

Bloating in Iran: SEPAHAN Systematic Review No. 4

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ABSTRACT

Objectives: Bloating is a common and bothersome gastrointestinal symptom. Despite its high prevalence, associated costs, and effects on the quality of life, very few studies have reported the epidemiology of bloating in Iran. Through this systematic review, findings and limitations of the current research will be discussed.

Methods: In March 2012, we searched PubMed, Google Scholar, Scientific Information Database, IranMedex, and Magiran to find articles for inclusion in the study. Two of the authors screened the articles on the basis of titles and abstracts. The full manuscripts of these publications were then evaluated according to the predefined criteria.

Results: Fifteen articles were included in the study, and data regarding the prevalence of bloating were extracted. The studies depict a prevalence of 1.5% to 8.8% for bloating in the Iranian population. Two studies reported the prevalence of functional bloating to be 1.5% and 10% according to the Rome III and Rome II criteria, respectively. Female to male ratio remains ≥ 1 for most of the studies criteria.

Conclusions: In Iran, data on the prevalence of bloating are limited, and have mostly been gathered from a highly selective population. The results of the present study advocate the necessity to perform further studies on the general population, which may help health policy makers in the allocation of the appropriate resources.

Keywords: Bloating, abdominal distension, epidemiology, Iran, systematic review

INTRODUCTION

Bloating is a common and bothersome gastrointestinal symptom that refers to the subjective sensation of "abdominal swelling, or increase in diameter of the abdominal area, usually together with excessive burping, farting, flatus or borborygmi".^[1-4] It usually coexists with other functional and organic gastrointestinal disorders.^[2,3,5,6] Few studies have adequately separated bloating from other functional gastrointestinal disorders (FGIDs), such as functional dyspepsia, functional constipation and irritable bowel syndrome (IBS).^[4,7] Functional bloating is defined as a separate condition, that is dominated by a recurrent feeling of bloating or visible distention, which is not part of another FGID.^[1]

Epidemiologic studies report that bloating symptoms occur in about 10–30% of community-based populations.^[1,2,4,8,9] Bloating is second only to abdominal pain as the most frequently reported symptom in functional bowel disorders.^[5] Most studies published on the mechanisms of bloating have focused on patients with IBS who had consulted their medical practitioners.^[5,10-12] These studies

have suggested that bloating might affect up to 96% of patients with IBS.^[13,14] About 80% of individuals with constipation report bloating, but patients with loose stools may also complain of bloating.^[6] The actual prevalence and incidence of functional bloating, separated from other FGIDs is unknown. As mentioned above, this is because it is very common in clinical practice to see patients with other disorders who also complain of bloating symptoms.

In different studies in the U.S. the prevalence of bloating was 16-21%,^[2,6,12] while in Mexico functional bloating was the second most common functional bowel disorder with a prevalence of 21% among healthy educated volunteers, and was reported to be more frequent in women than in men.^[15] In an Australian population-based study the prevalence of functional bloating was 11.2% and 4.1% according to the Rome I and Rome II criteria, respectively.^[16]

In Iran, very few studies have been carried out on the prevalence of bloating. A study conducted in a hospital in Kashan on day-working and shift-working nurses, reported the prevalence of bloating to be 49%.^[17] Sohrabi et al., reported the prevalence of bloating to be 16.9% in Tehran,^[18] and another study, reported it to be 1.5% in Tabriz.^[19] Two studies in Tehran reported that the prevalence of functional bloating was 1.5% and 10%, according to the Rome III and Rome II criteria, respectively.^[20,21]

Bloating extensively affects the individual's quality of life and is also a financial burden. The rate of work/school absenteeism, physician visits and the use of medication is increased for those with bloating. The majority of the patients suffering from bloating, rate the symptom as moderate to severe in intensity and particularly intrusive, and report that the symptoms influence their daily activities. One quarter of the sufferers report a reduction in their daily activity of $\geq 25\%$ attributable to their symptoms.^[9,12]

Despite the high prevalence, associated personal and economic costs, and effects on the quality of life, very few studies have reported the epidemiology of bloating in Iran. Furthermore, there are few data on the association of bloating with specific FGIDs. The aim of this study was to perform the first systematic review on the

epidemiology of bloating and its association with FGIDs in Iran. In addition, this review provides background knowledge for the "Study on the Epidemiology of Psychological, Alimentary Health and Nutrition" (SEPAHAN).^[22] The data of SEPAHAN will explore the epidemiology of FGIDs in the Isfahan province and will be published later by the same study group.

METHODS

Search Strategy

We performed a systematic review of the current evidence regarding the prevalence of bloating in Iran. Potentially relevant studies to be reviewed were identified via a computer-assisted search of five online electronic bibliographic databases. In March 2012, we searched PubMed, Google Scholar, Scientific Information Database, IranMedex, and Magiran to find both international and Persian articles for inclusion in the study.

