ± 0.5 years, and the proportion of women was 54.3%. The aged and gender of 1944 (99.4%) of the subjects given a questionnaire were available from the appointment schedule. Algebraic calculation revealed nonrespondents differed a little from the respondents in age (48.9 ± 1.1 years, $P = 0.02$) and proportion of women (56.9%, $P = 0.03$).

Questionnaire and Psychological Tests. The questionnaire elicited data on demographic characteristics, bowel function, and a history of 12 common nongastrointestinal symptoms (3, 8) and physician visits in the preceding year. Fecal incontinence was sought with the question (31), "Do you ever lose control of your bowels (including soiling your underwear)?" Laxative use was investigated

with the item (31), "Do you take laxatives?" The questions (3), "Does stress, pressure or tension affect your bowel pattern?" and "Does stress lead to abdominal pain or discomfort?", were included.

A history of five types of abdominal surgery (appendectomy, cholecystectomy, hiatal hernia repair, ulcer surgery, and intestinal resection) in addition to hysterectomy was sought.

Current cigarette smoking was questioned, and alcohol abuse was sought with the item (32), "Have you ever had an alcohol problem?" Use of certain drugs was determined by a question that asked if the person had ever used sedatives (eg, diazepam or triazolam), oral narcotics (eg, propoxyphene or codeine), marijuana, stimulants (eg, cocaine, "speed," "crack," or "crystal"), psychedelics (eg, lysergic acid diethylamide or phencyclidine) and intravenous narcotics (eg, heroin).

The childhood abuse section asked, "When you were young, did the following happen to you from anyone at least 5 years older than you?" This question was followed by experiences which identified emotional abuse (33) ("Insult or humiliate you or try to make you feel guilty?") and physical abuse (33) ("Hit, kick, or beat you?"). The opening question was also followed by four sexual abuse items (34): (1) "Exposure of body sex parts when you didn't want it?", (2) "Threats to have sex when you didn't want it?", (3) Touching your body sex parts when you didn't want it?", and (4) "Attempt to have sex with you or have sexual relations when you didn't want it or sexual attack."

There were two psychological tests. The Zung Self-Rating Depression Scale (35) consists of 10 statements regarding mood and symptoms, which respondents rate according to how they have felt "during the past week" by choosing one of four responses. A score ≥ 50 usually indicates depression. The Spielberger State-Trait Anxiety Inventory (36) comprises two separate series of 20 items. Respondents score the state anxiety scale according to how they feel "right now" and the trait anxiety scale by how they feel "generally" by choosing one of four responses. Anxiety of a transitory nature is measured by the state anxiety scale, and relatively stable anxiety-proneness is assessed by the trait anxiety scale.

IBS Definition. Subjects identified as having IBS-type symptoms had alternating bowel function more than 25% of the time in addition to constipation (≤ 2 bowel movements per week or straining at stool for $>25\%$ of the time), diarrhea (>21 bowel movements per week or loose/water stools $>25\%$ of the time) or abdominal pain (3, 8). People with IBS-type symptoms were divided into those with more than six episodes in the previous year of nonmenstrual abdominal pain and three or more Manning criteria (11) (more severe IBS-type symptoms) and those with bowel irregularity and zero to two Manning criteria (less severe IBS-type symptoms).

Data Analysis. Statistical analyses were performed using the SAS and BMDP softwares. Categorical data were analyzed using association tests (chi-square method or Fisher's exact test) and the Cochran-Armitage test for linear trend. Measurements based on continuous scales were analyzed using the two-tailed *t* test or analysis of variance (ANOVA). When ANOVA results were signifi-

