Epidemiology and Burden of Irritable Bowel Syndrome

An International Perspective

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KEYWORDS

• Irritable bowel syndrome • Disorders of gut-brain interaction • Epidemiology
• Prevalence • Diagnostic criteria • Research methodology • Rome criteria
• Rome Foundation Global Epidemiology Study

KEY POINTS

- Irritable bowel syndrome (IBS) is the most recognized and researched of the disorders of gut-brain interaction.
- The determination of prevalence rates has real-life effects on the allocation of health care and research resources, drug development, and so on.
- Because of heterogeneous research methods, country, regional, and global prevalence rates for IBS remain elusive.
- The methodology of the Rome Foundation Global Epidemiology Study facilitated a more valid assessment of IBS Rome IV local, regional, and global prevalence rates.
- Prevalence rates by Rome IV are lower than Rome III, reflecting more restrictive diagnostic criteria.

INTRODUCTION

The disorders of gut-brain interaction (DGBI) are related to any combination of motility disturbance, visceral hypersensitivity, altered mucosal and immune function, altered gut microbiota, and altered central nervous system processing.[1] Irritable bowel syndrome (IBS) is the most recognized and researched of the DGBI. In this article, available data on classical epidemiologic questions, such as the prevalence of IBS and its subtypes, and its distribution by age and sex are presented. However, beyond that, the author endeavors to present and discuss issues related to the validity and reliability of those data, including methodological pitfalls, comparing and/or pooling of data from different studies (**Fig. 1**), the effect of potential regional and cultural differences (diagnostic criteria, normal symptom frequency, symptom experience, interpretation, and reporting), and association with other factors. All these have real-life effects

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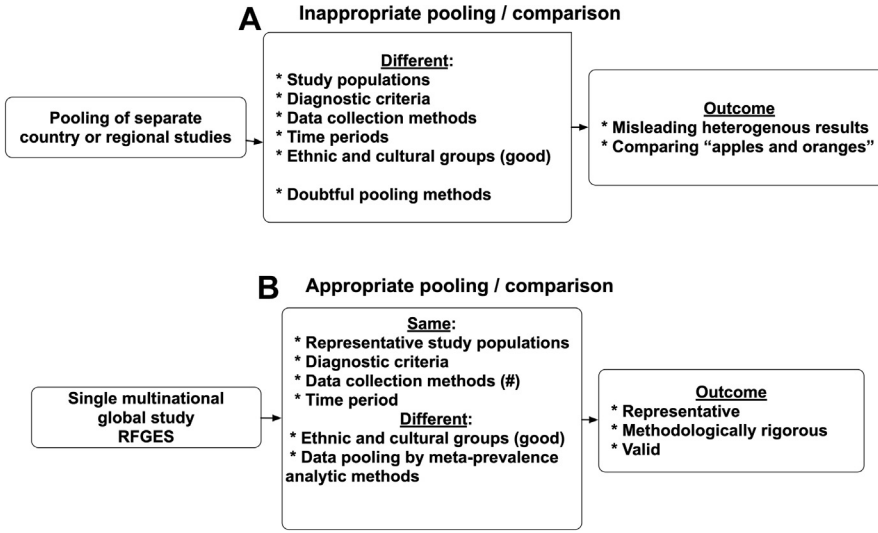

Fig. 1. Pitfalls in comparing and/or pooling the results of multiple epidemiologic prevalence studies for IBS: (*A*) individual studies; (*B*) multinational studies.

on the allocation of health care and research resources, drug development, and other matters addressed in later discussion.

There are many definitions and interpretations of the meaning of epidemiology.[2] The Centers for Disease Control and Prevention has defined epidemiology as the scientific, systematic, and data-driven study of the frequency and pattern (distribution) and causes and risk factors (determinants) of health-related conditions in specified populations.[3] In light of this broad range of substantive components, the results of epidemiologic studies can inform, provide guidance, and generate hypotheses for critical fields, including pathophysiology, prevention, and treatment of infectious and noninfectious diseases, including chronic disorders, such as the DGBI. **Box 1** shows the importance and potential benefits of prevalence studies, a central element of epidemiologic research.

PREVALENCE RATES AND DIAGNOSTIC CRITERIA

Prevalence rates are based on diagnostic criteria, which are the basis for case definitions. Thus, when discussing the epidemiology of the DGBI, it is essential to start with

Box 1
What can be gained from assessing prevalence rates of chronic diseases?