The PubMed search query was as follows: (bloating [All Fields] AND "Iran"[All Fields]). The keywords used to search the Google Scholar database were "bloating" and "Iran" combined with "prevalence, rate, proportion, epidemiology, and frequency". The Farsi bibliographic databases including Scientific Information Database (www.sid.ir), IranMedex (www.iranmedex.com), and Magiran (www.magiran.com) were also searched using the keyword "bloating" and its equivalents in Persian.

Moreover, manual searches of reference lists from studies with relevant abstracts, and recent reviews were also carried out to identify potentially overlooked articles.

Study Selection Criteria

Two of the authors screened all the articles identified by the literature search in a duplicate unblinded manner, mainly on the basis of titles and abstracts to include the studies in the analysis. The selected articles were then evaluated in full text format according to the predefined criteria as follows:

- 1- Original research articles; editorial articles and case reports were excluded.
- 2- Full-article publication
- 3- English or Farsi language only

Table 1. Characteristics of studies regarding the epidemiology of bloating in Iran

#	Author	City	Population	Sample Size	Age±SD	Prevalence of bloating (Number)	Female to male ratio
1	Pourhoseingholi et al. ^[25]	Tehran	General population	30334 F:15122(50%)	≥15	7.6% M:6.03%(914) F:9.25%(1339)	1.53
2	Sorouri et al. ^[20]	Tehran	General population	18180 F:9072(49.9%)	38.7±17.0	8.8% Functional bloating: 1.5%	
3	Khoshbaten et al. ^[14]	Tabriz	General population	3983 F:1903(48%)		1.5% (58) M:0.8%(17) F:2%(41)	2.5
4	Honarkar et al. ^[24]	Bam	The injured people of Bam earthquake	737 F:376 (%51)	30±14	19.5% (144)	
5	Saberi and Moravveji. ^[10]	Kashan	Nurses	160 F:117(73%)	37.9	49%	
6	Roshandel et al. ^[21]	Tehran	Outpatient gastroenterology clinic	1023 F: 575 (56.2%)	41.8±16.5	Functional bloating: 10% (102) M:10.5%(47) F:9.5%(55)	0.9
7	Behtash et al. ^[23]	Tehran	Control group in primary healthcare units	100 women	24.8±5.8	3%	
8	Safaei et al. ^[27]	Tehran	Patients with IBS from general population	198 F:139(60%)	>18yr	61.6% (122) M = F	1
9	Khoshkrood et al. ^[28]	Tehran	Patients with IBS from general population	198 F:139(60%)	38.7±17.1	61%	
10	Hoseini-ASL et al. ^[29]	Shahrekord	Patients with IBS from general population	4762 F:2650(56%)	37.9±14.3	Abdominal distension: 45%	
11	Matini and Khammechian ^[30]	Kashan	Patients with IBS	80 F:38(47.5%)	26.5±7	M: 100% F:97%	0.97
12	Hatami et al. ^[31]	Tehran	Blood Donors with IBS	3517 F:402(11.5%)	37.22±10.9	77.3%	
13	Fadai et al. ^[32]	Gorgan	Students with IBS	61 F:39(64%)	Range: 15-19	59%	
14	Majlesi et al. ^[33]	Hamedan	Patients with dyspepsia from general population	2700 F:1400(52%)	27±3.7	69% (339)	
15	Neshandar-asl et al. (34)	Tehran	Patients with dyspepsia undergoing endoscopy	50 F:30(60%)	38.29±12.67	82%	

SD : standard deviation, M:Males, F:Females, IBS: irritable bowel syndrome

- 4- Estimation of bloating prevalence and epidemiology
- 5- Proper diagnosis of bloating with criteria ranging from a symptom questionnaire based on patient's self-report via face-to-face interviews, mail or telephone surveys or a clinician diagnosis, to consensus criteria like the Manning or Rome I,II,III criteria for functional bloating

- 6- Good methodology (proven by experts), with no obvious bias
- 7- Adult age group (inclusion of pediatric patients within the adult study population was allowed)
- 8- Population-based samples recruited from the general population, primary care patients, or individuals undergoing routine health checks or control groups, representative of the general population, in a case controlled study.

Studies were excluded if they were conducted in highly selective populations (e.g., patients with diabetes or pregnant women or women during their menstrual phase).

Data Extraction and Data Analysis

The full manuscripts of all the eligible articles, relevant to the focus of our review were studied by two investigators in detail. Agreement between investigators was greater than 95%, and the few minor disagreements were resolved by consensus. Data regarding the pre-

valence of bloating with female to male ratio, sample size, mean age, first author, study population and the province of the study were extracted, if available.