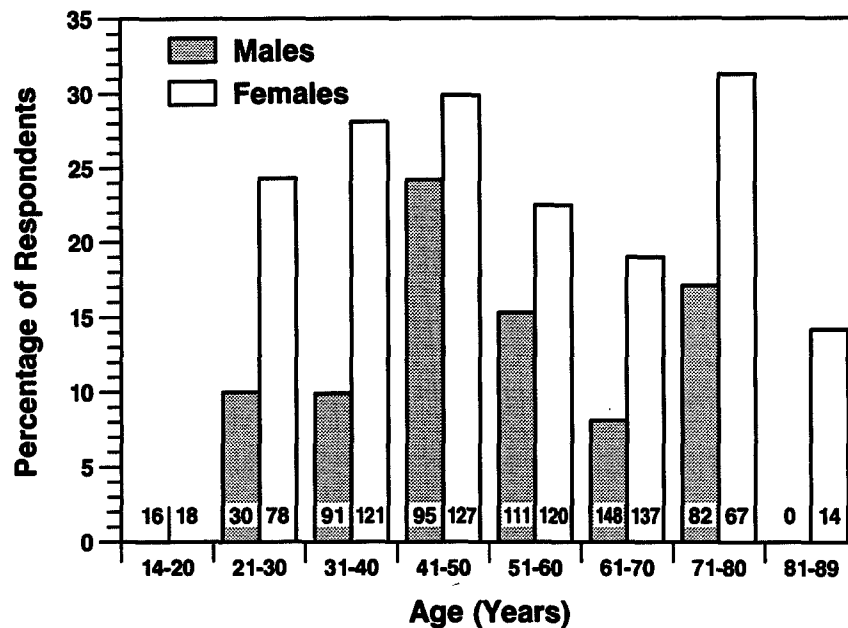


Fig 1. Histogram displaying the age and gender distribution of IBS-type symptoms indicated as percentage of all respondents in each age group. The numbers above the horizontal axis denote the number of respondents in each age and gender group.

cant at the 5% level, Tukey's multiple comparison method was used. Univariate and multiple logistic regression analyses with dichotomous (normal and IBS-type symptoms or abused and nonabused) and trichotomous (normal, less severe IBS-type symptoms, and more severe IBS-type symptoms) outcomes were used to estimate adjusted odds ratios of factors associated with IBS or sexual abuse. In all multiple regression analyses, the best of all possible subsets of outcome predictors were identified.

RESULTS

Prevalence and Demographics. IBS-type symptoms were present in 247 (19.5%) of respondents, including 45 (3.6%) with the more severe type. Three mutually exclusive groups were comparable: 202 subjects with less severe IBS-type symptoms, 45 subjects with more severe IBS-type symptoms, and 1017 subjects without either category of IBS-type symptoms who were classified as normal.

Figure 1 displays the age and gender data of the subjects with IBS-type symptoms. The ages of nine subjects were unavailable. Age (mean \pm SEM) was similar in people with and without IBS-type symptoms (51.6 ± 1.0 vs 51.8 ± 0.5 years, $P = 0.84$). There was a trend toward younger age in affected women than men (50.3 ± 1.2 vs 54.3 ± 1.6 years, $P = 0.06$).

As shown in Table 1, female gender was strongly

associated with IBS-type symptoms, and the proportion of women increased from the normals to the less severe IBS-type symptoms group to the more severe IBS-type symptoms group. Asians had a lower prevalence of IBS-type symptoms than other subjects [4 of 61 (6.6%) vs 241 of 1199 (20.1%), $P < 0.01$]. IBS-type symptoms were not associated with age, religion, or level of formal education.

Clinical Correlates. Table 2 presents the medical and surgical history of the three groups. Multiple comparisons of the number of nongastrointestinal symptoms revealed each group differed from each other group, and they increased from the normals to the less severe IBS-type symptoms group to the more severe IBS-type symptoms group. The difference in physician visits was primarily due to the difference between the normals and the less severe IBS-type symptoms subjects, who had the highest number. Incontinence, laxative use, and a stress effect on bowel pattern and abdominal pain were each strongly associated with IBS-type symptoms and showed a linear trend in the three groups. Past abdominal operations that applied to both sexes revealed no statistically significant differences when considered individually. However, the total number of these operations was higher in the combined IBS-type symptoms group than in the normal subjects (0.43 ± 0.5 vs 0.32 ± 0.02 , $P = 0.02$). Further-

