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Symptom Comparisons in Women with Irritable Bowel Syndrome between Asian-Americans and White-Americans

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Abstract

Purpose—There is little information on racial/ethnic characteristics of patients with irritable bowel syndrome. In this study we determined whether the severity of symptoms (gastrointestinal, psychological distress), cognitive beliefs about irritable bowel syndrome and life impacts (life interference, health related-quality of life) differ women with irritable bowel syndrome between Asian-Americans and White-Americans; and the relationships among these variables.

Methods—As a secondary data analysis, Asian-American women (N = 21) and age- and design-matched White-American women (N = 63) with irritable bowel syndrome were included. Data were collected from questionnaires and a 28-days daily diary (e.g., abdominal pain, depression).

Results—The percent days with moderate/severe abdominal pain and psychological distress were significantly higher; and constipation- and diarrhea-dominant bowel pattern subtypes were prevalent in White-Americans as compared to Asian-Americans. Positive relationships of gastrointestinal symptoms with psychological distress, and of gastrointestinal and psychological symptoms with negative cognitive beliefs and negative life impacts, were observed in White-Americans.

Conclusions—Further studies to evaluate contributing (e.g., cultural-environmental, pathophysiological, diet) factors of symptom characteristics in Asian-Americans are suggested.

Implications for practice—Our study provides useful information for health care providers to understand symptoms and cultural factors, and the potential for culturally-tailored symptom management for this patient group.

Keywords

irritable bowel syndrome; Asian-Americans; Whites-Americans; women; symptoms; cognitive beliefs; health impact

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Introduction

Irritable bowel syndrome (IBS) is a functional gastrointestinal (GI) condition characterized by recurrent abdominal pain or discomfort associated with bowel alterations, e.g., constipation-predominant (IBS-C), diarrhea-predominant (IBS-D) or a mixed type bowel pattern (IBS-M) (Drossman, 2006; Grundmann & Yoon, 2010). The prevalence of IBS in adults worldwide is 9% to 23% (IFFGD, 2013), 14% in the U.S. (Hungin, Chang, Locke, Dennis, & Barghout, 2005), 10% to 18% in European countries (Lovell & Ford, 2012) and 3% to 16 % in Asian countries (Gwee et al, 2010). IBS is associated with substantial costs to patients, healthcare systems and society (Fukudo et al., 2015). Moreover, health related-quality of life (HRQOL) is lower in adults with IBS (Agarwal & Spiegel, 2010). Symptom severity, which ranges from mild to severe, is associated with reductions in HRQOL (Cain et al., 2006; De Gucht, 2015; Hahn, Kirchdoerfer, Fullerton, & Mayer, 1997). IBS is viewed within a biopsychosocial model (Tanaka, Kanazawa, Fukudo, & Drossman, 2011) in which genetics, environmental, cultural, psychological as well as physiological factors are considered in both the development of IBS and its illness trajectory. Of these factors less is known about the influences of ethnicity and race. A recent call from the Rome foundation and World Gastroenterology Organization (Sperber et al., 2014; Sperber, Drossman, & Quigley, 2012) addressed the lack of awareness of cultural factors in multiethnic and cross-cultural approach in managing IBS; and emphasized the importance of understanding interaction between culture and health impact for patients with IBS.

Because cross-sectional studies of IBS have utilized samples that are predominantly White-Americans; there is a question as to whether the findings are applicable to all patients with IBS. In addition, little is known about symptom experiences of Asian-Americans with IBS as well as their strategies for managing their symptoms (County, 2001; Gralnek, Hays, Kilbourne, Chang, & Mayer, 2004; Heidelbaugh, Stelwagon, Miller, Shea, & Chey, 2015; Ho, Kang, & Seow, 1998; Zuckerman, Guerra, Drossman, Foland, & Gregory, 1995). The ability to generalize findings from Asia IBS studies among Asian countries to the experience of IBS in Asian-Americans in the U.S. is limited by numerous factors including cultural differences in diet, access to health care, and the environment (Kim & Keefe, 2010). In 2010, a consensus statement derived using a Delphi approach with a multinational group of 19 Asian physicians (Gwee et al., 2010) noted that Asian patients reported more meal-related abdominal pain, bloating, fullness, intestinal gas and upper GI symptoms relative to western populations. However, Gerson and Gerson (2010) conducted a survey to compare cross-cultural symptom experiences including Asian countries such as Hong Kong, Japan, India and western countries such as U.S. and Italy. Authors found that Asian patients with IBS suppressed the reporting of their psychological distress.

