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Prevalence of Constipation in the General Adult Population

An Integrative Review

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ABSTRACT

Constipation affects multiple aspects of a person's health, including health-related quality of life. It is one of the most frequently reported functional gastrointestinal disorders. The purpose of this integrative review of the literature was to identify research findings pertaining to the prevalence of constipation and factors are associated with constipation in the general population. Electronic databases were searched for articles published between 2005 and 2011. All retrieved studies were evaluated with respect to quality according to the guidelines for critical appraisal of health research literature on prevalence and incidence. Eleven studies were retrieved; they reveal a prevalence of constipation that varied from 2.6% to 26.9%. The most frequently cited associated factors were female gender and advanced age, which were cited in 11 and 7 of the studies, respectively. Prevalence rates reported by the selected studies were heterogeneous. This may be partially attributed to variability in methods used to measure prevalence, including differences in criteria for constipation.

KEY WORDS: constipation, epidemiology, prevalence

Introduction

Constipation is one of the most frequently reported functional gastrointestinal disorders (FGIDs) in the general population. In the 1980s, constipation accounted for 2.5 million physician visits per year in the United States.[1] The approximate annual direct health care costs are approximately $7522 (USD) per patient.[2]

The direct impact of constipation on health-related quality of life (HRQOL) has been highlighted in several studies.[3,4] Various validated instruments have been used to demonstrate that patients with constipation have lower HRQOL when compared to the general population.[3] A multinational survey conducted in 7 countries (France, Germany, Italy, England, South Korea, Brazil, and the United States) that enrolled 2870 participants revealed that constipation resulted in similarly impaired HRQOL scores in each of the countries surveyed.[4]

Constipation is a symptom, not a disease. Causes may be classified as primary and secondary. Primary causes are related to problems inherent to the intestine; they are subdivided into normal-transit constipation, slow-transit constipation, and anorectal dysfunction, according to their pathophysiology. Secondary causes include gastrointestinal disorders (intestinal tumors, stenosis, extrinsic compression, Chagas disease, idiopathic megacolon, intestinal pseudo-obstruction, rectocele, rectal prolapse, anal fissure, irritable bowel syndrome, and colonic inertia), metabolic and endocrine disorders (hyper- and hypocalcemia, diabetes, hyperparathyroidism, and chronic renal insufficiency), neurological conditions (Parkinson's disease, stroke, dementia syndromes, multiple sclerosis, spinal cord injuries, and Hirschsprung's disease), congestive cardiac insufficiency, psychogenic disorders (anxiety and depression), dehydration, and the use of a variety of medications (opioids, anti-inflammatories, calcium channel blockers, calcium and iron supplements, anticholinergics, antipsychotics, and antihistamines).[5] Most cases are attributed to functional disorders without a structural abnormality that could explain the symptoms.

While objective criteria for constipation have been defined, patients define constipation in more subjective terms.[6] For example, clinicians frequently use the Bristol Stool Form Scale to characterize stool consistency. The scale identifies 7 categories, including 2 that are associated with constipation. Type 1 is described as hard lumps, like

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nuts, and type 2 is characterized as sausage-shaped, lumpy stools.[7,8] However, many individuals who regularly pass stools type 1 or 2 do not consider themselves constipated, illustrating the varied symptoms patients perceive as indicating constipation.[5] These differences also may influence findings of epidemiological studies that rely on self-reporting to identify constipation.

A standardized definition of constipation is given in the Rome III Criteria for FGIDs. The Rome criteria, versions I, II, and III, were developed in the 1980s to classify FGIDs based on clinical symptoms. The main differences among the 3 versions are related to the number of symptoms assessed and duration of the observation period. In Rome III criteria[9] (the most recent version), the required symptom frequency has been changed to 25% or greater, which is consistent with other FGIDs criteria. Studies using Rome II criteria yield a lower prevalence than those using Rome I criteria, because the Rome II criteria did not allow for laxative-induced loose stools, an anomaly that has been corrected in the Rome III criteria. According to the Rome III criteria, constipation is defined when 2 or more of the following symptoms are present for the last 3 months with an onset at least 6 months before diagnosis: (1) straining during at least 25% of defecations; (2) lumpy or hard stools in at least 25% of defecations; (3) sensation of incomplete evacuation for at least 25% of defecations; (4) sensation of anorectal obstruction/blockage for at least 25% of defecations; (5) manual maneuvers to facilitate at least 25% of defecations (eg, digital evacuation, support of the pelvic floor); and (6) fewer than 3 defecations per week. In addition, loose stools are rarely present without the use of laxatives and the patient does not meet criteria for irritable bowel syndrome.[9]