TABLE 1. DEMOGRAPHIC DATA [NUMBER (PERCENT)] OF RESPONDENTS WITH AND WITHOUT IBS-TYPE SYMPTOMS

	<i>Normal</i>	<i>Less severe IBS-type symptoms</i>	<i>More severe IBS-type symptoms</i>
Age, years [<i>N</i> (mean ± SEM)]	1010 (51.8 ± 0.5)	200 (52.7 ± 1.1)	45 (46.5 ± 2.3)
Gender*			
Female	518 (50.9)	132 (65.4)	36 (80.0)
Male	499 (49.1)	70 (34.7)	9 (20.0)
Total	1017 (100.0)	202 (100.0)	45 (100.0)
Race/ethnicity			
White	822 (80.8)	166 (82.2)	37 (82.2)
Hispanic	70 (6.9)	15 (7.4)	5 (11.1)
Black	48 (4.7)	10 (5.0)	1 (2.2)
Asian	57 (5.6)	4 (2.0)	0 (0.0)
Other	18 (1.8)	6 (3.0)	1 (2.2)
No data	2 (0.2)	1 (0.5)	0 (2.2)
Total	1017 (100.0)	202 (100.0)	45 (100.0)
Religion			
Protestant	501 (49.3)	102 (50.5)	25 (55.6)
Catholic	289 (28.4)	64 (31.7)	12 (26.7)
Jewish	56 (5.5)	11 (5.5)	1 (2.2)
Other	154 (15.1)	21 (10.4)	7 (15.6)
No data	17 (1.7)	4 (2.0)	0 (0.0)
Total	1017 (100.0)	202 (100.0)	45 (100.0)
Formal education (years)			
4-8	19 (1.9)	2 (1.0)	1 (2.2)
9-12	335 (32.9)	65 (32.2)	24 (53.5)
>12	653 (64.2)	135 (66.8)	20 (44.4)
No data	10 (1.0)	0 (0.0)	0 (0.0)
Total	1017 (100.0)	202 (100.0)	45 (100.0)

* $P < 0.0001$ (association test and linear trend test).

more, the data from women revealed an association of hysterectomy with IBS-type symptoms.

Childhood emotional, physical, and sexual abuse and a history of substance use are displayed in Table 3. Each type of childhood abuse was strongly associated with the presence of IBS-type symptoms. Moreover, each abuse showed a highly significant positive linear trend in the three groups. At least one of the four types of sexual abuse was reported by 104/1017 (10.2%) normals, 43/202 (21%) less severe IBS-type symptoms subjects, and 16/45 (35.6%) people with more severe IBS-type symptoms ($P < 0.01$). Some form of sexual abuse was reported by 130/686 (19.0%) women versus 33/578 (5.7%) men ($P < 0.001$). Sexual abuse had occurred in 62/177 (35.0%) people with physical abuse versus 100/1074 (9.3%) subjects without physical abuse ($P < 0.001$). Past use of sedatives, oral narcotics, and stimulants showed a significant association with IBS-type symptoms and a linear trend in the three groups. Although the histories of use of marijuana or psychedelics and a past alcohol problem did not

reveal a significant association with IBS-type symptoms, each also had a significant linear trend.

As shown in Table 4, depression was strongly associated with IBS-type symptoms and revealed a significant linear increase. Comparisons of the state and trait anxiety inventory scores also showed significant differences. Each score was higher in both groups with IBS-type symptoms than in normals ($P < 0.05$); the two IBS-type symptoms groups were similar.

Univariate (crude) and multivariate (adjusted) odds ratios of factors considered in the prediction of IBS-type symptoms, without regard to its type, are given in Table 5. Female gender was not a significant factor after adjustment. Being white or Hispanic compared to being Asian remained a highly significant factor. Incontinence, laxative use, a stress effect on bowel pattern, and a prior alcohol problem were significant factors with adjusted odds ratios in excess of 2. The number of nongastrointestinal symptoms, physician visits, and a childhood history of sexual abuse constituted risk markers

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TABLE 2. MEDICAL AND SURGICAL HISTORY COMPARISONS

<i>Medical/surgical history</i>	<i>Normal</i>	<i>Less severe IBS-type symptoms</i>	<i>More severe IBS-type symptoms</i>
Nongastrointestinal Symptoms [N(mean ± SEM)]*	1017 (2.0 ± 0.1)	202 (3.0 ± 0.2)	45 (4.5 ± 0.4)
Physician visits [N(mean ± SEM)]*	983 (2.6 ± 0.1)	196 (4.2 ± 0.4)	42 (3.2 ± 0.4)
Incontinence [N/total (%)†‡]	70/962 (7.3)	36/195 (18.5)	10/44 (22.7)
Laxative use [N/total (%)†‡]	85/984 (8.6)	46/202 (22.8)	9/45 (20.0)
Stress effect on bowel pattern [N/total (%)†‡]	264/974 (27.9)	103/190 (54.2)	32/42 (80.0)
Stress effect on abdominal pain [N/total (%)†‡]	145/949 (15.3)	53/189 (28.0)	23/39 (59.0)
Appendectomy [N/total (%)]	208/1015 (20.5)	47/200 (23.5)	11/45 (24.4)
Cholecystectomy [N/total (%)]	58/1016 (5.7)	19/200 (9.5)	3/45 (6.7)
Hiatal hernia repair [N/total (%)]	37/1016 (3.6)	9/200 (4.5)	0/45 (0.0)
Ulcer surgery [N/total (%)]	13/1016 (1.3)	1/200 (0.5)	1/45 (2.2)
Intestinal resection [N/total (%)]	14/1016 (1.4)	6/200 (3.0)	0/45 (0.0)
Any abdominal operation [N/total (%)]	267/1015 (26.3)	62/200 (31.0)	12/45 (26.7)
Females only			
Hysterectomy [N/total (%)§]	141/518 (27.2)	49/132 (37.1)	11/36 (30.6)