There may be also ethnic and cultural differences (e.g., sociocultural factors, illness perception, attitudes about symptoms, diet, emotional resistance, and access to health care) in cognitive beliefs about IBS and life impacts (e.g., life interferences and HRQOL) as well as symptom experiences (Gerson & Gerson, 2010; Gwee et al., 2010). Gerson and Gerson (2010) found that Asian IBS patients in Asian countries perceived IBS symptoms with a positive holistic view such as mind-body imbalance, not with a western perspective of believing IBS as an illness per se. Currently, there is the lack of study to compare life

impacts in relation to symptoms such as HRQOL between Asian and/or Asian-Americans and White-Americans with IBS. Only one Asian study by Gwee et al. (2010) reported that when asked '*how much they were interfered by IBS symptoms*', they reported 'less' when compared to western IBS patients. Such discrepancies point to the need for more descriptive work related to the experience of IBS in Asian-Americans in the U.S.

Previous IBS studies did not determine whether psychological distress was related to GI symptoms as has been shown in predominantly White-Americans with IBS (Jarrett et al., 1998). As well, examination of IBS symptom severity has been primarily limited to one-time measures using retrospective tools such as the IBS Symptom Severity Index. However, IBS is a recurrent fluctuating condition for most individuals. Therefore, in the current study, we conducted a secondary data analysis of several studies that included GI symptoms and psychological distress using daily diary data. Using such an approach may provide useful information to understand and manage symptoms for Asian-Americans women with IBS.

The purposes of this study are two-fold: (a) to compare severity of GI symptoms and psychological distress, cognitive beliefs about IBS, and life impact variables (life interferences and HRQOL); and (b) to compare the relationships (correlations) among symptoms, and of symptoms with cognitive beliefs about IBS and with life impact variables. Comparisons were made between White-American women with IBS and women with IBS who self-identify as Asian-Americans.

Our hypotheses were based on the previous literatures as outlined above. First, Asian-American women with IBS would have more GI symptoms, less psychological distress, more positive cognitive beliefs, and more negative life impacts compared to White-American women with IBS. Second, there would be significant and positive correlations among GI symptoms, psychological distress, negative cognitive beliefs and negative life impacts in each group. We expect these relationships to be weaker in Asian-American women with IBS than White-American Women with IBS.

Methods

Design, Settings, and Participants

This comparative descriptive study of Asian-American and White-American women was a secondary analysis study. To achieve appropriate sample size of Asian-American with IBS, data was collected from four previous IBS studies, which were conducted by the same research team and same facilities from 2002 to 2012. Similar research methods in four studies were used: inclusion and exclusion criteria, recruitment, data collection, settings, and instruments, diagnostic criteria and paper formats of a daily health diary. In original studies, all participants were recruited through community advertisement. To be included, participants had to be: female, 18–70 years old, have a clinical diagnosis of IBS made by a health care provider, and have current symptoms as described by Rome criteria (Rome II in 1 study; Rome III criteria in 3 studies). Rome II criteria included: at least 12 weeks, which need not be consecutive, in the preceding 12 months of abdominal discomfort or pain that has two or more of the following: improvement with defecation, onset associated with a change in frequency of stool, onset associated with a change in form of stool; while Rome

III criteria included: recurrent abdominal pain or discomfort at least 3 days/month in last 3 months associated with two or more of the symptoms aforementioned above (Drossman, 2006). Potential participants were excluded for co-existing GI pathology (e.g., inflammatory bowel disease) or surgery, renal or reproductive pathology (e.g., endometriosis); or select medications (e.g., antibiotics, anticholinergics, narcotics, iron supplements).