After the development of the Rome criteria, several studies have contributed to establish the concept of normal bowel habits of a population and to the understanding of the epidemiology of constipation and other FGIDs. Population-based epidemiological studies are important because they contribute to planning of health interventions and development of public health programs. However, our literature search revealed that most epidemiologic studies of constipation focus on special populations, such as pregnant women, elderly persons, and children. There are few general population-based studies on constipation, and the reported prevalence rates vary appreciably. For example, Mugie and coworkers[10] completed a systematic review and found that the prevalence of constipation in the worldwide general population ranged from 0.7% to 79%. Our literature search of articles published in the last 6 years retrieved only 3 review articles focusing on the prevalence of constipation.[10-12] However, these articles tended to aggregate studies based on convenience samples, varied in objectives and methods used to extract data from relevant studies, used different electronic databases (MEDLINE alone,[10] PubMed alone,[11] or MEDLINE, EMBASE, and EMBASE Classic[12]), excluded articles based on publication language (English only,[10] English and French,[11] no language restriction[12]), and studied different populations (children and adults without age limit,[10] general population of Europe and Oceania,[11] or children 15 years or older and adults[12]).

Because of the paucity and variability of available research, we elected to complete a integrative review of the prevalence of constipation in the general population. We posed the following question: "What is the prevalence constipation and what factors are associated with constipation in the general population?"

Methods

We searched the following electronic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Latin American and Caribbean Health Science Literature database (Literatura Latino-Americana e do Caribe em Ciências da Saúde, LILACS), and Medical Literature Analysis and Retrieval System Online (MEDLINE). The databases were searched using the key words "constipação intestinal," "prevalência," and "epidemiologia" in Portuguese, which are Health Sciences Descriptors (DeSC) created by the Regional Library of Medicine (Biblioteca Regional de Medicina, BIREME). We used the following key words: "constipation," "prevalence," and "epidemiology" in English, which are Medical Subject Headings terms used for indexing and retrieving documents in MEDLINE. The key words were grouped as follows: "constipação intestinal AND prevalência" and "constipação intestinal AND epidemiologia" for searching LILACS; "constipation AND prevalence" for searching CINAHL, and "constipation AND epidemiology" for searching MEDLINE.

Our search was limited to epidemiological studies reporting prevalence of constipation in the general population. We included full research reports published in English, Portuguese, or Spanish between 2005 and 2011. Review articles and studies that investigate constipation in subpopulations (eg, children, pregnant women, and elderly persons) were excluded.

The selection of articles was initially based on a title review; abstracts were then reviewed to determine if the study met inclusion criteria. Retrieved studies were analyzed descriptively, and the results were grouped according to (1) year of publication; (2) country where the study was conducted; (3) population/sample size; (4) study design including method used for measuring the prevalence of constipation (Rome Criteria, self-report, or other methods), and statistical analysis; and (5) the pertinent findings reported by the authors (prevalence and associated factors).

Guidelines developed by Loney and colleagues[13] for critical appraisal of research on prevalence and incidence were used to rate the quality of retrieved studies. The scoring system is based on 8 items that evaluate study methods

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(sample size, sampling frame, outcome measures, measurement, and response rate), interpretation of results (reports prevalence or incidence with confidence interval by subgroup), and applicability of findings (detailed description of study subjects and setting). A score of 0 or 1 is assigned for each item, for a possible range of 0 to 8.[13] Articles were independently appraised by the 2 authors of the present review. Divergent opinions were resolved by discussions between the authors.

Results

Our initial search identified 465 articles; 21 were found to be population-based studies, and 13 met additional inclusion criteria. Two of the 13 studies were duplicates, leaving a total of 11 unique general population-based studies (Figure 1).

Nine articles were retrieved from MEDLINE and 2 from the LILACS and CINAHL databases. Of the 8 articles excluded from the analysis, 6 were review papers that included, for the most part, studies with subpopulations,[10-12,14,15] one was a cohort study analyzing the incidence of constipation,[16] and 1 study was excluded because it did not report constipation prevalence.[17] The selected studies were conducted in South Korea (n = 4), Brazil (n = 4), and France (n = 2); most of the other studies were performed in Europe (n = 6). Two of the 11 were multicenter.[18,19] Personal interviews and telephone interviews were the most common data collection strategies (n = 9). Ten of the 11 used self-report or Rome III criteria to establish a diagnosis of constipation. Self-report and Rome criteria were used together in 4 studies; self-report alone was used in 4; the Rome criteria alone were used in 2; and in 1 study a questionnaire designed by the authors of that article was administered to the participants (Table 1).[18-28]