*P < 0.001 (ANOVA).
 †P < 0.0001 (association test).
 ‡P < 0.0001 (linear trend test).
 §P < 0.05 (association test).

with lower odds ratios. The three psychological test scores were not identified as significant predictors of IBS-type symptoms.

The trichotomous outcome logistic regression analysis results are presented in Table 6. These adjusted odds ratios must be viewed in the context of the results that do not distinguish between the

two groups with IBS-type symptoms (Table 5). Race/ethnicity was not one of the listed factors because there were no Asians with more severe IBS-type symptoms. Nongastrointestinal symptoms and a stress effect on bowel pattern were independent markers for IBS-type symptoms of both types. A prior alcohol problem was associated

TABLE 3. CHILDHOOD ABUSE AND SUBSTANCE USE COMPARISONS

	<i>Normal [N/total (%)]</i>	<i>Less severe IBS-type symptoms [N/total (%)]</i>	<i>More severe IBS-type symptoms [N/total (%)]</i>
Type of abuse			
Insulted, humiliated*†	199/1007 (19.8)	61/198 (30.8)	23/45 (51.1)
Hit, kicked, beaten*‡	124/1008 (12.3)	44/198 (22.2)	9/45 (20.0)
Sexual exposure*†	51/1007 (5.1)	23/198 (11.6)	10/45 (22.2)
Sexually threatened†§	31/1008 (3.1)	10/198 (5.1)	7/45 (15.6)
Sexual touching*†	75/1008 (7.4)	30/198 (15.2)	13/45 (28.9)
Attempted sex, attack†¶	52/1005 (5.2)	19/198 (9.6)	10/45 (22.2)
Substance use			
Drugs			
Sedatives†¶	104/1014 (10.3)	34/200 (17.0)	14/45 (31.1)
Oral narcotics†¶	129/1013 (12.7)	39/200 (19.5)	17/45 (37.8)
Marijuana**	121/1013 (11.9)	28/200 (14.0)	12/45 (26.7)
Stimulants‡§	55/1014 (5.4)	16/200 (8.0)	8/43 (18.6)
Psychedelics**	29/1014 (2.9)	9/200 (4.5)	4/45 (8.9)
Intravenous narcotics	5/1014 (0.5)	2/199 (1.0)	1/45 (2.2)
Current cigarette smoking	123/1006 (12.2)	28/199 (14.1)	10/45 (22.2)
Prior alcohol problem**	49/997 (4.9)	15/198 (7.6)	5/44 (11.4)

*P < 0.0001 (association test).
 **P < 0.05 (linear trend test).
 †P < 0.0001 (linear trend test).
 ‡P < 0.001 (linear trend test).
 §P < 0.05 (association test).
 ¶P < 0.001 (association test).

TABLE 4. ZUNG SELF-RATING DEPRESSION AND SPIELBERGER STATE-TRAIT ANXIETY INVENTORY SCORES

<i>Psychological test</i>	<i>Normal</i>	<i>Less severe IBS-type symptoms</i>	<i>More severe IBS-type symptoms</i>
Zung score ≥ 50 [N/total (%)]*†	22/835 (2.6)	14/164 (8.5)	4/40 (10.0)
State anxiety score (N/mean \pm SEM)‡	959/31.1 \pm 0.31	189/35.5 \pm 0.83	44/36.8 \pm 2.01
Trait anxiety score (N/mean \pm SEM)‡	966/33.4 \pm 0.31	190/37.8 \pm 0.84	44/40.8 \pm 1.93

* $P < 0.0005$ (association test).† $P = 0.0002$ (linear trend test).‡ $P < 0.0001$ (ANOVA).

with more severe IBS-type symptoms, whereas the number of physician visits, incontinence, and laxative use were independently associated with less severe IBS-type symptoms only. The number of nongastrointestinal symptoms was the sole factor that discriminated IBS-type symptoms of the two types.