For this secondary data analysis, Asian-American and White-American with IBS in the U.S. were included. Of this, we included only women with IBS due to data availability as a majority of the samples in original studies, and due to minimize the confounding effect of gender. Twenty one Asian-American women with IBS were assigned to reference group and compared with sixty three age-matched and study design-matched White-American women with IBS as a comparison group (Asian-Americans: White-Americans = 1:3 ratio matching).

Ethical Considerations

The four studies used in this secondary analysis received Institutional Review Board (IRB) approval by the University of Washington (UW) Human Subject Division. Once the studies were closed they no longer required IRB oversight. Thus this secondary data analysis required no additional human subjects involvement.

Protocol and Data Collection

After recruitment process, participants were initially screened over the phone for eligibility. If they met the study criteria they were mailed a consent form to review and questionnaires to complete demographic and baseline symptom characteristics. At the initial visit to the research office, women gave written informed consent, returned completed questionnaires and were oriented to the study. They completed a daily health diary each evening for 28 days.

Measurements

Baseline Characteristics—Demographic data such as age, race and ethnicity, marital status, education, and total household income level were collected. IBS specific history, baseline information and health behaviors (e.g., types of health care utilization such as oriental medicine, self-medications such as anti-depressants, herb and dietary supplement) were assessed using a Health History Questionnaire. Mental health disorders such as major depression disorders and generalized anxiety disorders were assessed by using the Composite International Diagnostic Interview (CIDI) (Rubio-Stipec, Bravo, & Canino, 1991).

Daily Diary Symptoms (GI symptoms and Psychological Distress)—One of the four studies (15 % of total participants) used a diary with 37 symptoms and three studies (85% of total participants) used a diary with 26 symptoms. Both diaries had similar symptoms, format, and scaling. GI symptoms include abdominal pain, abdominal pain after eating, intestinal gas, bloating, constipation, diarrhea, nausea, heartburn, and stomach pain. Daily psychological distress symptoms were anxiety, depression, fatigue, sleepiness during the day, and stressed. We also computed a sum score of these five psychological distress

symptoms in this study. We computed the mean severity of each symptom for 28 days and the percentage of days (28 days) with moderate/severe rating for each symptom.

Life interferences—Life interferences were measured by two items using a diary: “*How much do your IBS symptoms affect your ability to carry out normal daily activities, other than work?*” and “*did you go to work/school today?*” It was rated on a scale of 1 ‘*not at all*’, 2 ‘*some*’, 3 ‘*quite a lot*’, or 4 ‘*very much*’. We computed a mean life interferences for each item for 28 days.

Cognitive Scale for Functional Bowel Disorders (CSFBD)—The CSFBD consists 25 items to assess cognitive beliefs related to functional bowel disorder, using a 7-point Likert scale ranging from 1 ‘*strongly disagree*’ to 7 ‘*strongly agree*’ (Toner et al., 1998). An example item is “*I often worry that there might not be a bathroom available when I need it.*” We computed a mean of all items, with the higher scores indicating more negative cognitive beliefs about IBS. Internal consistency for the scales ranged from $\alpha = 0.89$ to $\alpha = 0.93$ for this study.

HRQOL—IBS-Quality of life instrument was used to assess HRQOL (Hahn et al., 1997). This questionnaire has 30 items to assess QOL in nine domains: emotional, mental health, sleep, energy, physical functioning, diet, social role, physical role, and sex relations. Sample items include: “*How often did your IBS make you feel fed up or frustrated?*” and rated as 1 ‘*always*’, 2 ‘*often*’, 3 ‘*sometimes*’, 4 ‘*seldom*’, and 5 ‘*never*’. The scales were transformed to a standard scale from 0 to 100, and averaged to compute a total score for the analysis (Hahn et al., 1997; Mönnikes, 2011). Internal consistency for the scales ranged from $\alpha = 0.74$ to $\alpha = 0.85$ for this study.