1. Assess and understand the medical, social, and economic burden of disease
2. Enable comparisons across societies, cultures, and ethnic and racial subpopulations
3. Generate hypotheses for pathophysiologic research
4. Allocate health care resources
5. Allocate research funding
6. Determine priorities and provide incentives for the development of new treatment
7. Satisfy scientific and intellectual curiosity

diagnostic criteria, how they are determined, and what their strengths and weaknesses are. This issue is a complex and, often, controversial one. Because there are no diagnostic biomarkers for IBS, the diagnosis is based on symptom reporting and symptom clusters with a minimal diagnostic workup. The first iteration of the Rome Diagnostic criteria (Rome I) was published in 1994, and the last iteration of the Rome Diagnostic criteria (Rome IV) was published in 2016. Rome I was determined through a consensus of experts using the Delphi process with ensuing iterations, including an incrementally greater degree of evidence from dedicated research.[1]

A thorough review of the prevalence rates for IBS in various countries and regions of the world shows significant intracriteria and intercriteria variability, as seen in the results of a meta-regression analysis[4] and a systemic literature review,[5] both conducted before the publication of the Rome IV criteria in 2016. Both reviews found a very broad range of IBS prevalence rates among countries, with extremes ranging from 1.1% in Iran[6] using the Rome III criteria, to 45% in Pakistan[7] using Rome II[4] in 1 study[4] and 1.1% in both France[8] (Rome I) and in Iran[6] (Rome III), to 35.5% in Mexico[5] (Rome II) in the second study.[5]

METHODOLOGICAL ISSUES

Possible explanations for these strikingly different results are shown in **Fig. 1** and **Box 2**. There is a tendency in the literature to compare the results of individual studies of significantly dissimilar methodology and determine pooled prevalence rates without making appropriate adjustments, resulting in misleading conclusions[5,9,10] (see **Fig. 1**). In light of these shortcomings, a Rome Foundation Working Team on Multinational, Cross-Cultural Research published recommendations for the conduct of this type of study[9] and initiated a global study of DGBI epidemiology (Rome Foundation Global Epidemiology Study [RFGES]), the results of which are discussed in detail here.[11]

IBS is characterized by chronic recurrent abdominal pain, and an irregular bowel habit (texture and frequency). The abdominal pain can improve or worsen with a bowel movement.[12] Symptom-based prevalence studies cannot entirely rule out organic/structural disease as the cause of the symptoms. For example, in the absence of upper endoscopy or anorectal manometry, some individuals diagnosed with a DGBI by survey questionnaire may actually have an organic cause of their symptoms. However, the rate of organic disease in patients who meet symptom-based criteria and have no alarm features is considered low. This issue was addressed in the RFGES whereby participants were asked, in addition to their symptoms, if they had been diagnosed in the past with any of a list of organic gastrointestinal (GI) diagnoses, such as celiac disease, GI cancer, inflammatory bowel disease, peptic ulcer, and so forth, or had undergone GI surgery, such as appendectomy, cholecystectomy, bowel resection, and so forth. The rate of any DGBI diagnosis was 40.3% of all participants. This rate was determined after 7.6% of the overall study population who met the diagnostic criteria for a DGBI was disqualified because they also reported a previous diagnosis of an organic GI disease or GI surgery.[11] Thus, the final prevalence rates did account for other GI diseases, to the degree possible in a questionnaire-based survey, making the final result conservative in comparison with other studies where this adjustment was not made.

Types of Studies and Methods for Comparing and Pooling Study Results

Can a global prevalence rate for IBS be determined? The 2 reviews mentioned above (meta-analysis and systematic literature review) had slightly different inclusion criteria, but both included general population studies only. Although the inclusion criteria were

Box 2
Why is it difficult to determine, compare, and pool prevalence rates?

1. General issues:
   a. Cultural and geographic differences
   b. Normal frequency values for gastrointestinal symptoms
      i. Basis for frequency criteria for diagnoses
      ii. Discomfort/pain: separate or spectrum of same entity?
      iii. Bloating
2. Methodological issues:
   a. Representativeness of study population
      i. Geographic
      ii. Sex, age, other key variables
   b. Method of data collection
      i. Personal interview
      ii. Telephone
      iii. Mail
      iv. Internet survey
   c. Study population
      i. National representation
      ii. Local/regional representation
      iii. Specific sites: clinic, workplace, shift workers, race/ethnic groups, sex-specific
   d. Translation of study questionnaire into other languages
      i. Professional translators
      ii. Literal translation and cultural adaptation
3. Comparisons of study results
   a. Comparing individual studies: "apples and oranges"
      i. Within countries and regions
      ii. By diagnostic criteria
      iii. Population types
      iv. Data collection methods
   b. Pooling study results: *heterogeneity*
      i. Systematic literature searches
      ii. Meta-regression analyses
4. Protocol to reduce the impact of heterogeneous studies to a minimum
   a. Multinational study, if possible, global
   b. Same time period, methodology, research team, data handling, statistical analyses

