Obesity and Functional Constipation; a Community-Based Study in Iran

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Abstract

Background: Many factors have been linked to the occurrence of constipation, but few studies exist regarding the link between obesity and constipation. The aim of this study was to assess the association between body mass index (BMI) and functional constipation in the Iranian community. **Methods:** From May 2006 to December 2007, a cross sectional study was conducted in the Tehran province and a total of 18,180 adult persons were drawn up randomly. One questionnaire was filled in two stages through interviews. In the first part, personal characteristics and 11 gastrointestinal symptoms were listed. Those who reported at least one of these 11 symptoms were referred for the second interview. The second part of the questionnaire consisted of questions about different gastrointestinal disorders based on the Rome III criteria including functional constipation. **Results:** 459 adult persons were found to have functional constipation. The mean±SD of BMI was 26.5±4.7 and 60% of the patients had a BMI more than 25. Age and education were significantly associated factors with obesity, showing that older patients and less educated patients were more overweight and obese. Smoking, marital status and sex were not significantly associated with obesity but, up to 60% of low educated women who had functional constipation, had a BMI more than 25. **Conclusions**: Our study showed that about 60% of patients with functional constipation were overweight, which was more than the mean of our community. In addition there may be an association between higher BMI level and the low education level with constipation in Iranian women.

Key words

Obesity – functional constipation – Iranian community

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Introduction

The prevalence of obesity is increasing worldwide. Obesity is a major health problem in Iran [1]. Although the potential role of obesity in gastrointestinal symptoms is unclear, it is possible that gastrointestinal disorders and obesity have more in common than merely high population prevalence rates. Functional gastrointestinal disorders are hypothesized to be a result of an initial inflammatory insult to the gastrointestinal tract that modifies visceral sensitivity and/or motility [2]. Obesity may therefore increase the risk of functional gastrointestinal disorders due to the release of proinflammatory cytokines. Epidemiologic data indicate that obesity is associated with a wide range of chronic gastrointestinal complaints, many of which overlap with functional gastrointestinal disorders such as irritable bowel syndrome (IBS) or dyspepsia [3-7].

Constipation is a common problem and affects between 2% and 28% of the general population [8-11].

Constipation is an important public health issue because of its impact on patient well-being and productivity, in addition to the costs of medical consultation [12]. It appears that environmental factors play an important role in the etiology of constipation. The relationship of constipation with lifestyle behaviors such as an unhealthy diet, smoking, excessive alcohol consumption, and lack of exercise has also been investigated [13, 14]; however, only one investigator has reported an association between obesity and constipation in adults [15] and others have studied this association in obese children [16, 17].

The aim of the present study was to evaluate the association between obesity and functional constipation so the results could reveal new insights into the relation between patients' BMI and their symptoms.

Methods

This study was part of a cross-sectional household survey conducted from May 2006 to December 2007 in Tehran province, Iran, which was designed to find the prevalence of gastrointestinal symptoms and disorders and their related factors [18, 19]. A total of 18,180 adult persons were drawn

up randomly. Sampling strategy was on the basis of the list of postal codes and systematic samples of these postal codes and their related addresses were drawn from the databank registry of Tehran central post office. Trained health personnel from each corresponding local health centre were sent to each selected house of all these 18,180 individuals, door-to-door and face-to-face, and then they were asked to participate in the first interview according to the first part of our questionnaire. Before the interview survey, the interviewer explained the purpose of these questions to all eligible individuals and requested their participation. The research protocol was approved by the Ethics Committee of the Research Center for Gastroenterology and Liver Diseases, Shaheed Beheshti Medical University.

The questionnaire comprised two parts. The first part which was filled out by trained health personnel, consisted of questions about personal and family characteristics such as age, sex, occupation, educational level, and household income. In addition, interviewers asked them regarding 11 gastrointestinal symptoms (yes or no) including abdominal pain or distress, constipation, diarrhea, bloating, heartburn, acid regurgitation, proctalgia, nausea and vomiting, fecal incontinence, existence of blood in the stool or black stool (melena), weight loss or anorexia, and difficulty in swallowing. Those who reported at least one of these 11 gastrointestinal symptoms were selected for participation in the second interview. The second part of the questionnaire consisted of questions about functional bowel disorders (including functional constipation, functional diarrhea, IBS, functional bloating, etc.) on the basis of Rome III criteria. The Rome III criteria were translated and standardized for Persian language. Test–retest reliability of the Persian version of the questionnaire was good and Cronbach's values were all higher than 70% for all major symptoms and disorders but some minor corrections were made after the pilot testing.

According to the Rome III criteria, constipation was defined as the presence of at least one or two of the upcoming symptoms, for at least three months, with the onset at least six months preceding this study.