Data Analysis

First, demographic characteristics were computed with descriptive statistics using mean, standard deviation (SD), or percentages. Independent *t*-test and Chi square /Fisher’s exact test were employed for continuous data and categorical data, respectively. Second, analysis of covariance (ANCOVA) was applied to identify differences in symptoms severity (GI symptoms and psychological distress), cognitive beliefs about IBS, and life impact variables (life interferences and HRQOL) between Asian-American and Whites-American women with IBS. Third, partial *Pearson’s* correlation coefficients with controlling for diary versions were used to examine and compare relationships among outcome variables between the two groups.

As an exploratory data analysis (EDA), a *p* value < .05 was established as the level of statistical significance and *p* .05 and < .20 was as a marginal trend. Potential covariates were education, income, diagnosed of mental disorders, abuse history, medications, and health care utilization. They were removed, if they were not statistically significantly different between the two groups (*p*-value .05). Statistical analyses were performed using SPSS version 19.0 for Windows.

Results

Baseline Characteristics

Demographic and IBS characteristics were described in Table 1. Of the 21 Asian-American women included in this analysis, six self-identified as Chinese and five as Korean (Table 1). The majority of the patients were married and had a college or graduate degree. IBS bowel pattern subtype distributions differed significantly in women with IBS between Asian-Americans and White-Americans. More White-American women were categorized as IBS-C (27%) and IBS-D (47.6%) bowel pattern subgroups; while IBS-M group (33.3%) was prevalent in Asian-American women. There were no significant differences in other demographic and baseline characteristics between the two groups.

Comparisons of Symptoms, Cognitive Beliefs about IBS and Life Impact Variables

Our preliminary analyses did not find any significant differences of the mean severity of symptoms between the two groups. Thus, we did not present these results in the tables. The mean percent of days with moderate/severe abdominal pain differed between Asian-American and White-American women ($p = .055$) (Table 2). Similar, albeit not statistically significant difference were found for abdominal pain after eating ($p = .068$) and intestinal gas ($p = .075$). Similar trends of a marginal trend toward significance in several psychological distress variables (depression, anxiety, and sum of psychological distress scores) were also found between Asian-Americans and White-Americans with IBS (p values ranged from .117 to .065) (Table 2). There were no significant differences in cognitive beliefs about IBS and life impact variables (life interferences and HRQOL) between the two groups (data are not shown).

Relationships of GI symptoms with Psychological distress

Depression was positively correlated with pain (abdominal pain and abdominal pain after eating) and upper GI symptoms (nausea and heartburn) in White-American women but not in Asian-American women (Table 3). As well, fatigue and anxiety were related to abdominal pain after eating, constipation and nausea only in White-American women. The relationships of the total sum of psychological distress scores with five GI symptoms (abdominal pain, abdominal pain after eating, intestinal gas, constipation, and stomach pain) were significantly positive only in White-American women with IBS (maximum: $r = 0.48$ of sum of psychological distress scores with constipation, $p = .015$). In Asian-American women, intestinal gas and bloating were positively and significantly related to all daily psychological distress; and the strongest relationship were between bloating and daily stress ($r = 0.81$, $p = .002$).

Relationships of Symptoms with Cognitive Beliefs about IBS and with Life Impact Variables (Life Interferences and HRQOL)

Most of GI symptoms were positively and significantly related to negative cognitive beliefs about IBS, life interferences and inversely related to the HRQOL scores in White-American women with IBS (Table 4). Similar to GI symptoms, psychological distress, in particular, more severe ratings of fatigue and sleepiness were related to more negative cognitive beliefs

about IBS and more negative life impacts in White-American women (Table 5). But overall, non-significant relationships between symptoms (GI and psychological distress) and cognitive beliefs and life impact variables were shown in Asian-American women with IBS (Table 4 & 5).