Sample sizes ranged from 995 to 13,879; the pooled sample population was 49,784 individuals. Subjects were 14 years of age or older, although 1 study did not report the age of the study population.[28]

Prevalence of constipation ranged from 2.6% to 26.9%. The mean prevalence from all 11 studies is 15.4% (range, 2.6%-26.9%; Table 1). Prevalence ranged from 4.1% to 25.6% in studies using the self-report measure of constipation, and from 2.6% to 26.9% in those using the Rome criteria. Female gender was identified as a factor associated with constipation in all studies with odds ratios of 2.17 and 2.43 reported in 2 studies.[18,19] Advanced age was the second most common factor associated with constipation; it was reported in 7 of the 11 studies. Other associated factors included sedentary lifestyle, low income, ethnicity (blacks and mulattos), low education, use of medications, heart disease, and neurological diseases. Two studies obtained the highest score of 8,[24,26] satisfying all the appraisal criteria and 3 studies received the lowest possible score

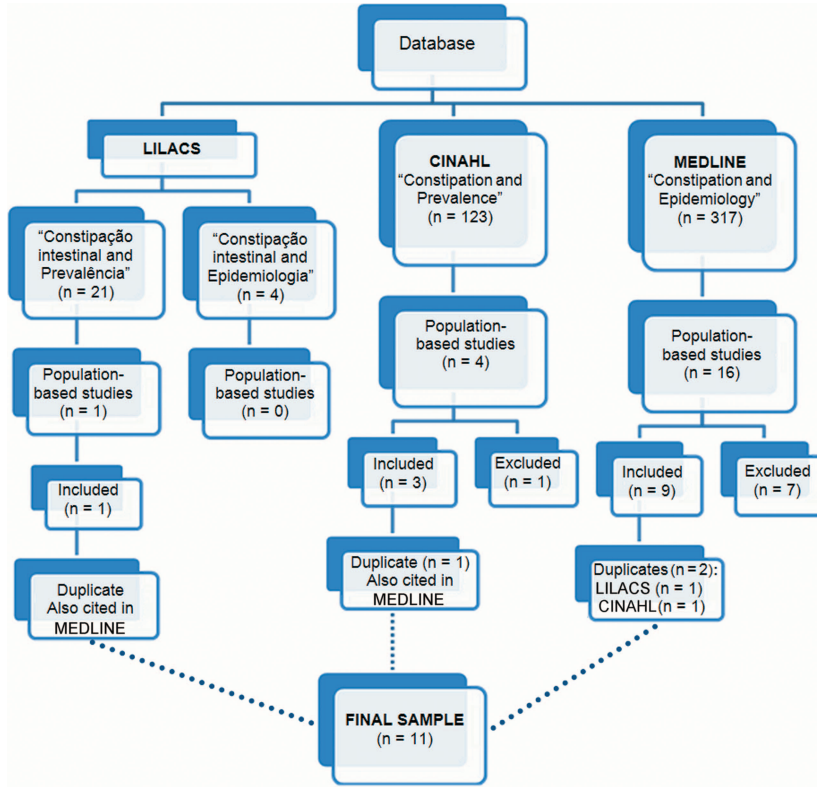

FIGURE 1. Flow diagram showing the number of studies retrieved, excluded, and included in the review according to the database and key words. Articles published between 2005 and 2011.

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TABLE 1.

Summary of the 11 Studies Included in the Present Review, Listing First Authors, Year of Publication, Country Where the Studies Were Conducted, Methodology Used, Results, and Study Quality Scores