different as well as the range of years of publication, the final number of publications and participants included in each study was similar at 81 papers and 260,960 participants in the meta-analysis,[4] and 83 papers and 288,103 participants in the systematic literature review,[5] giving greater confidence in the article selection process. In both studies, a pooled global prevalence rate was calculated with a result of 11.2% in the meta-analysis and 8.8% in the literature review. However, an analysis of heterogeneity in the systematic literature review showed that the percentage of residual variation owing to heterogeneity was 99.9%. Thus, the authors of that review concluded that the goal of calculating a global prevalence for IBS was still elusive. Another factor supporting this conclusion was the absence of sufficient data from some areas of the world, notably Africa, Eastern Europe, and Arab countries.

Four studies conducted in the past in Japan, all using the Rome II diagnostic criteria, reported IBS prevalence rates of (a) 6.1%,[13] (b) 10.7%,[14] (c) 14.2%,[15] and (d) 31%.[13] If the results of these 4 studies are compared or pooled, the following would be compared in a study of (a) a community sample, (b) university students, (c) a health screening sample that was close to the average Japanese population, and (d)

outpatients in Department of Internal Medicine. Five studies from Mexico, using different diagnostic criteria, reported IBS rates of (a) 4%,[16] (b) 16%,[17] (c) 16.6%,[18] (d) 28.9%,[19] and (e) 35.5%.[20] These Mexican studies also had a great variance in the composition of their study populations. Thus, based on these studies from Japan and Mexico, one would be hard pressed to say what the "actual" prevalence of IBS was in these 2 countries.

To be clear, all types of studies are valid. For example, it is perfectly acceptable to determine IBS rates among university students or outpatients, and the results could be of interest and even generate hypotheses for more general research. However, these results should not be compared or pooled together because the studies are so different in methodology. Furthermore, they cannot be generalized to the overall population or compared with the results of other studies with different study populations, as is done too often.

THE ROME FOUNDATION GLOBAL EPIDEMIOLOGY STUDY

The RFGES was conducted in the same time period using the same questionnaire and diagnostic criteria (Rome IV) in 33 countries on 6 continents. It was a very complex and challenging project requiring collaboration and support on an unprecedented scale. It took 10 years between the initial idea and establishment of its Executive Committee and the publication of its first paper in 2021 (**Fig. 2**).

The detailed study methodology can be found in the first study paper.[11] The major methodological obstacle was related to data collection methods. In 26 countries where most adults use the Internet, a secured online survey (accessible only to preselected invited participants with a predetermined age and sex distribution and national geographic representation) was conducted using population samples provided by a professional company (Qualtrics, LLC, Provo, UT, USA). There were 7 countries (Bangladesh, India, Indonesia, Iran, Ghana, Malaysia, Nigeria) where an Internet survey was not feasible, so the data were collected by personal household interviews. In 2 countries, China and Turkey, data were collected by both methods for purposes of comparison. Other than data collection, the methods were identical in Internet and

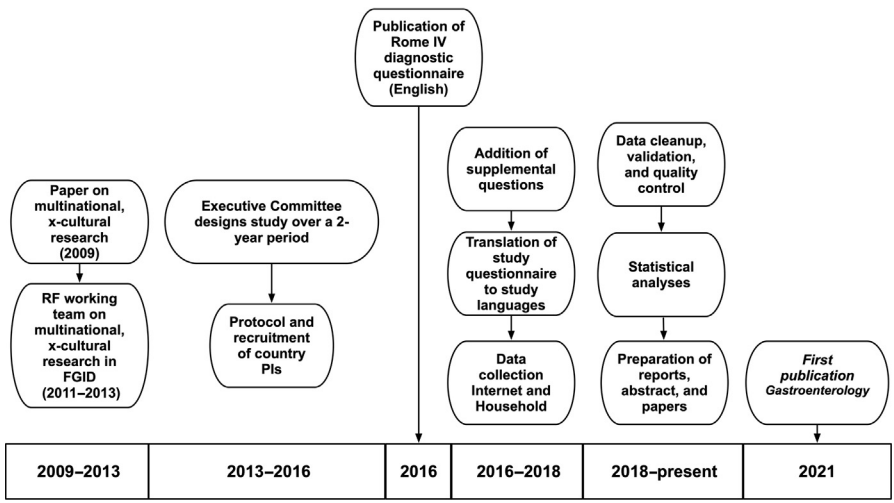

Fig. 2. RFGES timeline.

household interview countries. Fig. 3 shows the global extent of the study and the rates of meeting Rome IV criteria for IBS (inner circle) and for any DGBI (outer circle). For convenience, the Internet survey countries will be referred to as "Internet" countries and the household interview countries will be referred to as "Household" countries in this article.