Post-Hoc Analysis

Because IBS bowel pattern subtypes differed between Asian-American and White-American women with IBS ($p = .022$) in Table 1, a post-hoc analysis was performed controlling for bowel pattern subtypes. We observed that the group differences in percent days of moderate/severe abdominal pain became less significant ($p = .082$), and the relationships of abdominal pain with psychological distress variables were attenuated in White-Americans women with IBS (data are not shown).

Discussion

Our study is first to compare symptom characteristics of carefully phenotyped Asian-American women and White-American women with IBS using daily diary symptom measures. The percent of days with moderate to severe abdominal pain was greater in White-American women and there was a trend toward more days with abdominal pain after eating, intestinal gas, depression, anxiety, and sleepiness when compared to Asian-American women. Positive and significant relationships of psychological distress variables with GI symptoms, cognitive beliefs about IBS, and life impact variables were found more frequently in White-American women as compared to Asian-American women.

In contrast to Gwee's study of reporting higher meal-related GI symptoms (e.g., abdominal pain, intestinal gas, and stomach pain) in Asians in Singapore (Gwee et al., 2010), we did not find higher severity in meal-related GI symptoms in Asian-Americans as compared to White-Americans (Table 2). Gerson and Gerson (2010) suggested that IBS symptom experience patterns may differ significantly across different geographic locations. Geographic differences in diet, thus, may account for the discrepancy of results between Gwee's Asian IBS study and our study for Asian-American women with IBS. Asian food consumption such as spicy and chili food in Asian countries has been cited as a major triggering factor for IBS exacerbation (Ghoshal et al., 2007; Gwee, Wee, Wong, & J C Png, 2004; Masud, Hasan, & Khan, 2001). But, it can be conjectured that the adaptation of Asian-American women to a western diet may contribute to relatively less upper GI symptom severity and frequency. We did not collect dietary intake data and thus, do not have information on dietary preferences in our sample. Thus, results of our study need much more cautious interpretation, and further studies.

In our study, Asian-American women with IBS reported fewer days with moderate/severe abdominal pain than White-American women. Previous studies reported that there are ethnic and cultural differences in pain perception between healthy White-Americans and Asian-Americans (Callister, 2003; Campbell, 2008; Campbell & Edwards, 2012). It is well known that culture shapes pain perceptions, expression and experiences, social roles, health care seeking behaviors, self-treatment, and illness beliefs and behaviors (Callister, 2003; Campbell, 2008; Campbell & Edwards, 2012). For example, Asian IBS patients tend to

utilize herbal remedies to alleviate symptoms as their self-treatment which are readily available in Asia (Kua, Ng, Lhode, Kowalski, & Gwee, 2012). However, in the current study we found no differences in utilization of oriental medicine strategies between the two groups suggesting that use of self-care strategies may not explain symptom differences. Another pathophysiological factor which has not been fully explicated is the possibility of biologic or genetic differences in terms of pain sensitivity and motility. Further studies are required to confirm the roles of biologic and genetic factors on the differences of symptom experiences between Asian-American and White-American women with IBS (Campbell, 2008; Reimann et al., 2010).

With a marginal trend toward significance, Asian-American women reported less psychological distress compared to White-American women; which is consistent with the work of Gerson and Gerson (2010) who studied Asian (Chinese) IBS patients. This could be due to greater abdominal pain reports in White American women as compared to Asian-American women in our study. However, we also cannot rule out the possibility that the tendency of Asian-American women to under-report their symptoms (Kim & Keefe, 2010). Asian IBS patients considered the psychological distress in IBS (e.g., depression and anxiety) as a stigma. When they report psychological distress, this is labeled as psychologically unstable for Asian IBS patients (Gerson & Gerson, 2010). Qualitative studies are needed to fully explicate the experience of IBS in diverse populations.