1. Straining during in at least 25% of defecations (at least often).

2. Lumpy or hard stools in at least 25% of defecations (at least often).

3. Sensation of incomplete evacuation in at least 25% of defecations (at least sometimes).

4. Sensation of anorectal obstruction/blockage in at least 25% of defecations (at least sometimes).

5. Manual maneuvers to facilitate in at least 25% of defecations (e.g., digital evacuation, support of the pelvic floor) (at least sometimes).

6. Fewer than three defecations per week (at least often).

Using the equation of BMI=weight (kg)/height square (m^2), BMI was calculated. For this study, the BMI was further grouped into three categories: "being underweight and normal weight" was established when the BMI was less than 25 kg/m^2; "being overweight" was defined as a BMI between 25 and 29.9 kg/m^2; and "being obese," as a BMI $\geq$ 30 kg/m^2. These definitions are consistent with the recommendations of the World Health Organization [20].

Some demographic and clinical variables including sex (male/female), age, marital status (single, married, widow), education (less than high school, upper high school), tobacco smoking (non-smokers, and current-smokers of cigarettes, cigars, or pipes) were included in the analysis.

All statistical analysis was carried out using SAS version 9.1. ANOVA was used to compare the means of continuous variables and Pearson's chi-square and contingency tables were performed to test the independence between discrete classifications variables. A P-value of 0.05 or less was considered statistically significant and all reported P values were two sided.

Results

Of the 18,180 subjects, a total of 2,790 participants had at least one gastrointestinal symptom (15.3%). BMI was measured for 2,547 participants and the mean±SD of BMI was 25.95±4.87 (due to some domestic problems the interviewers were unable to measure BMI in up to 90% of participants). Table I shows the relationship between obesity and individual symptoms from the first interview in these 2,790 participants indicating a significant association between BMI and bloating, heartburn, nausea and vomiting, weight loss and incontinence.

A total of 459 adult persons were found to have functional constipation based on Rome III criteria in second interview. The mean±SD age was 47.3±15.8 and 70% of patients were female. 18% of the constipated patients had a history of gastrointestinal medication use, among them 12 patients with history of using laxative drugs including Lactulose, Bizacodyl, Sorbitol and Syr.Mom. The percentage of constipated patients with a history of abdominal surgery was 40% (24% in men and 45.2% in women) and in women with history of abdominal surgery the most frequent surgery was cesarean section. From the total of constipated patients, the BMI was measured for 386 patients. The mean±SD of BMI was 26.5±4.7. Up to 60% of patients had BMI more than 25 (40% being overweight and 20% being obese). Table II indicates the relation between BMI and demographic factors. Age and education were significant associated factors with obesity, showing that older patients and less educated patients had a tendency to be overweight and obese.

Smoking, marital status and sex were not significant but up to 60% of women with low education (less than high school) who had functional constipation had BMI more than 25, whereas highly educated women, only 43.3%, had BMI more than 25 ($P<0.001$).

Table III indicates the distribution of symptoms and clinical factors with BMI consisting of functional constipation symptoms, abdominal pain and history of abdominal surgery. No significant associations were observed between clinical factors and obesity.

Table I. Gastrointestinal symptoms and body mass index

Individual symptoms (%)	Body mass index (kg/m^2)			P value
	<25 (n=1158)	25-30 (n=959)	≥30 (n=430)	
	Mean±SD:22.01±2.6	Mean±SD:27.25±1.4	Mean±SD:33.67±3.7	<0.001
Abdominal pain	484 (41.8%)	374 (39%)	169 (39.3%)	0.38
Constipation	468 (40.4%)	373 (38.9%)	175 (40.7%)	0.72
Diarrhea	98 (8.5%)	86 (9%)	35 (8.1%)	0.85
Bloating	628 (54.2%)	561 (58.5%)	268 (62.3%)	0.009
Heartburn	630 (54.4%)	580 (60.5%)	225 (52.3%)	0.04
Anal pain	154 (13.3%)	150 (15.6%)	72 (16.7%)	0.14
Anal bleeding	65 (5.6%)	64 (6.8%)	27 (6.3%)	0.54
Nausea and vomiting	107 (9.2%)	59 (6.2%)	42 (9.8%)	0.01
Weight loss	155 (13.4%)	65 (6.8%)	26 (6%)	<0.001
Dysphagia	62 (5.4%)	43 (4.5%)	33 (7.7%)	0.05
Incontinence	15 (1.3%)	14 (1.5%)	14 (3.3%)	0.02