To assess the independent association of sexual abuse with nongastrointestinal symptoms, physician visits, and abdominal operations, the data for these factors were dichotomized (because they were not normally distributed) to 0 and ≥ 1 . Logistic regression analysis revealed the following IBS-type symptoms-adjusted odds ratios of the clinical correlates for predisposition to sexual abuse: (1) ≥ 1 nongastrointestinal symptoms, 1.74 ($P = 0.0160$); (2) ≥ 1 physician visits, 1.42 ($P = 0.1099$), and (3) ≥ 1 operation, 1.47 ($P = 0.0349$).

DISCUSSION

IBS-type symptoms were found in 19.5% of HMO health examinees, including 3.6% with more severe IBS-type symptoms. Race/ethnicity, nongastrointestinal symptoms, physician visits, incontinence, laxative use, a stress effect on bowel pattern and abdominal pain, sexual abuse, and a prior alcohol problem were independent markers for IBS-type symptoms. Although not independent markers, female gender, the number of abdominal operations, hysterectomy, depression, and anxiety were also associated with IBS-type symptoms. Some clinical correlates were especially related to more severe IBS-type symptoms: nongastrointestinal symptoms, a stress effect on bowel pattern and abdominal pain, sexual abuse, past use of sedatives and oral narcotics, and a prior alcohol problem. Sexual abuse also correlated with nongastrointestinal symptoms and abdominal surgery independent of IBS-type symptoms.

A potential shortcoming was bias caused by the nonrespondents who differed in age and gender from the respondents. These differences were small, but they were statistically significant due to the large number of examinees given a questionnaire. Since the multivariate analysis did not identify age and sex as independent markers for IBS-type symptoms and other investigators found no effect on psychosocial variables from self-selection (16), such a bias should have been minor. Although the large number of statistical tests performed could have revealed some differences by chance, the importance of some of the clinical correlates based on very small P values should be underscored.

The high prevalence of IBS-type symptoms and their occurrence over a wide age range resemble the findings of other surveys (2–8). The female predom-

TABLE 5. ODDS RATIOS OF FACTORS ASSOCIATED WITH DICHOTOMOUS (IBS-TYPE SYMPTOMS AND NORMAL) STATUS

<i>Factor</i>	<i>Odds ratio (P)</i>	
	<i>Crude</i>	<i>Adjusted</i>
Female gender	1.95 (0.0002)	1.09 (0.6701)
Race/ethnicity		
White	3.62 (0.0332)	4.37 (0.0209)
Hispanic	4.67 (0.0214)	5.09 (0.0220)
Black	4.14 (0.0477)	4.33 (0.0615)
Other	5.00 (0.0414)	3.87 (0.1118)
Asian	1.00	1.00
Nongastrointestinal symptoms	1.27 (0.0000)	1.16 (0.0003)
Physician visits	1.11 (0.0000)	1.07 (0.0053)
Incontinence	2.70 (0.0001)	2.15 (0.0058)
Laxative use	3.04 (0.0000)	2.38 (0.0018)
Stress effect on bowel pattern	4.05 (0.0000)	2.53 (0.0000)
Sexual abuse*	2.54 (0.0000)	1.74 (0.0232)
Prior alcohol problem	1.75 (0.0784)	2.30 (0.0173)
Zung score	1.08 (0.0000)	1.03 (0.1285)
State anxiety score	1.05 (0.0000)	1.01 (0.6951)
Trait anxiety score	1.05 (0.0000)	1.00 (0.9995)

*At least one of four types of sexual abuse surveyed.

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TABLE 6. ADJUSTED ODDS RATIOS OF FACTORS ASSOCIATED WITH TRICHOTOMOUS (MORE SEVERE IBS-TYPE SYMPTOMS, LESS SEVERE IBS-TYPE SYMPTOMS, AND NORMAL)