PREVALENCE OF IRRITABLE BOWEL SYNDROME IN THE ROME FOUNDATION GLOBAL EPIDEMIOLOGY STUDY

Irritable Bowel Syndrome Prevalence Rates: Rome IV

Overall, IBS prevalence rates using the Rome IV criteria were consistently lower than in previous studies using earlier iterations of the Rome criteria. This finding was the case for Internet surveys with a pooled prevalence rate in 26 countries of 4.1 (95% confidence interval [CI]: 3.9, 4.2) and in Household countries with a pooled prevalence rate in 9 countries of 1.5% (95% CI: 1.3, 1.7).

The prevalence rates of IBS among Internet survey countries ranged from a low of 1.3% (0.8%–1.8%) in Singapore to 7.6% (6.4%–8.7%) in Egypt (Fig. 4A). A striking finding relating to prevalence rates for IBS was the consistency of Rome IV IBS rates among the 26 Internet countries. Nineteen of 26 countries had prevalence rates between 3% and 5%. The outliers other than Singapore and Egypt were Japan (2.2%), China (2.3%), Russia (5.9%), South Africa (5.9%), and the United States (5.3%). Of the 26 countries, 24 countries had rates between 2% and 6% (see Fig. 4A).

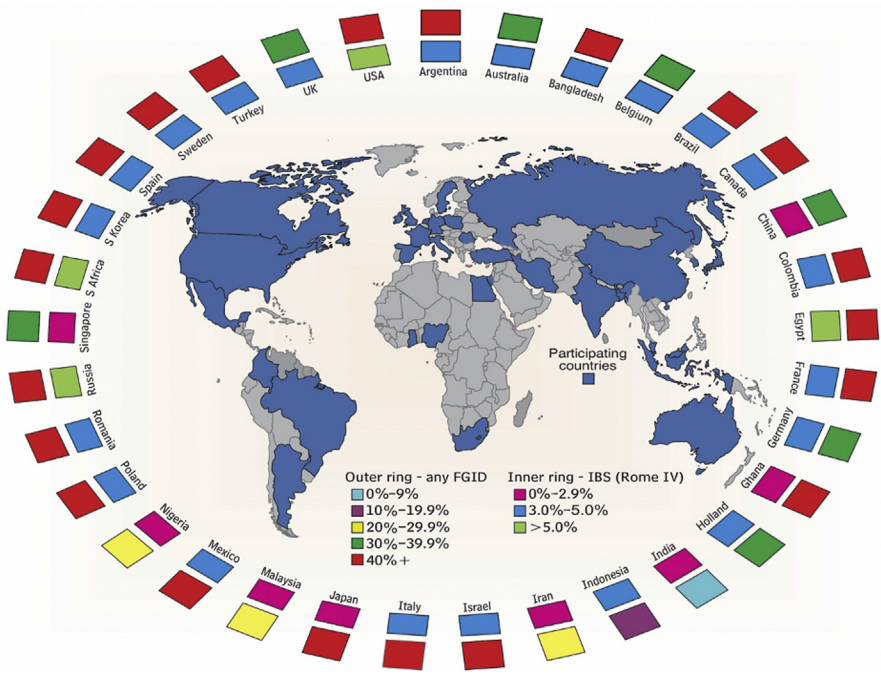

Fig. 3. The worldwide prevalence, by country (RFGES), of Rome IV IBS (*inner circle*) and meeting Rome IV diagnostic criteria for any DGBI (*outer circle*). FGID, functional gastrointestinal disorders. (*Courtesy of* the Rome Foundation, Raleigh, NC; with permission.)