We fail to reject null hypothesis of differences in cognitive beliefs about IBS and life impact variables (life inferences and HRQOL) between the two groups. One study for healthy Asian-Americans in the U.S. found that the impaired HRQOL in Asian-Americans compared to White-Americans is due to their socioeconomic status (SES) (Kim & Keefe, 2010). Another study for non-White-Americans with IBS (3% were Asian/Pacific Islander of total 166 participants) and White-Americans with IBS (N = 707) (Gralnek et al., 2004), non-White-Americans reported greater personal impairment in HRQOL, but these differences disappeared after controlling for income and education. In our study, prevalent western perspective to perceive the symptoms in Asian-Americans; and no differences in SES as compared to White-Americans (Table 1) could contribute to no true differences between the two groups in terms of cognitive beliefs about IBS and HRQOL, respectively. We had expected based on previous studies with predominantly White-American women (Hertig, Cain, Jarrett, Burr, & Heitkemper, 2007; Jarrett et al., 1998; Rey de Castro, Miller, Carruthers, & Whorwell, 2015) that there would be positive and significant relationships among GI symptoms and psychological distress. We did find many of these relationships but mostly in White-American women. The overall higher level of symptoms in White-Americans even when controlling for bowel pattern subtypes may account for this group difference. Of note, our study showed that the intestinal gas and bloating were strongly related to daily psychological distress measures in Asian-American women (Table 3). This is consistent with the report of Gwee et al (2010) that Asian patients appear to be bothered more by bloating. As such, dietary interventions focused on altering diet to reduce intake of gas-producing foods may be important strategies to improve the physical and mental health for Asian-American women with IBS.

The positive relationships of symptoms with negative cognitive beliefs about IBS and negative life impact scores were significant in White-Americans but not in Asian-American women. It has been shown that IBS patients' cognitive perception about the disease mediates the relationships between symptoms and HRQOL (De Gucht, 2015). Even though, our study did not show statistical significant differences in cognitive beliefs about IBS between Asian-Americans and White-Americans with IBS, it is possible that cultural protective effects such as strong family and social support for Asian-Americans (Gwee et al., 2010). This may influence the overall non-significant relationships among symptoms and cognitive beliefs and life impact variables in Asian-American women with IBS in our study.

Interestingly, we found that when bowel pattern subtypes were controlled in the analyses, the observation that percent days of symptom severity (e.g., abdominal pain) differences disappeared with control of bowel predominance between the two groups. Moreover, the strengths of relationships among variables became weaker with maintaining a statistical significance in White-American women. These results may suggest that diet and motility may be key factors.

Our findings are novel for several reasons. First, overall there is little in the literature related to ethnic and racial group characteristics of symptoms in IBS and our data provide the first description of daily symptoms and their impact in Asian-American women with IBS. Second, our findings point to bowel pattern subtype predominance differences between Asian-American women and White-American women. Third, we provide evidence that differences in the prevalence of bowel pattern exist between White-and Asian-Americans may be related to differences in daily symptoms and the relationships of symptoms with cognitive beliefs about IBS and life impact variables.

There are several important limitations to this study. Although age and study design were adjusted to match Asian-Americans and their White counterparts, there may be other confounding factors, such as Asian immigrant or native-born in the U.S. status. Because our study was limited to test racial and ethnic differences other than Asian group self-identification, we did not collect data on whether they were first, second, third or beyond generation Asian-Americans. The causal relationships among the variables could not be determined. Moreover, the small sample size of this study may underestimate the relationships among different variables, and limit the power to test the differences between the two groups. We did not use validated tools to measure cultural factors contributing to symptoms (e.g., diet, cultural health beliefs, health behaviors, cultural competencies, religions, and family support). The study cannot be generalized beyond women. Finally, the underlying biological mechanisms for symptom experiences such as pain perceptions in Asian-American women with IBS was not addressed in this study.

Clinical Implications

Our study provides the useful information for the health care provider (e.g., gastroenterologist and gastroenterology nurses) to understand and manage symptom characteristics for managing Asian-American women with IBS in clinical practice; and points to the need to consider race and ethnicity from a variety of sociocultural backgrounds. The findings could be used to tailor IBS management strategies.

