

*Short Communication*

## Irritable bowel syndrome in adults over 35 years in Shiraz, southern Iran: prevalence and associated factors

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**Abstract**

**BACKGROUND:** The symptoms of irritable bowel syndrome (IBS) are common in the general population. The aim of this population-based study was to determine the prevalence of IBS and describe the associated factors including demographic, life style and health-seeking behaviors in Shiraz city, southern Iran.

**METHODS:** From April to September 2004, 1978 subjects aged > 35 years old completed a validated and reliable questionnaire on IBS.

**RESULTS:** The prevalence rate of IBS was 10.9%, higher in females, in 35-44 years old age group and among subjects eating fast food (14.1%) but was lower in those taking more fruits and vegetables (10.5%). The occurrence of anxiety, nightmare and restlessness was also significantly higher in subjects with IBS. It had an association with psychological distress and recurrent headaches but not with drinking tea/coffee, smoking or physical activity.

**CONCLUSIONS:** In our area, IBS was correlated with gender, age, psychological distress, recurrent headaches and consumption of fast foods that necessitate health planning programs by health policy makers.

**KEYWORDS:** Irritable Bowel Syndrome, Prevalence, Demography, Life Style, Health Behavior.

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Irritable bowel syndrome (IBS) comprises 40% of outpatient consultations<sup>1</sup> and 15% of adults in western countries.<sup>2</sup> In US, IBS accounts for 3.5 million annual visits, costing about 8 billion USD.<sup>3</sup>

IBS, a gastrointestinal disorder with key pathophysiological features of disordered gut motility and visceral sensitivity, is usually painful and disabling.<sup>4</sup> It is associated with major psychological and psychiatric elements<sup>5</sup> and is characterized by abdominal pain and

disturbed defecation.<sup>3</sup> Symptoms are common in general population but a minority of patients may receive a doctor's advice.<sup>6,7</sup>

IBS is a chronic widespread disease often with severe consequences.<sup>8</sup> Persons with IBS usually demonstrate impaired health-related quality of life<sup>9-11</sup> affecting the patient's every day life.<sup>12-14</sup> At five-year follow-ups, 5% reported complete and about 30% partial recovery.<sup>15</sup> Women are affected more and in 50% of patients, symptoms start before 35 years of age

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while almost all report symptoms onset before they are 50.<sup>16</sup> Here, we investigated the prevalence of IBS and the associated factors in Shiraz, southern Iran. We have previously reported the prevalence of gastroesophageal reflux disease (15.4%)<sup>17</sup> and subjective lactose intolerance (28.4%)<sup>18</sup> in this population.

## Methods

From April to September 2004, using cluster random sampling method, 3600 subjects were enrolled based on postal code divisions of 17 districts in Shiraz, southern Iran. Each subject was invited to refer to Mottahari Clinic of Gastroenterohepatology Research Center affiliated to Shiraz University of Medical Sciences. The study received the approval from institution's Ethics Committee and a written consent was provided from each participant. Then, 1978 subjects that were of both genders, older than 35 years and from both urban and rural areas completed the questionnaire. The questionnaire had four sections of demographic factors, lifestyle, symptoms of IBS, and health-seeking behavior and a gastroenterologist completed the clinical questions. The reliability and validity of the questionnaire were calculated by inviting 100 subjects for a further interview. Rome II criteria were applied to identify IBS subjects.<sup>19</sup> IBS was defined as abdominal pain recurring over a period of more than three months in the prior year with symptoms described by Tally et al.<sup>20</sup> The variables were age, gender, habitat, marital status, educational level, BMI (weight in kg in the fasting state divided by the square of the height in meters resulting in five categories of thin [18 kg/m<sup>2</sup>], normal [18-24.9 kg/m<sup>2</sup>], overweight [25-29.9 kg/m<sup>2</sup>], obese [30-40 kg/m<sup>2</sup>] and very obese [40 kg/m<sup>2</sup>]), physical activity (at least 30 min/week or sufficient to produce adequate sweating), dietary habits, cigarette smoking, alcohol, coffee and tea consumption, and the use of aspirin and NSAIDs. Rural and urban residence areas were defined by the size of the habitat region (under 30000 inhabitants vs. 30000 inhabitants or more). Statistical analysis

was performed using SPSS software (version 11.5) and two-sided Chi-Square test. A *p* value less than 0.05 was considered significant.