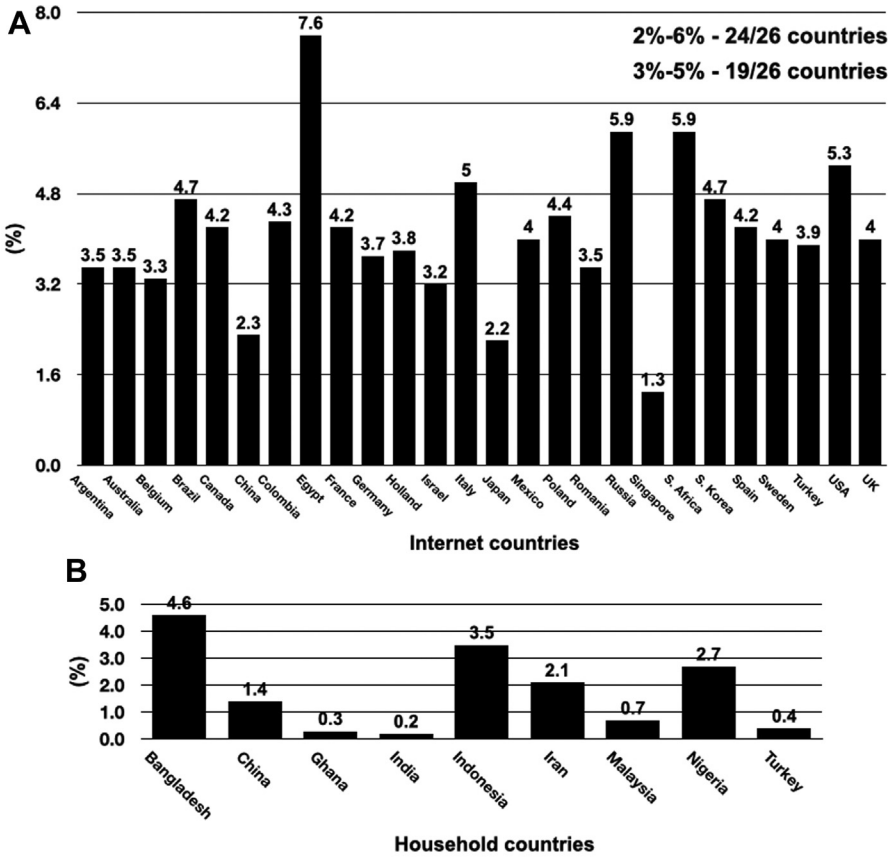

Fig. 4. Rome IV prevalence rates in 19 of 26 of the Internet countries; the prevalence rates ranged between 3% and 5% and in 24 of 26 countries between 2% and 6% with Singapore (1.3%) and Egypt (7.6) as outliers (*A*); in the 9 Household countries, 4 countries had prevalence rates less than 1% and only 2 countries were greater than 3% (*B*).

Prevalence rates were more variable in the Household countries with a lower overall range from 0.2% (0.1%–0.3%) [India] to 4.6% (3.7%–5.5%) (Bangladesh). Four of 9 countries had rates less than 1%, and only 2 countries had rates greater than 3% (Fig. 4B). The differing results between India and Bangladesh are of particular potential interest for further research because (a) these countries share a common border and similar cultures; and (b) in the case of India, the survey was conducted in 2 geographically separate regions, and the results were the same in both, thus leading further credence to the very low rate of IBS in that country.

Why Were the Irritable Bowel Syndrome Prevalence Rates Lower in Household Countries Compared with Internet Countries?

The "default" explanation for the differences could be that the differences are real and reflect actual differences between different geographic regions and cultural groups. That hypothesis, based on the study results, could lead to important research into the reasons for these differences. It is possible, for example, that cultural factors lead to a difference in symptom experience, symptom interpretation, and symptom

reporting, yielding lower results among some population groups, for example, East and West.[21,22] Other possible explanations include diet and nutrition, early life living conditions and hygiene, and previous GI infections, among others. All these potential factors were assessed in the RFGES.

However, there are other possible explanations related to methodological issues, especially differences between the 2 data collection methods. The Internet survey was anonymous, had full national representation for the study population, and incorporated multiple methods to preclude the risk of incomplete and/or inaccurate data. In contrast, the surveys in the Household countries were based on personal interviews in limited catchment areas. Thus, the survey was not anonymous, and the study population was not nationally representative.

Although the interviewers in the Household countries underwent prior training, including cultural sensitivity, it is reasonable to assume that fewer individuals would acknowledge and share sensitive personal information on GI symptoms, such as their bowel habit, leading to lower case identification and lower prevalence in the Household populations. To speculate further, this effect may be more salient among younger respondents, leading to the finding described in later discussion that prevalence rates in the younger age groups were lower than among the more elderly in the Household countries, whereas the opposite was the case in the anonymous Internet surveys.