Conclusions

Asian-American women with IBS show differences in symptom characteristics (e.g., bowel pattern subtypes, abdominal pain, intestinal gas, and psychological distress) compared to White-American women with IBS. Moreover, many of the positive and significant relationships of psychological distress with GI symptoms, and of symptoms with negative cognitive beliefs about IBS and life impact variables were shown in White-American women, but not in Asian-American women with IBS. Further studies evaluating cultural-environmental factors using validated instruments to assess cultural factors and health behaviors for Asian-American IBS are needed. Additional studies are suggested to examine underlying pathophysiological mechanisms such as pain perceptions, dietary transitions and genetics for this patient group. Expanding these studies to larger diverse populations and testing culturally-tailored comprehensive self-management intervention for different races/ethnicities are warranted.

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Table 1

Demographic and Irritable Bowel Syndrome Characteristics of Women with Irritable Bowel Syndrome between Asian-Americans and White-Americans

	Asian-Americans	White-Americans	<i>p</i>
Age in years, mean (standard deviation)	38 (15.0)	38 (14.0)	.951
Married/Partnered, n (%)	8 (38.1)	27 (42.8)	.801
College graduate, n (%)	17 (80.9)	43 (68.2)	.403
Income \$ 60,000, n (%)	10 (47.6)	32 (50.8)	.611
Predominant bowel pattern with Rome II and III criteria, n (%)			
Constipation	3 (14.3)	17 (27.0)	.022
Diarrhea	5 (23.8)	30 (47.6)	
Mixed	7 (33.3)	7 (11.1)	
Unknown	6 (28.6)	9 (14.3)	
Health History, n (%)			
Abuse history	4 (19.0)	10 (15.9)	.999
Self-medications ^a	7 (33.3)	10 (15.9)	.578
Utilization of oriental medicine	6 (28.6)	16 (23.8)	.789
Mental disorders by using the Composite International Diagnostic Interview (CIDI), n (%)			
Major depression disorder (MDD)	2 (9.5)	6 (7.2)	.999
General anxiety disorder (GAD)	2 (9.5)	10 (15.9)	.721

Note: *p* = 2-group comparison women with irritable bowel syndrome between Asian-Americans (N = 21) vs. Whites-Americans (N = 63).

^a antidepressant (serotonin selective reuptake inhibitor, tricyclic acid), herbal and dietary supplement. *p* < .05.

Table 2

Percent of Days with Moderate/Severe Symptoms of Women with Irritable Bowel Syndrome between Asian-Americans and White-Americans

Mean (standard deviation)	Asian-Americans N = 21	White-Americans N = 63	<i>p</i>
Lower Gastrointestinal Symptoms			
Abdominal pain	30.1 (24.8)	36.9 (24.9)	.055
Abdominal pain after eating	19.9 (18.1)	28.8 (27.4)	.068
Intestinal gas	28.1 (28.1)	36.5 (31.3)	.075
Bloating	32.8 (25.5)	32.4 (29.8)	NS
Constipation	23.3 (26.4)	22.9 (24.2)	NS
Diarrhea	15.7 (24.6)	13.1 (19.2)	NS
Upper Gastrointestinal Symptoms			
Heart burn	5.6 (13.6)	4.6 (12.8)	NS
Nausea	7.1 (8.7)	6.9 (15.8)	NS
Stomach pain	16.1 (17.4)	18.2 (22.6)	NS
Daily Psychological Distress			
Depression	6.9 (14.0)	7.6 (14.8)	.117
Anxiety	13.6 (19.3)	18.9 (21.2)	.113
Stressed	21.6 (28.9)	27.6 (27.5)	NS
Fatigue	33.6 (29.9)	30.7 (26.1)	NS
Sleepiness	23.9 (21.2)	25.6 (23.8)	.065
Sum of score	19.9 (22.4)	23.9 (24.3)	.094

Note: NS= not significant ($p \geq .20$). p = 2-group comparison women with irritable bowel syndrome between Asian-Americans vs. White-Americans. $p < .05$.