## Results

The response rate was 54.9%. The mean age of subjects was 49.90 ± 11.14 years among whom, 39.7%, 29.7%, 17.2% and 13.5% of the participants were respectively in 35-44, 45-54, 55-64 and > 65 years age groups; 56.6% lived in urban regions; 29.4% were male and 21.2%, 31.2%, 38.1% and 9.5% of the subjects were illiterate, or with primary, high school and university educational levels, respectively. The reliability of the questionnaire was 82% while the validity was 70%.

The prevalence rate of IBS was 10.9% (215 subjects). The IBS patients included 82 subjects (38.1%) with mild, 81 (37.7%) with moderate and 37 (17.2%) with severe disease, while in 15 patients (7.0%), the severity was unknown. Table 1 demonstrates the prevalence regarding demographic data, showing that IBS was more prevalent in 35-44 years old age group (13.28%, *p* = 0.013) and females (12.7%, *p* = 0.001). IBS was correlated with psychological distress (23.5%, *p* = 0.001) and recurrent headaches (21.4%, *p* = 0.001), but had no association with education, habitat, marital status, or BMI.

Table 2 depicts the prevalence of IBS according to dietary habits and life style. The results denotes to a higher prevalence in subjects consuming fast food (14.1%, *p* = 0.007) but a lower prevalence in those taking more fruits and vegetables (10.5%, *p* = 0.027). IBS had no correlation with drinking tea/coffee, smoking, physical activity or taking aspirin/NSAID.

Subjects with IBS restricted their diets (16.1%, *p* = 0.001), used herbal therapies (14.6%, *p* = 0.001) and over-the-counter (OTC) medicines (19.4%, *p* = 0.001), consulted with physicians (18.7%, *p* = 0.001), and consumed medication recommended by their friends (17.6%, *p* = 0.001). They significantly experienced more anxiety (15.3%, *p* = 0.001), nightmare (18.1%, *p* = 0.001) and restlessness (14.5%, *p* = 0.001; Table 3).

**Table 1.** Prevalence of IBS according to different characteristics of subjects in Shiraz, southern Iran (n = 1978)

Characteristics		IBS		P value
		No	Yes	
Gender	Male	655 (92.4)	54 (7.6)	0.001
	Female	1108 (87.3)	161 (12.7)	
Age (years)	35-44	637 (86.8)	97 (13.2)	0.013
	45-54	574 (88.9)	72 (11.1)	
	55-64	314 (91.5)	29 (8.5)	
	> 65	236 (93.3)	17 (6.7)	
Habitat	Urban	1097 (88.3)	146 (11.7)	0.102
	Rural	658 (90.6)	68 (9.4)	
Marital status	Single	55 (88.7)	7 (11.3)	0.259
	Married	1558 (89.5)	182 (10.5)	
	Other	147 (85.5)	25 (14.5)	
Education	Illiterate	379 (90.5)	40 (9.5)	0.057
	Primary school	559 (90.9)	56 (9.1)	
	High school	650 (86.7)	100 (13.3)	
	University	169 (89.9)	19 (10.1)	
BMI	Thin	16 (94.1)	1 (5.9)	0.281
	Normal	565 (89.3)	68 (10.7)	
	Overweight	772 (89.4)	92 (10.6)	
	Obese	397 (88.8)	50 (11.2)	
Psychological distress	Very obese	10 (71.4)	4 (28.6)	0.001
	No	1701 (89.7)	196 (10.3)	
	Yes	62 (76.5)	19 (23.5)	
Recurrent headache	No	1620 (90.2)	176 (9.8)	0.001
	Yes	143 (78.6)	39 (21.4)	