Reference (Year)	Country	Participants and Methods	Prevalence	Associated Factors	Quality Score[15]
Jun et al (2006)[20]	South Korea	$n = 1029$ (≥ 15 y) Telephone interview χ^2 test and linear-by-linear association	Self-report: 16.5% Rome II criteria: 9.2% (No CI available)	Female gender	6
Mendoza-Sassi et al (2006)[21]	Brazil	$n = 1259$ (≥ 15 y) Home interview Poisson regression; prevalence ratio; Wald test; linear trend χ^2 test; Fisher exact test	Self-report: 21.3% (No CI available)	Female gender; advanced age	6
Siproudhis et al (2006)[22]	France	$n = 7196$ (≥ 15 y) Mail survey t test	Instrument developed by authors: 22.4% (No CI available)	Female gender	5
Adibi et al (2007)[23]	Iran	$n = 995$ (≥ 14 y) Self-completed t test; Pearson's correlation test; χ^2 test; ANOVA	Self-report: 9.6% Rome II criteria: 22.9% (No CI available)	Female gender	3
Jeong et al (2008)[24]	South Korea	$n = 1417$ (≥18 y) Personal interview χ^2 test; Fisher exact test; *t* test; logistic regression model; ANCOVA; Bonferroni-adjusted t test; multiple regression model	Rome II criteria: 2.6% 95% CI: 1.8-3.5	Female gender	8
Wald et al (2008)[18]	USA, UK, Germany, France, Italy, Brazil, and South Korea,	$n = 13,879$ (≥15 y) Personal or telephone interview Univariate and multivariate analysis; χ^2 test; multiple regression model	Self-report: 12.3% (No CI available)	Female gender; advanced age; sedentary lifestyle; low education; low income	3
Esteban y Peña et al (2010)[25]	Spain	$n = 7341$ (≥ 16 y) Personal interview MANCOVA; χ^2 test; Fisher exact test; Yates' correction; Snedecor's *F* test	Self-report: 4.1% (No CI available)	Female gender; advanced age	3
Wald et al (2010)[19]	Argentina, Colombia, Indonesia, Brazil, South Korea, and China	$n = 8100$ (≥15 y) Personal or telephone interviews Univariate and multivariate analysis; χ^2 test; multiple regression model	Self-report: Total: 16.2% (95% CI: 13.8–18.6%) Argentina: 14.2% Colombia: 21.7% Brazil: 16.7% China: 15.2% Indonesia: 12.9% South Korea: 16.7% (No CI per country available)	Female gender; advanced age (in some countries).	4
Collete et al (2010)[26]	Brazil	$n = 2946$ (≥20 y) Home interview	Self-report: 25.6% (95% CI: 24.0-27.2)	Female gender; advanced age; ethnicity (blacks and mulattos); low education; low income	8

(*continues*)

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TABLE 1.

Summary of the 11 Studies Included in the Present Review, Listing First Authors, Year of Publication, Country Where the Studies Were Conducted, Methodology Used, Results, and Study Quality Scores (*Continued*)

Reference (Year)	Country	Participants and Methods	Prevalence	Associated Factors	Quality Score[15]
		Bivariate and multivariate analysis; Poisson regression with robust variance estimation; prevalence ratio; Wald test	Rome III criteria: 26.9% (95% CI: 25.1-28.8),		
Papatheodoridis et al (2010)[27]	Greece	$n = 1000$ (≥ 15 y) Personal interview Corrected χ^2 or χ^2 for trend or 2-sided test; Fisher exact test; Student t test; logistic regression models; multivariate analysis	Self-report: 14% Rome III criteria: 13% (No CI available)	Female gender; advanced age	7
Fosnes et al (2011)[28]	Norway	n = 4622 (age not available) Personal interview + mail survey Bivariate analysis; Student *t* test; Wilcoxon-Mann-Whitney test; Fisher exact test; multiple logistic regression	Rome II criteria: 13.8% (No CI available)	Female gender; use of medication; advanced age; sedentary lifestyle Heart disease; neurological diseases	5

Abbreviations: ANCOVA, analysis of covariance; ANOVA, analysis of variance; CI, confidence interval; MANCOVA, multivariate analysis of covariance.

of 3.[18,23,25] Low-quality scores were mainly attributable to selection procedures of participants and failure to provide confidence intervals.

Discussion

The purpose of this integrative review was to review available research focusing on the prevalence of constipation and associated factors in the general population. The reported prevalence rates varied considerably from as low as 2.6% to as high as 26.9%.

Lower prevalence rates were reported by Jeong and colleagues[24] in a study conducted in South Korea (prevalence, 2.6%), and Esteban y Peña and coworkers[25] reported a 4.1% in a study of the general population of Spain. Jeong's group used self-report and Esteban y Peña' group used Rome II criteria to identify constipation. Using the Rome II criteria, a prevalence of 9.6% for functional constipation, 16.5% for self-reported constipation, and 3.9% for constipation associated with irritable bowel syndrome were reported for South Korean participants.[20]

The highest constipation prevalence rate was reported by Collete and associates[26] in a study conducted in the city of Pelotas, Rio Grande do Sul (RS), Brazil. The researchers reported constipation prevalences of 25.6% and 26.9%, using self-report and Rome II criteria, respectively. Constipation was more prevalent in women (37%) than in men (14%), in blacks and mixed-race individuals (33.4%), and in low-income persons.[26] Another study, set in the same location, based presence of constipation on self-report and found a prevalence of 21.3%.[21] High prevalences of constipation were also reported in population-based studies from Iran (22.9%),[23] France (22.4%),[22] and Colombia (21.7%).[19]