Relationships of Gastrointestinal Symptoms with Psychological Distress of Women with Irritable Bowel Syndrome between Asian-Americans and White-Americans

Table 3

	Pain ^a	Pain after eating ^a	Intestinal gas	Bloating	Constipation	Diarrhea	Heart burn	Nausea	Stomach pain
Depression	AA -.15	-.29	.67*	.54*	.29	.47	-.04	-.01	-.02
	WA .21*	.26*	-.03	.27*	.32	-.01	.33*	.43*	.15
Anxiety	AA -.07	-.19	.57*	.59*	.06	.41	-.17	.27	-.01
	WA .17	.29*	-.04	.17	.45*	.01	.11	.33*	.17
Stressed	AA .37	.03	.59*	.81*	.52*	.33	.28	.56*	.34
	WA .28*	.38*	.17	.18	.32*	-.02	.16	.39*	.24
Fatigue	AA .72*	.47	.64*	.75*	.25	.14	.49*	.47	.13
	WA .31*	.34*	.27	.35*	.47*	-.01	.57*	.32*	.18
Sleepiness	AA .48*	.56*	.53*	.61*	-.05	-.15	.35	.27	-.26
	WA .26*	.33*	.21	.30*	.40*	.10	.44*	.29*	-.03
Sum of scores	AA .42	.22	.16	.06	.39	.23	.35	.58	.39
	WA .25*	.45*	.31*	.27	.48*	.02	.41*	.21	.19

Note: AA = Asian-American (N = 21) & WA = White-American (N = 63) women with irritable bowel syndrome. Diary symptom data were percent of days with moderate/severe.

^a abdominal pain.

* $p < .05$ (partial Pearson correlation r controlling for diary versions).

Relationships of Gastrointestinal Symptoms with Cognitive Beliefs about IBS and Life impact variables of Women with Irritable Bowel Syndrome between Asian-Americans and White-Americans

Table 4

	Abdominal pain	Abdominal pain after eating	Intestinal gas	Bloating	Constipation	Diarrhea	Heart burn	Nausea	Stomach pain
Cognitive Beliefs about Irritable Bowel Syndrome (higher scores indicate more negative cognitions)									
Asian-Americans	.17	.34	.06	-.03	.43	.42	.01	.37	.35
White-Americans	.36*	.45*	.20	.04	.33*	.31*	.14	.33*	.28*
Life Interferences Impact on Normal Daily Activity									
Asian-Americans	.47*	.32	.04	-.23	.05	-.01	.02	.50*	.40
White-Americans	.66*	.48*	.77*	.57*	.42*	.43*	.33*	.39*	.71*
Health Related Quality of Life									
Asian-Americans	-.11	-.08	.14	.43	-.36	-.37	.07	-.38	-.17
White-Americans	-.44*	-.46*	-.25*	-.16	-.35*	-.24*	-.06	-.32*	-.37*

Note: Asian-American women with irritable bowel syndrome (N = 21), White-American women with irritable bowel syndrome (N = 63). Diary symptom data were percent of days with moderate/severe.

* $p < .05$ for partial Pearson correlation r controlling for diary versions.

Table 5

Relationships of Psychological Distress with Cognitive Beliefs about IBS and Life impact variables of Women with Irritable Bowel Syndrome between Asian-Americans and White-Americans

	Depression	Anxiety	Stressed	Fatigue	Sleepiness	Sum of scores
Cognitive Beliefs about Irritable Bowel Syndrome (higher scores indicate more negative cognitions)						
Asian-Americans	.25	.13	.14	.19	.37	.42
White-Americans	.21	.16	.32	.23*	.22*	.15
Life Interferences Impact on Normal Daily Activity						
Asian-Americans	-.12	.13	.32	.26	.02	.47
White-Americans	.42*	.49*	.42	.45*	.45*	.23
Health Related Quality of Life						
Asian-Americans	.20	.38	.33	.07	.13	-.56
White-Americans	-.12	-.19	-.12	-.29*	-.35*	-.29*

Note: Asian-American women with irritable bowel syndrome (N =21), White-American women with irritable bowel syndrome (N = 63). Diary symptom data were percent of days with moderate/severe.

* $p < .05$ for partial Pearson correlation r controlling for diary versions.