Irritable Bowel Syndrome Prevalence Rates by Sex and Age

In the 2 systematic reviews cited above, the prevalence of IBS was significantly higher in women compared with men,[4,5] showing this to be a global phenomenon. In the RFGES, the pooled prevalence rates for IBS were substantially higher among women in both survey methods, with a female-to-male odds ratio (OR) of 1.8 (1.7–2.0) for the Internet and 2.0 (1.5–2.5) for the Household countries.

Although almost all studies of IBS prevalence included rates by sex, there are much fewer data pieces on prevalence rates by age. In the meta-analysis by Lovell and Ford,[4] prevalence rates were lower with increasing age based on $\geq$50 years compared with less than 50 years (OR: 0.75; 95% CI: 0.62, 0.92). In the RFGES, IBS prevalence decreased with age in the Internet surveys, from 5.3% (5.0%5.6%) in the 18- to 39-year-old age group to 3.7% (3.5%–4.0%) in the 40- to 64-year-old age group and 1.7% (1.4%–1.9%) in those 65+ years of age, whereas it increased with age in the Household countries from 1.4% (1.1%–1.7%) to 1.5% (1.2%–1.7%) to 1.9% (1.4%–2.4%), respectively, in these age groups.

COMPARISON OF IRRITABLE BOWEL SYNDROME BY ROME III VERSUS ROME IV DIAGNOSTIC CRITERIA IN ROME FOUNDATION GLOBAL EPIDEMIOLOGY STUDY

The RFGES questionnaire included questions for diagnosis of IBS by the previous Rome III criteria. Because these questions were introduced into the questionnaire after data collection was completed in 12 Internet countries, the results on Rome III are available from 14 of the 26 Internet countries and all 9 Household countries. **Fig. 5** shows data on IBS prevalence by data collection method for both Rome III and Rome IV. The pooled rate by Rome III is higher by a magnitude greater than 2 compared with Rome IV in the entire study population and in both sexes. The prevalence rates were consistently higher among women than men for both diagnostic criteria. Prevalence rates were also higher among women for the 3 age categories (18–39, 40–64, 65+). As was seen in the results for Rome IV, in Rome III, there was a difference in prevalence trends by age with the prevalence decreasing by age in the Internet countries and increasing by age in the Household countries.

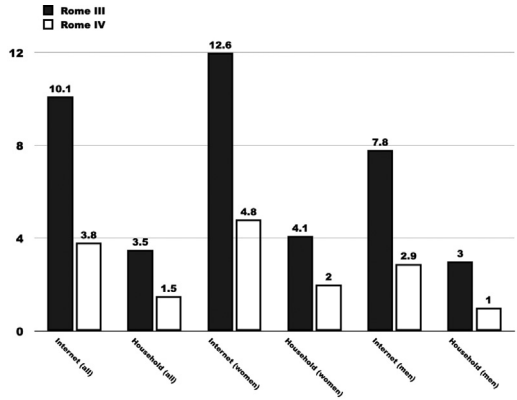

Fig. 5. Comparison of pooled prevalence rates between Rome III and Rome IV by data collection type (for 14 Internet countries and 9 Household countries) for total study population and by sex.

In a validation study of the Rome IV questionnaire before its official publication conducted in the United States, United Kingdom, and Canada, the results were very similar with mean Rome III IBS prevalence of 9.0% compared with a mean Rome IV IBS prevalence of 4.6%.[23,24]

Why Are There Such Large Differences in Irritable Bowel Syndrome Prevalence Between Rome III and Rome IV?

The changes in the Rome IV criteria made them more restrictive, thus leaving out some of the individuals who were diagnosed with IBS by Rome III.[25,26] This finding relates to 2 major changes and 1 more minor change: (a) the removal of the term "discomfort," leaving only "pain" from the question in Rome IV, whereas the Rome III formulation was "pain or discomfort"; (b) the change of symptom frequency for pain (or discomfort) from at least 2 to 3 times monthly (Rome III) to at least weekly (Rome IV); and (c) a change that was less significant in terms of the difference in prevalence rates was the change in the association between pain and bowel habit. In the Rome III criteria, pain had to improve following a bowel movement, whereas in Rome IV, this was changed to either an improvement or a worsening of pain.

Although the prevalence rates for IBS are much lower for Rome IV, the severity of disease is higher in individuals diagnosed with IBS by Rome IV compared with those identified by Rome III, with mean IBS-SSS severity scores of 250 (244–256) and 191 (187–194), respectively, in the 14 Internet countries and 174 (158–190) and 134 (124–144), respectively, in the 9 Household countries. Thus, the Rome IV IBS criteria select out a more restricted group of individuals with more severe symptoms.[27] This selection of more restricted group could have advantages for clinical trials in that the study groups would be more homogeneous but may not identify patients who clinicians would likely diagnose as IBS in clinical practice.