RESULTS

Characteristics of Selected Studies

The PubMed database returned a list of 12 articles for the selected search string. After having reviewed their titles and abstracts, based on the criteria outlined in the methods section, seven reports were excluded. The full texts of the remaining five studies were read and included in our systematic review.^[17,18,19,21,23] Thirteen articles were selected to be reviewed as full text manuscripts after searching in Scientific Information Database, IranMedex, and Magiran. In addition, 18 articles were found to be suitable for further evaluation via searching Google Scholar. Considering the overlapping articles found in different databases, we reviewed the full manuscripts of 15 articles that met our criteria mentioned in the methods section (Figure 1).

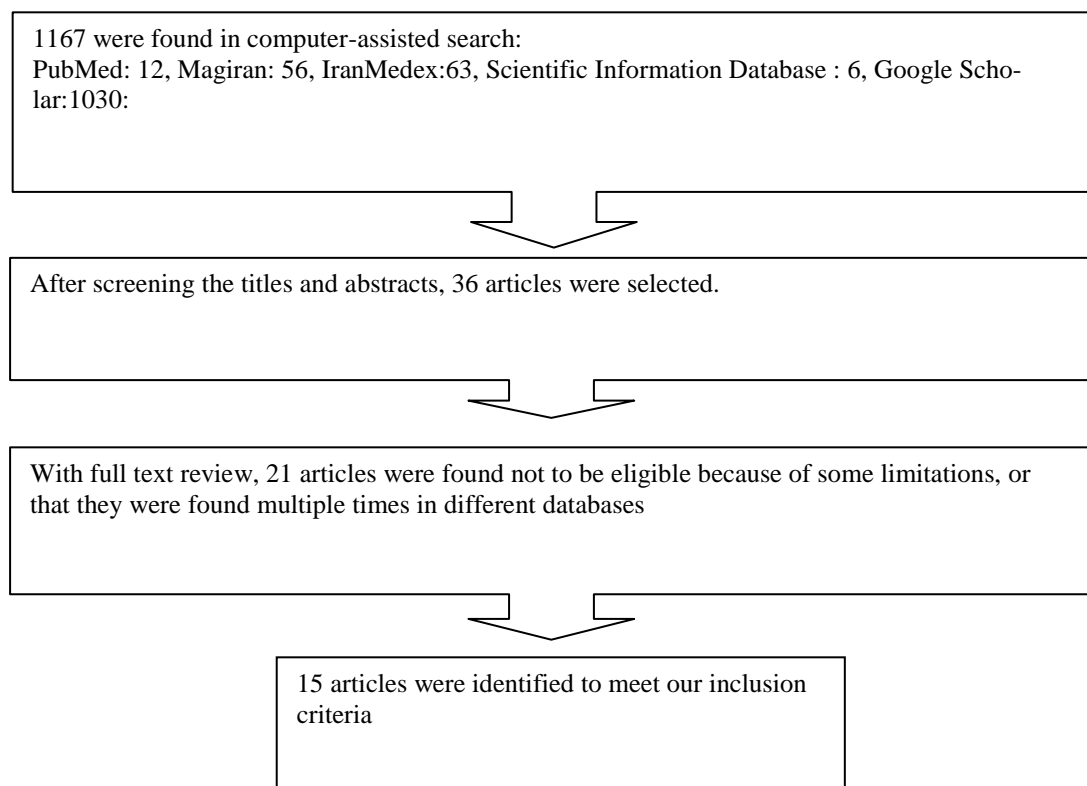


Figure 1. Detailed explanation of the process carried out to include the eligible articles in the final analysis

In Table 1, we have summarized the characteristics of the reviewed studies regarding the prevalence of bloating in Iran in detail without taking into consideration the differences in methodology among the reviewed studies.

Three of these studies had a significantly restricted population and thereby limited generalizability.^[17,23,24] Six studies reported the prevalence of bloating in IBS^[29-34] and two studies estimated the prevalence of bloating in patients with dyspepsia^[35,36]. Two of the studies^[27,28] on the prevalence of bloating among patients with IBS appeared to be describing the same data set as a previous publication by the same authors (included in this review).

Prevalence Estimates

Overall the reviewed studies depict prevalence estimates ranging widely from a low prevalence of 1.5% using the diagnostic criterion of bloating in the last two weeks in the general population of Tabriz^[19] to a high prevalence of 100%^[29] for bloating among male patients with IBS. In these studies, different case definitions of bloating were used, including self-reported bloating, self-reported answers to questions about bloating and clinician diagnosis.

Seven studies have data on the prevalence of bloating in different parts of Iran, with half of the studies reporting the prevalence to be between 7-20%.^[17,19-21,23-25] The mean value of the reported bloating rates was 14.2%. Saberi and Moravveji recorded the highest prevalence rate of bloating in the population of nurses (49%).^[10] Three of these studies were conducted on subjects recruited from the general population, with the mean prevalence of bloating estimated to be 5.96%.^[19,20,25] We calculated the mean values of the prevalence of bloating in Iran by averaging the prevalence obtained in each study.