## Discussion

Our prevalence rate is consistent with the findings of Halder et al in UK who reported a prevalence of 10.5%.<sup>21</sup> Jones and Lydeard also showed a 10-20% prevalence in adult general population aged 20-90 in southern England.<sup>6</sup> In Denmark, the prevalence ranged from 5 to 65%.<sup>15</sup> IBS prevalence was 12.1% in Canada,<sup>22</sup> 14% in Pakistan,<sup>23</sup> and 16.8% in South Korea.<sup>24</sup> In France in subjects aged  $\geq 18$  years old, a prevalence of 1.1% was reported.<sup>25</sup> The wide range of prevalence rates may be the consequence of cultural differences<sup>26</sup> as well as different methodologies.<sup>24</sup> In our study, gender, age, psychological distress, and recurrent headaches were correlated factors. Female to male ratios varied from 1:1 to  $> 2:1$  throughout different reports.<sup>27</sup> Han et al<sup>28</sup> noticed that gender had no significant relation with IBS prevalence, Jafri et al<sup>23</sup> reported a higher

prevalence in 16-30 years old men and we found more prevalence in females which is in agreement with Park et al study.<sup>24</sup> Similar trends were observed in France with a female to male ratio of 2.3.<sup>25</sup> The differences in physiological sex-related status and in the autonomic and perceptual response to stress and pain may be responsible for variations in prevalence.<sup>29</sup> Factors influencing gender differences include the sex role, response to behavioral stress, menstrual cycle, and affective symptoms.<sup>30</sup> Men and women with IBS vary in activating brain networks of cognitive and autonomic responses to deliver and anticipate aversive visceral stimuli.<sup>27</sup> Among our participants, the prevalence decreased as the age increased and the disease was more common in the youngest age group. Similarly, IBS prevalence was higher among Korean subjects in their 20's.<sup>28</sup> Ruigómez et al<sup>31</sup> noticed more

**Table 2.** Prevalence of IBS according to dietary habits and lifestyle of subjects in Shiraz, southern Iran (n = 1978)

Life style		IBS		P value
		No	Yes	
Pickle consumption	No	476 (87.5)	68 (12.5)	0.157
	Yes	1287 (89.7)	147 (10.3)	
Fried food	No	119 (92.2)	10 (7.8)	0.239
	Yes	1644 (88.9)	205 (11.1)	
Fast food	No	1324 (90.3)	143 (9.7)	0.007
	Yes	439 (85.9)	72 (14.1)	
Fiber (fruit and vegetables)	No	79 (82.3)	17 (17.7)	0.027
	Yes	1684 (89.5)	198 (10.5)	
Cigarette	No	1577 (88.9)	197 (11.1)	0.321
	Yes	186 (91.2)	18 (8.8)	
Water pipe	No	1523 (89.6)	177 (10.4)	0.106
	Yes	240 (86.3)	38 (13.7)	
Tea	No	698 (88.5)	91 (11.5)	0.440
	Yes	1065 (89.6)	124 (10.4)	
Coffee	No	1737 (89.2)	210 (10.8)	0.343
	Yes	26 (83.9)	5 (16.1)	
Physical activity	No	1115 (88.8)	140 (11.2)	0.591
	Yes	648 (89.6)	75 (10.4)	
Aspirin	No	1584 (89.1)	194 (10.9)	0.859
	Yes	179 (89.5)	21 (10.5)	
NSAID	No	1310 (89.9)	147 (10.1)	0.062
	Yes	453 (86.9)	68 (13.1)	