Table II. Demographic factors and BMI in patients with functional constipation

Demographic factors (%)	Body mass index (kg/m^2)			P value
	<25 (n=157)	25-30 (n=156)	≥30 (n=73)	
	Mean±SD:22.36±1.9	Mean±SD:27.35±1.4	Mean±SD:33.73±3.5	<0.001
Sex				
Female	116 (75%)	109 (70%)	58 (80%)	0.29
Age				
Mean age (SD)	43.5 (16.9)	48.1 (14.2)	50.9 (13.8)	0.001
15-35 years	57 (36.3%)	29 (18.6%)	10 (13.7%)	0.001
36-60 years	74 (47.1%)	96 (61.5%)	49 (67.1%)	
>60 years	26 (16.6%)	31 (20%)	14 (19.2%)	
Marital status				
Married	113 (75%)	119 (78%)	55 (70%)	0.66
Education				
Less than high school	123 (81%)	137 (89%)	68 (93%)	0.02
Smoking				
Current smoker	18 (12%)	18 (12%)	10 (14%)	0.87

Discussion

We studied the association between BMI and functional constipation in the Iranian community. From the first interview the prevalence of gastrointestinal symptoms was 15.3% which conforms with a similar previous study in northwestern Iran where it was reported that the prevalence rate of at least one or more gastrointestinal symptoms was 14.3% [21]. In addition a significant association was found between obesity and gastrointestinal symptoms including bloating, heartburn and nausea vomiting. Some recent studies have reported that obesity was independently associated with heartburn [3, 4], bloating [4] and nausea vomiting [6]. Although no significant association was found between the self report of constipation and BMI in the first interview, our study observed a greater percentage of obese individuals with functional constipation according to Rome III criteria than in normal BMI individuals. In contrast, no significant relationship was observed between BMI and constipation in other studies, although constipation was somewhat more frequent in obese patients [4-6]. These findings from the western population may appear to be surprising, as constipation has been historically linked with sedentary lifestyles. In Iranian women, as women in developed countries, the level of education was negatively related to BMI, while in men the association was positive [22]. There may be an association between higher BMI level, low educational state and constipation in Iranian women. Our study showed that in patients with functional constipation about 60% of constipated patients had BMI≥25, which was

Table III. Clinical factors and BMI in patients with functional constipation

Clinical factors (%)	Body mass index (kg/m^2)			P value
	<25	25-30	≥30	
Symptoms				
Fewer than three defecations per week	109 (70%)	101 (65%)	43 (59%)	0.28
Lumpy or hard stools	134 (85%)	135 (86%)	62 (85%)	0.93
Straining	136 (87%)	139 (89%)	68 (93%)	0.34
Sensation of incomplete evacuation	100 (64%)	95 (61%)	43 (59%)	0.76
Sensation of anorectal obstruction/blockage	44 (28%)	37 (24%)	17 (23%)	0.61
Manual maneuvers to facilitate	44 (28%)	46 (29%)	14 (20%)	0.24
Abdominal pain				
Yes	69 (44%)	58 (37%)	30 (41%)	0.47
History of abdominal surgery				
Yes	55 (36%)	66 (42%)	34 (47%)	0.20

more than the mean of our community [23]. The prevalence of obesity and overweight in Iran is as high as in the US. However Iranian women are more obese than American women and Iranian men are less obese than their American counterparts. This discrepancy might be due to the low rate of smoking among Iranian women [24]. Another interesting finding in this study was the high number of patients who had undergone abdominal surgery even though there was no significant relationship observed with obesity. This is due to the fact that a great number of patients were women with a history of a cesarean section. According to statistics from the Ministry of Health and Medical Education, Iranian women are more likely to have cesarean sections and this rate has increased from 35% to 42% [25].

The etiology of constipation in obese people is not clear. Disordered eating patterns such as bingeing have been shown to be an independent contributor to constipation in adults [26]. In addition obese people may eat less fiber or have less physical activity, which could change their defecation pattern [27].

In **conclusion** a clear association between obesity and constipation could be assessed in this study and this association is increased for elderly and less educated people (especially in women). However it might require further studies to explore the underlying factors. The limitation of this study was that we had no healthy people to compare with patients as a control group. Therefore further studies should be carried out in order to find the difference between healthy people and constipated people with obesity.

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Conflicts of interest

None to declare.