A study of Rome III patients in the Netherlands, using a proxy Rome IV definition, found that Rome IV patients represented a subset of Rome III patients with a more severe clinical disorder.[28] A study from Sweden with a similar methodological approach found that 85% of Rome III patients met the proxy criteria for Rome IV. This subgroup was characterized as female, with poorer quality of life, greater pain severity, bloating, somatization, fatigue, and rectal sensitivity compared with Rome IV–negative individuals.[29]

Why Was the Term Discomfort Removed from the Diagnostic Criteria?

The case against use of the term discomfort was influenced by the results of a study conducted in the United States by Spiegel and colleagues[30] designed to develop a framework to measure patient symptoms and inform patient-reported outcomes for clinical trials. The investigators concluded that discomfort was a nondiscriminative term that includes symptoms, such as bloating, gas, fullness, flatulence, sensation of incomplete evacuation, and urgency, for which there was a great degree of variance in interpretation and reporting. The participants in this study were all from the United States. It would be reasonable to ask whether similar results would have been obtained had the same study been conducted in Asia, Latin America, Africa, the Middle East, or Europe? It is known that culture and ethnicity affect the way symptoms are interpreted and reported[21,22] and that there are obstacles to translating symptoms in both linguistic and culturally adaptive manners. All the Rome diagnostic questionnaires, as well as almost all other questionnaires on DGBI, were developed in English, primarily in the United States but also in the United Kingdom.[23,31] This finding speaks to the possibility of unintentional ethnocentrism[32] that could make it difficult to compare results in different geographic regions and cultural groups. Compounding these potential confounders is the risk that the questionnaire is translated literally into other languages, in some cases, without cultural adaption and/or cognitive debriefing of representatives of the local population.[33–35]

Why Was Symptom Frequency for Pain Changed to at Least Weekly Instead of at Least 2 to 3 Times per Week?

This change was based on a survey of a nationally representative sample of US adults to generate data and set thresholds for normal and abnormal symptom frequency based on the participants' responses to questions, such as, "How often did you have discomfort or pain anywhere in your abdomen," with 9 response options between "never" and "greater than 1 time per day."[23] The results of this survey informed the decision as to the threshold for pain for Rome IV IBS. Because this survey was conducted only on US adults, there is a potential problem when extrapolating this result to other countries around the world.

Which Change, Pain Frequency, Elimination of the Term Discomfort, or the Change in Association of Pain with Bowel Movement Contributed More to the Difference Between Rome III and Rome IV Prevalence Rates?

In a study on the prevalence of functional bowel disorders in 3 English-speaking countries (Canada, United States, United Kingdom),[24] the investigators assessed the relative size effect of the 3 changes on the difference in prevalence rates for IBS by Rome III (9.0%) and Rome IV (4.6%). The relative effect was 80.7% for the change in pain frequency, 16.8% for the removal of the word "discomfort," and 2.5% for the change in association between bowel movements and pain. Thus, the change in pain threshold was by far and away the most important change in the Rome criteria. As such, it will be very important moving forward to determine if this change reflects a global phenomenon in symptom reporting or is more specific for the United States and perhaps other English-speaking countries, such as Canada and the United Kingdom.

What Else Can Be Learned by Mining the Rome Foundation Global Epidemiology Study Database?

The RFGES database includes close to 90 diagnostic questions to determine all Rome IV DGBI diagnoses. The inclusion of all Rome IV diagnoses is unusual because, to

date, few studies, if any, assessed all DGBI; most assessed the major diagnoses, such as IBS, function dyspepsia, functional constipation, and so forth. In addition to facilitating the identification of each and every DGBI individually, it also enabled the determination of 2 other important outcomes: (a) the percentage of individuals with any DGBI diagnosis, which was very high at 40.3% in the RFGES; and (b) the degree of overlap among the DGBI in any individual and the associations between degree of overlap with disease severity, quality of life, and associated risk factors beyond sex and age.

The questionnaire also included close to 90 questions related to multiple variables potentially associated with the prevalence of DGBI and their severity. These details included additional sociodemographic items, questions on living conditions and hygiene at the present time and in childhood (age 7), doctor consultations in general and for bowel problems, medications and abdominal surgeries, known diagnoses of "organic" GI diseases, use of complementary and alternative medical services, history of GI infection and relation to present bowel symptoms, effect of stress on symptoms, degree of concern and embarrassment over bowel function, diet, and embedded questionnaires on quality of life (PROMIS Global-10), somatization, anxiety and depression (Personal Health Questionnaire 4 and 12), IBS severity (IBS-SSS), and so forth. Thus, the database contains a rich source of data for comprehensive future research on DGBI.