Differences in reported prevalence rates were noted, even among studies conducted in the same country. For example, studies conducted in South Korea by Jun and colleagues[20] and Jeong and coworkers[24] reported prevalence rates of 16% in 2006 and 2.6% in 2008, respectively. This variability across studies may be attributed to differences in methods of data collection, age of the study populations, and the criteria used to identify constipation. For instance, Jun and colleagues[20] used telephone interviews for collecting data from a population 15 years of age and older and found a prevalence of 16% assessed by self-report, which is much higher than that of 9% obtained by them using the Rome II criteria. On the other hand, Jeong and coworkers[24] administered personal interviews for collecting data from an adult population (≥18 years of age) using the Rome II criteria alone and observed a prevalence of 2.6%.

While this review was limited to individual studies, we also identified several systematic reviews that estimated regional or global prevalence for constipation. Suares and Ford[12] conducted a systematic review of literature published between 1974 and 2010 to estimate the global prevalence of constipation. Findings were based on 45 studies, providing a pooled sample population of 261,040 individuals aged 15 years and older. Based on findings from this systematic review, the authors estimated a global constipation prevalence rate of 14%. Systematic reviews also revealed constipation prevalence rates of 16.6% in Europe

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and 15.3% in Oceania.[11] A review conducted in the United States reported prevalences ranging from 2% to 27%, with most estimates falling between 12% and 19%.[29]

A Latin-American Consensus on Chronic Constipation was developed based on a systematic review of the literature including studies published between 1995 and 2005. Participants called for improved guidelines for the identification, diagnosis, and treatment of constipation in Latin America.[15] Studies cited in this consensus statement reported prevalence estimates of constipation ranging from 5% to 22%, with a female-to-male ratio of 3:1.[15]

Associated Factors

Female gender was identified as a risk factor for constipation in all 11 of the studies retrieved in this review. Several factors may explain the high prevalence of constipation in women, including hormonal factors, damage to the innervation of the pelvic floor musculature related to childbirth or gynecological surgery, and genital prolapse.[30] Age, socioeconomic status, and level of education were strongly associated with an increased likelihood of constipation.[11,29]

Our review revealed clinically relevant variations in the prevalence of constipation in the general population. This variability may be partly attributed techniques used to recruit participants. Loney and colleagues[13] highlighted the importance of the type of sampling frame (list for study recruitment) and suggested the use of census data instead of telephone directory listings or lists of registered voters to minimize sampling bias. The authors also pointed out the relevance of reporting prevalence estimates and other quantities with confidence intervals, and in detail by subgroups, such as by age, sex, occupational status, socioeconomic status, and education level.

The variability in reported prevalence rates created by differences in criteria used to identify constipation is difficult to quantify. The Rome Criteria were developed to standardize the definition of constipation, allowing a more objective assessment of this condition. However, many studies have used self-report, frequency of weekly bowel movements, or their own questionnaires to assess constipation, making it difficult to compare results. Moreover, these criteria have been shown to have low accuracy and sensitivity to define constipation; for example, an individual with high frequency of bowel movements may have difficulty in defecation, and self-report is a subjective means of assessing this condition and therefore is susceptible to response bias.[31,32]

Conclusion

This integrative literature review of 11 population-based studies revealed prevalences of constipation ranging from 2% to 26.9%, with a mean of 15.4%. Female gender was identified as an associated factor in all of the studies. Advanced age was the second most common associated factor; it was reported in 7 of the 11 studies. Our review also revealed considerable variability in prevalence rates; these and other gaps in knowledge were highlighted at the Latin-American Consensus on Chronic Constipation.[15] Further epidemiological studies using the validated Rome criteria are necessary to better define the prevalence of constipation in the general populations. We also recommend additional studies combining incidence and prevalence with evaluations of HRQOL in persons with constipation. Findings from such studies are needed to enhance the prevalence and impact of constipation and may contribute to implementation of public health policies for this population, especially in developing countries.

KEY POINTS

✔ Prevalence of constipation ranged from 2% to 26.9% in the general adult population.

✔ Constipation was associated with female gender in all 11 studies and with advanced age in 7 of the 11 studies.

✔ More epidemiological studies on constipation using validated methodologies such as the Rome Criteria are needed.

✔ The methods for patient recruitment and presentation of quantitative results including confidence intervals are important factors for the assessment of the quality of epidemiological studies.

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