Factor	Odds ratio (P)		
	More severe IBS-type symptoms versus normal	Less severe IBS-type symptoms versus normal	More severe IBS-type symptoms versus less severe IBS-type symptoms
Female gender	2.30 (0.0989)	0.98 (0.9172)	2.40 (0.1031)
Nongastrointestinal symptoms	1.40 (0.0000)	1.10 (0.0188)	1.20 (0.0088)
Physician visits	0.98 (0.6958)	1.10 (0.0015)	0.90 (0.0949)
Incontinence	2.40 (0.0673)	2.00 (0.0198)	1.20 (0.6796)
Laxative use	2.00 (0.1971)	2.60 (0.0011)	0.77 (0.6192)
Stress effect on bowel pattern	5.60 (0.0003)	2.10 (0.0004)	2.60 (0.0512)
Sexual abuse*	2.20 (0.0767)	1.70 (0.0308)	1.30 (0.6234)
Prior alcohol problem	6.20 (0.0028)	2.10 (0.0536)	3.00 (0.0819)
Zung score	1.00 (0.3508)	1.00 (0.1310)	1.00 (0.8705)
State anxiety score	0.99 (0.6667)	1.00 (0.4105)	0.98 (0.4226)
Trait anxiety score	1.00 (0.9679)	1.00 (0.7849)	1.00 (0.8619)

*At least one of four types of sexual abuse.

inance agrees with some (3, 6–8) but not all (4, 5) studies. The female–male ratio of 4:1 in subjects with more severe IBS-type symptoms is particularly notable. There is little published data on the relation of IBS-type symptoms to racial/ethnic origin for comparison with the low prevalence in the Asian respondents. A survey in China found a prevalence similar to that in the United States (38). A preliminary report of an American study indicated a lower prevalence in Hispanics than whites (39), a finding at variance with our results.

The 35.7% rate of hysterectomy in the IBS-type symptoms group is considerably higher than previously reported in population (6) and patient (30) studies. Women often consult gynecologists for symptoms compatible with IBS (22) and IBS-type symptoms were more common in women having elective hysterectomy than in controls (23).

Previous reports that patients with functional disorders are more likely than those with organic disease to have a history of sexual (18, 19) or physical (18) abuse were corroborated by the associations found with sexual abuse. Since patients usually do not report their abuse experiences to physicians (18, 40), these findings emphasize the importance of asking patients about abuse.

Psychological differences between our examinees, IBS patients, and people not seeking any care at all might be expected due to self-selection. To investigate this possibility, we calculated the mean score on the 20 test items of the Spielberger Trait Anxiety Inventory in the IBS-type symptoms group and compared it by Student's two-tailed unpaired *t* test with the mean score in 55 IBS patients (16) and

the calculated mean score in 1838 working adults (36). The score (standard deviation in parentheses) was 1.92 (0.59) in the IBS-type symptoms group versus 2.04 (0.59) in the IBS patients ($P = 0.18$) and 1.74 (2.06) in the working adults ($P = 0.004$). Therefore, the anxiety level in the IBS-type symptoms group was higher than in people seeking no care but was similar to that of IBS patients. Comparison of the findings concerning depression with studies of IBS was not done because different psychometric indices were used (13–15). Furthermore, statistical comparison of the Zung score data with results from published normal groups is complicated by the age effect on this scale; however, the proportion of the IBS-type symptoms group with depression exceeded what has been found in normally functioning people (35). The findings regarding alcoholism and drug use could be related to depression and anxiety (41).

IBS is a multifactorial disorder (1). The diagnosis is based on features in the history, particularly the Manning criteria (11), and the exclusion of organic disease. The Manning criteria are less useful in men than women when assessing patients seeking care for symptoms (37, 42); however, the gender effect on their accuracy is not necessarily applicable to this survey of health examinees. Although the diagnostic sensitivity of the Manning criteria increases as more are present (11, 38), psychosocial factors are not useful in diagnosing IBS (16). It should not be concluded that the findings of this study, such as medical/surgical and abuse history and psychological test results, have clinical diagnostic value. Rather, it should be important to physicians that

people obtaining a routine health examination who have IBS-type symptoms, especially those with the more severe type, have demographic and clinical characteristics that distinguish them from people without these symptoms and that on a spectrum of anxiety and depression they may resemble patients seeking care for IBS symptoms.

The findings regarding IBS-type symptoms and their association with anxiety and depression in health examinees complement previous studies that compared psychosocial features in patients seeking care for IBS versus people with IBS-type symptoms who were not requesting care (8, 13–16). Poor health perception alone correlates with increased anxiety, depression, and health care utilization (43). Therefore, health-related worry could have predisposed these HMO examinees to undergo a screening examination and could also explain their increased anxiety and depression compared with nonpatients.

This study differed from other epidemiological work because it surveyed a diverse population of people obtaining a routine examination and obtained a broad range of clinical information about them. The results suggest further study of the prevalence of IBS-type-symptoms in different racial/ethnic groups. The various clinical correlates suggest research on the health care costs related to IBS-type symptoms and the effect of treatment on health care utilization.

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