The Example of Postinfection Irritable Bowel Syndrome

The development of IBS following an acute enteric infection in individuals who did not suffer from prior IBS (postinfection irritable bowel syndrome [PI-IBS]) has become a focus of epidemiologic and pathophysiologic research because it is prevalent at about 10% of IBS cases and reflects one of the strongest and most recognizable risk factors for IBS.[36,37] Although there are culture-confirmed pathogens, including bacteria, viruses, and protozoa in some cases, many cases follow an undiagnosed enteric infection and are based on a clear patient history. In PI-IBS cases, where there is culture confirmation, the pathogen is equally likely to be bacterial or viral.[38] Risk factors have been identified for the development of PI-IBS, including female sex, antibiotic treatment of the infection, anxiety, and severity and duration of the initial infection.[39] The RFGES database provides a rich array of associated factors that can be mined to further understand and characterize PI-IBS.

Where to Go from Here? Future Directions

The Rome Foundation has started the 5-year process of upgrading its diagnostic criteria, which will culminate in publication of the new Rome V diagnostic criteria, expected in 2026. Based on the results of research that have accumulated over the years, this iteration of the Rome diagnostic criteria will be less "eminence based" and more "evidence based."

One important challenge is to gain a firmer global and cross-cultural basis for changes that will be considered from Rome IV to Rome V. Thus, the previous change in pain threshold was based on a study of symptom frequency of GI symptoms in a nationally representative population in the United States. However, it is not clear that these changes are generalizable to other countries and cultural groups, in particular, in Asia, Africa, Latin America, Eastern Europe, and the Middle East. In advance of the finalization of the Rome V criteria, it is essential that parallel symptom frequency norm studies be conducted in at least 5 other geographic regions and cultural groups other than the United States, and that is the plan. The conduct of parallel studies lead to uniform findings confirming that symptom frequency patterns are similar throughout

the world and increase confidence in the results of prevalence studies. In contrast, it may turn out that normal and abnormal symptom frequencies are different between, for example, China and the United States. In that case, adjustments would have to be made to "equalize" the diagnostic criteria because it is theoretically possible that at least once a week is the threshold for abnormal symptom presentation in the United States, but a lower or higher threshold would hold for China. Although this process could obviously complicate the conduct of epidemiologic studies on a global level, it would lend credence to comparisons of rates between countries, regions and country groups, because individuals in different populations have different cultural-based interpreting and reporting their symptoms.[21] Another potential obstacle is the translation of the diagnostic questionnaire. This translation of the diagnostic questionnaire must be done with linguistic accuracy, but also with appropriate cultural adaptation. For example, in Brazil and among Israeli Arabs, individuals in different regions and ethnic groups use different terms to describe concepts, such as stool or bowel movement.[40] Another illustration of this issue is the concept of bloating. This term has no equivalent in multiple languages, including Spanish, Italian, Farsi, and others. The most commonly used solution has been a work-around using multiple words to convey the same meaning. These issues will have to be addressed, perhaps by the use of pictograms in order to ensure that individuals in different countries understand the question in the same way.[41,42]

The study of the epidemiology of IBS and the other DGBI goes well beyond dry statistics. It is challenging and complex and can provide vital information. The most important factor is the implementation of well-planned studies using rigorous research methodology and global collaboration. The new age of communication has made achievement of these goals eminently feasible. The outcomes of future studies will inform and facilitate a broad spectrum of endeavors, including clinical practice, basic and clinical research, and the conduct of clinical trials.

CLINICS CARE POINTS

- The epidemiology of irritable bowel syndrome, especially prevalence rates, has practical importance in clinical practice beyond intellectual curiosity.
- Diagnostic criteria, based on epidemiologic studies, can guide identification of cases and definitions of symptom severity.
- Evidence-based diagnostic criteria can guide the diagnostic process in disorders of gut-brain interaction by enabling a positive diagnosis using a minimum number of diagnostic tests.
- Although diagnostic criteria should be applied strictly in clinical trials and other research, they can be adapted with a flexible approach by clinicians who can add their own clinical experience and intuition in the final diagnostic determination.
- Prevalence rates are also important to clinical practice in that they inform and guide decisions on the development of new treatment modalities.

DISCLOSURE

There are no conflicts of interest.

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