Eight studies depict bloating prevalence rates in patients with other FGIDs such as IBS and dyspepsia. Two studies reported the prevalence of functional bloating to be 1.5% and 10% according to the Rome III and Rome II criteria^[1], respectively.^[20,21]

Gender Differences in Prevalence of bloating

Female to male ratio was calculated in five

studies and in about half of them the predominance of the female gender in the bloating prevalence was documented. In order to depict the exact magnitude of this association, we present in Table 1 the female/ male ratio, where available. There are differences in the female/male ratio estimates.

DISCUSSION

Our systematic review of the literature has found prevalence estimates for bloating in Iran. The literature review identified 15 studies that reported the prevalence of bloating in Iran, and met the criteria outlined in the methods section. There are three population-based studies reporting the prevalence of bloating in Iran. The prevalence estimates are 1.5% to 8.8%, which is less than that observed in other populations. In Tabriz the prevalence of bloating was 1.5%^[19], which, unlike the two other studies carried out in Tehran^[20,25] that did not have a time limitation for having a gastrointestinal symptom, has enquired about symptoms limited to the two weeks before the survey. This is probably the reason for the low prevalence reported in Tabriz. Other factors, including differences in lifestyle factors and cultural behaviors, may also account for the diversity in the prevalence of bloating estimated in different studies.

Roshandel et al.^[21] reported a higher prevalence of functional bloating according to the Rome II criteria than the prevalence reported in the study conducted by Sorouri et al.^[20] that applied the Rome III criteria for the diagnosis of functional bloating. This may also be due to the different characteristics of the populations studied. Whilst Roshandel et al.^[21] investigated patients referring to an outpatient gastroenterology clinic; Sorouri et al.'s study^[20] was a community-based survey. Moreover, Roshandel et al.^[21] estimated the prevalence of functional bloating employing the Rome II criteria, though the questionnaire used to evaluate this disorder could not exclude bloating related to other gastrointestinal disorders, and this may count for the higher prevalence of functional bloating in this study.

According to the Rome III criteria, bloating is a common feature of IBS and functional dys-

pepsia.^[1] Moreover, there is a considerable overlap of symptoms between these two disorders.^[26] According to the present review, the prevalence of bloating in patients with IBS and functional dyspepsia was 60-100% in different studies, which is not comparable to that of the general population. This finding is consistent with previously published data.^[5] Studies in other countries show a higher prevalence of bloating in patients with constipation,^[35] but in Iran there are no data concerning bloating in constipation.

In a few studies evaluating the female to male ratio of the bloating disorder, prevalence of bloating was higher in women, which is similar to other FGIDs.^[16]

There are few published data concerning the association between demographic factors and the prevalence of bloating in Iran. However, several studies investigated the effect of some demographic factors such as age and education level on gastrointestinal symptoms or disorders. Pourhoseingholi et al. showed that a higher education level and being single decreases the rate of gastrointestinal symptoms.^[25] In a study conducted by Khoshbaten et al. the prevalence of gastrointestinal symptoms increased with age.^[14] However, in another study, gastrointestinal symptoms were higher in those under 40 years of age.^[17] Roshandel et al. showed a peak onset during the 30s for bloating.^[21]

In a study on nurses in a hospital in Kashan, the overall prevalence of bloating was 49%, with no significant differences between shift-working nurses and day-shift nurses.^[17] The high prevalence of bloating in nurses may be due to environmental factors, hospital organization, social factors, insufficient welfare activities, inordinate hours of working, irregularity in the timing of meals or erratic shifts.

Abdominal bloating is a common worldwide complaint in the general population. It is second only to abdominal pain as the most frequently reported symptom in functional bowel disorders.^[27] It is the third most common functional bowel disorder, following functional constipation and IBS.^[21] However, in Iran data on the prevalence of bloating are limited, and have mostly been gathered from specific groups of people. The few studies conducted on the general population in Iran, report the prevalence of

bloating along with other gastrointestinal disorders and there are no studies focusing on the prevalence of bloating alone. Moreover, no study investigated the effect of different risk factors on the prevalence of bloating in Iran. Thus, the pathophysiology and etiology of bloating in Iran remains unknown. There are also few studies on the natural history of bloating, or quality of life in patients with bloating.

Few population-based studies on the economic burden of bloating have been published from developing countries like Iran. The single population-based study on the economic burden of bloating in Iran reported a moderately high impact of bloating on the quality of life, productivity, and waste of resources and a relatively heavy financial burden on the Iranian national health system.^[36]

Considering the effect of bloating on the patient's life, and the lack of epidemiological data on bloating, there is a necessity to perform further studies in the Iranian general population. The results of such studies will be beneficial in the prevention and management of bloating and may help health policy makers in the allocation of the appropriate resources.

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