**Table 3.** Health-seeking behavior of subjects with IBS in Shiraz, southern Iran (n = 1978)

Health-seeking behavior		IBS		P value
		No	Yes	
Restricting diet	No	1179 (66.9)	103 (47.9)	0.001
	Yes	584 (33.1)	112 (52.1)	
Herbal medicine intake	No	1139 (64.6)	108 (50.2)	0.001
	Yes	624 (35.4)	107 (49.8)	
Medication advised by friends and relatives	No	1707 (96.8)	203 (94.4)	0.001
	Yes	56 (3.2)	12 (5.6)	
Using over-the-counter drugs	No	1480 (83.9)	147 (68.4)	0.001
	Yes	283 (16.1)	68 (31.6)	
Consulting a physician	No	1219 (69.1)	90 (41.9)	0.001
	Yes	544 (30.9)	125 (58.1)	
Reporting anxiety	No	783 (44.4)	38 (17.7)	0.001
	Yes	980 (55.6)	177 (82.3)	
Reporting nightmare	No	1315 (74.6)	116 (54.0)	0.001
	Yes	448 (25.4)	99 (46.0)	
Reporting restlessness	No	710 (40.3)	37 (17.2)	0.001
	Yes	1053 (59.7)	178 (82.8)	

prevalence in young and middle-aged population. In Nigeria, however, IBS was significantly associated with the increase of age.<sup>32</sup>

Habitat had no significant relation with occurrence of IBS in our study which is identical to Jafri et al<sup>23</sup> who reported IBS in both urban

and suburban communities in Pakistan. While we found no correlation with educational status, Celebi et al<sup>33</sup> pointed out that IBS was higher in illiterate persons and lower in those with university degree. In another study, education was correlated with IBS prevalence.<sup>34</sup>

We observed a significantly higher prevalence of psychological distress in subjects with IBS. Moreover, IBS was more in subjects with anxiety, nightmares and restlessness (Table 3). In Nicholl et al<sup>35</sup> study, anxiety and sleep problems were independent predictors of IBS onset. According to Secondufo et al,<sup>36</sup> 50% of IBS patients described a stressful job and family disease, while IBS was significantly associated with depression in Nigeria.<sup>32</sup>

IBS was more prevalent in subjects with recurrent headaches (21.4%). This is consistent with the study by Si et al<sup>37</sup> where 29.0% of IBS patients presented with headache. Similarly, complaint of headache was significantly more frequent in patients with IBS.<sup>38</sup>

With regards to dietary habits and life style of our subjects, IBS was significantly more in those who ate fast food but less common in the group with fruits and vegetables intake. The high fat content of fast foods, the spices used, and beverages typically consumed along with these foods, might explain this correlation. On the other hand, consumption of fruits and vegetables which have high fiber-contents seems to play a protective role in IBS. We found no correlation between IBS and pickle consumption, fried foods, cigarette or water-pipe smoking, tea or coffee consumption, and physical activity.

We observed a significant relationship between IBS symptoms and consulting a physician (58.1%). In France, 83.7% of IBS patients consulted a health-care practitioner for their condition<sup>25</sup> whereas in Malaysia, 13.1%

consulted their physician.<sup>38</sup> Ringström et al found that mental health and poor social, emotional and physical functioning were independent predictors of being a healthcare seeker while mild symptoms and ability to control symptoms were reasons for not seeking healthcare.<sup>39</sup> Moreover, our IBS patients restricted their diets, took herbal medicine, used over-the-counter (OTC) drugs, and consumed medication recommended by their friends. According to Tan et al,<sup>38</sup> 20.2% of IBS patients reported self-medication. In another study, 50% had sought alternative care or advice from friends and/or relatives.<sup>39</sup>

### Conclusions

Prevalence of IBS defined by ROME II criteria was 10.9% in Shiraz, southern Iran, higher in females, younger individuals, consumers of fast food, and in subjects with psychological distress and recurrent headaches. There was no association between IBS and drinking tea/coffee, smoking or physical activity. Our results may help health policy makers in the area with their health programs.

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### Conflict of Interests

Authors have no conflict of interests.

### Authors' Contributions

MSF carried out the design and finalized the article. FK and DM prepared the manuscript and supervised the study. MN and MB participated in data collection. STH analyzed the data. AM participated in the design of the study. MS and NZ designed the questionnaire. All authors have read and approved the content of the manuscript.

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