References

1. Kelishadi R, Alikhani S, Delavari A, Alaedini F, Safaie A, Hojatzadeh E. Obesity and associated lifestyle behaviours in Iran: findings from the First National Non-communicable Disease Risk Factor Surveillance Survey. Public Health Nutr 2008; 11: 246-251.
2. Bercik P, Verdu EF, Collins SM. Is irritable bowel syndrome a low-grade inflammatory bowel disease? Gastroenterol Clin North Am 2005; 34: 235–245.
3. Van Oijen MG, Josemanders DF, Laheij RJ, van Rossum LG, Tan AC, Jansen JB. Gastrointestinal disorders and symptoms: does body mass index matter? Neth J Med 2006; 64: 45-49.
4. Delgado-Aros S, Locke GR 3rd, Camilleri M, et al. Obesity is associated with increased risk of gastrointestinal symptoms: a population-based study. Am J Gastroenterol 2004; 99: 1801-1806.
5. Talley NJ, Quan C, Jones MP, Horowitz M. Association of upper and lower gastrointestinal tract symptoms with body mass index in an Australian cohort. Neurogastroenterol Motil 2004; 4: 413-419.
6. Talley NJ, Howell S, Poulton R. Obesity and chronic gastrointestinal tract symptoms in young adults: a birth cohort study. Am J Gastroenterol 2004; 99: 1807-1814.
7. Aro P, Ronkainen J, Talley NJ, Storskrubb T, Bolling-Sternevald E, Agréus L. Body mass index and chronic unexplained gastrointestinal symptoms: an adult endoscopic population based study. Gut 2005; 54: 1377-1383.
8. Higgins PD, Johanson JF. Epidemiology of constipation in North America: a systematic review. Am J Gastroenterol 2004; 99: 750–759.
9. Adibi P, Behzad E, Pirzadeh S, Mohseni M. Bowel habit reference values and abnormalities in healthy adults. Dig Dis Sci 2007; 52: 1810-1813.
10. Corazziari E. Definition and epidemiology of functional gastrointestinal disorders. Best Pract Res Clin Gastroenterol 2004; 18: 613–631.
11. Harris LA. Prevalence and ramifications of chronic constipation. Manag Care Interface 2005; 18: 23–30.
12. Locke GR 3rd, Pemberton JH, Phillips SF. AGA technical review on constipation. Gastroenterology 2000; 119: 1766–1778.
13. Campbell AJ, Busby WJ, Horwath CC. Factors associated with constipation in a community based sample of people aged 70 years and over. J Epidemiol Community Health 1993; 47: 23–26.
14. Sandler RS, Jordan MC, Shelton BJ. Demographic and dietary determinants of constipation in the US population. Am J Public Health 1990; 80: 185–189.

15. Pecora P, Suraci C, Antonelli M, De Maria S, Marrocco W. Constipation and obesity: a statistical analysis. Boll Soc It Biol Sper 1981; 57: 2384-2388.
16. Misra S, Lee A, Gensel K. Chronic constipation in overweight children. JPEN J Parenter Enteral Nutr 2006; 30: 81-84.
17. Pashankar DS, Loening-Baucke V. Increased prevalence of obesity in children with functional constipation evaluated in an academic medical center. Pediatrics 2005; 116: e377-380.
18. Zarghi A, Pourhoseingholi MA, Habibi M, Nejad MR, Ramezankhani A, Zali MR. Prevalence of gastrointestinal symptoms in the population of Tehran, Iran. Trop Med Int Health 2007; 12 (suppl); 181-182.
19. Zarghi A, Pourhoseingholi MA, Habibi M, et al. Prevalence of gastrointestinal symptoms and the influence of demographic factors. Am J Gastroenterol 2007; 102 (suppl): 441-441.
20. World Health Organization (WHO): Obesity: preventing and managing the global epidemic. Report of a WHO Consultation on Obesity, Geneva, 3–5 June 1997. Geneva, WHO, 1998.
21. Khoshbaten M, Hekmatdoost A, Ghasemi H, Entezariasl M. Prevalence of gastrointestinal symptoms and signs in northwestern Tabriz, Iran. Indian J Gastroenterol 2004; 23: 168-170.
22. Maddah M, Eshraghian MR, Djazayery A, Mirdamadi R. Association of body mass index with educational level in Iranian men and women. Eur J Clin Nutr 2003; 57: 819-823.
23. Janghorbani M, Amini M, Willett WC, et al. First nationwide survey of prevalence of overweight, underweight, and abdominal obesity in Iranian adults. Obesity (Silver Spring) 2007; 15: 2797-2808.
24. Bahrami H, Sadatsafavi M, Pourshams A, et al. Obesity and hypertension in an Iranian cohort study; Iranian women experience higher rates of obesity and hypertension than American women. BMC Public Health 2006; 6: 158.
25. Ministry of Health and Medical Sciences - Iran Statistic Center, September 2000.
26. Crowell MD, Cheskin LJ, Musial F. Prevalence of gastrointestinal symptoms in obese and normal weight binge eaters. Am J Gastroenterol 1994; 89: 387-391.
27. Van der Sijp JR, Kamm MA, Nightengale JM, et al. Circulating gastrointestinal hormone abnormalities in patients with severe idiopathic constipation. Am J Gastroenterol 1998; 93: 1351-1356.