Revista ARACÊ
ISSN: 2358-2472

STUDY OF PREVALENCE OF IRRITABLE BOWEL SYNDROME (IBS) IN THE GENERAL POPULATION OF RIO DE JANEIRO - BRAZIL. A CONTRIBUTION TO THE EPIDEMIOLOGICAL STUDY OF IBS IN SOUTH AMERICA

https://doi.org/10.56238/arev6n4-169

Date of submission: 11/11/2024 **Date of publication:** 11/12/2024

Rosa Leonôra Salerno Soares[1], Ana Maria Ribeiro dos Santos[2], Giovanna Aparecida Balarini Lima[3], Marcia Sales dos Santos[4] and Maria Auxiliadora Nogueira Saad[5]

ABSTRACT

Irritable bowel syndrome (IBS) remains a clinical challenge in the 21st century. Various mechanisms and theories have been proposed about its etiology, but the biopsychosocial model is the most currently accepted. The prevalence of IBS in the general population ranges from 9% to 22%. However, the contrasts between different studies highlight the importance of standardizing diagnostic criteria, study methodology and subject populations and justify the importance of studies that standardize the prevalence of IBS in the various regions of the world, unifying the clinical therapeutic approach for these patients. This study aimed to study the prevalence of IBS in a group of volunteers in a Brazilian urban community using the personal interview research method. Our cross-sectional study included 700 university volunteers who completed a clinical epidemiological questionnaire and a Portuguese version of the Rome III modular questionnaire. The prevalence of IBS in this group was 12.4%. The factors highlighted by this study, when comparing the two groups of volunteers, were those related to the higher prevalence of IBS in women, the higher frequency of other gastrointestinal symptoms, and self-reported food intolerance. The prevalence rate was similar to that found in European countries and the USA. We believe that our study contributes to the literature in the specific area and consequently to better clinical and therapeutic management of irritable bowel syndrome (IBS).

Keywords: Irritable Bowel Syndrome. Prevalence. Clinical Demographic Characteristics. South America. Brazil.

[1] Professor Titular UFF/ Full Professor
Lattes: http://lattes.cnpq.br/4236328959320774
[2] Professor Adjunto UFF
Lattes: http://lattes.cnpq.br/1037886268982675
[3] Professor AssociadoUFF
Lattes: http://lattes.cnpq.br/0003423598440275
[4] Professor Associado UFF
Lattes: http://lattes.cnpq.br/4307867106255790
[5] Professor Adjunto UFF
Lattes: http://lattes.cnpq.br/0368930706229911

Revista ARACÊ
ISSN: 2358-2472

INTRODUCTION

Functional gastrointestinal disorders (FGIDs) are a heterogeneous group of remarkably common chronic conditions that are considered important for public health and can be disabling and induce a great social and economic burden. Irritable bowel syndrome (IBS), characterized by abdominal pain and discomfort without obvious structural changes, one of the most common gastrointestinal diseases that remains a clinical challenge of the 21st century, is associated with the group of (FGIDs) and is a disorder of bowel function. IBS is the most prevalent FGID seen in the general population worldwide and also the most common reason for referral to gastroenterology clinics [1–5]. IBS may affect up to one in five people at some point in their lives and has a significant impact on quality of life and healthcare utilization. Several mechanisms and theories have been proposed regarding its etiology, but the biopsychosocial model is the most currently accepted for IBS [1,2,3]. The symptom complex would be the result of the interaction between psychological, behavioral, psychosocial and environmental factors. The pathogenesis of IBS is also associated with alterations in the intestinal microbiota, affecting immunity and intestinal integrity and altering the brain-gut axis and intestinal neuromuscular junctions. [6-15]. The diagnosis of IBS is not confirmed by a specific test or structural abnormality. The Rome Criteria are the current gold standard for the diagnosis of IBS [11,12]. The prevalence of IBS in the general population ranges from 9% to 22% in the USA and Western European countries. The contrasts between different studies highlight the importance of standardizing diagnostic criteria, study methodology and subject populations, all important factors that can influence the frequencies and clinical characteristics related to IBS. [15-20]. Furthermore, there is a notable lack of data from Latin America, Africa, Eastern Europe, and Arab countries, justifying the need for a global survey on the prevalence of IBS with multinational collaboration and uniform research methodology emphasizing regional and cross-cultural differences that are more likely to shed light on the pathophysiology. In South America, data are also limited and few studies have estimated the prevalence and burden of FGIDs. Most studies have been conducted in selected populations, emphasizing the need for more rigorous population-based studies using standard criteria and methodologies to study the prevalence of IBS in South America. [19-25]. The use of standardized criteria and methodology is imperative in future studies to elucidate the worldwide frequency and clinical features of IBS and justify the importance of studies that standardize the prevalence of IBS

Revista ARACÊ
ISSN: 2358-2472

in the various regions of the world, unifying the clinical therapeutic approach for these patients. This study will use the personal interview research method in an urban community.

OBJECTIVE

To study the prevalence of IBS in a group of volunteers in a Brazilian community.

MATERIAL AND METHODS

We conducted a cross-sectional study (Survey method: Personal Interview and Urban community). of prevalence and clinical demographic of IBS in Niteroi-Rio de Janeiro between October 2017 and December 2019.A total of 700 volunteers were evaluated between September 2017 and January 2019. They were selected between students and employees of the Medical School of the Fluminense Federal University, Niteroi, RJ, Brazil, recruited through a poster affixed on the door of the group of study of intestinal diseases (outpatient unit), Antonio Pedro Universitario Hospital (HUAP). The study included relatives of patients visiting hospitals, students and staff members of the hospital. Volunteers under-18s, those who refused to participate and reported a list of red flag symptoms and organic disorders that could be mistaken for IBS were excluded from the study. There we planned to estimate the prevalence of IBS using Rome III criteria A Portuguese language version of the Rome III modular questionnaire applied to 700 volunteers. [19-22] Clinical Socio demographic such mean age, sex, prevalence of IBS; prevalence of subtypes of IBS, self-reported food intolerance and presence of other digestive symptoms were evaluated. The non-probability sampling method was used in this study Ethics: This study was conducted in accordance with the Declaration of Helsinki. All volunteers gave their informed consent for inclusion before they participated in the study and the protocol was approved by the Regional Committee for Medical and Health Research Ethics, Niteroi, Rio de Janeiro, Brazil (approval no. 93546518.8.0000.5243). Statistical analysis: Statistical analysis was performed using IBM Corp. Released 2017. IBM SPSS statistics for windows, version 25.0. Armonk, NY: IBM corp. Analysis of categorical data was summarized by descriptive statistics, including total numbers, percentages and odds ratio (OR). The correlation analysis between variables was performed using Pearson's chi-square correlation coefficient. Continuous variables were summarized by mean and standard deviations (SD) with significant differences between two groups analyzed using the Independent Samples t-

Revista ARACÊ
ISSN: 2358-2472

test. All statistical hypotheses were tested at 0.05 level of significance, and p<0.05 was considered significant.

RESULTS

A total of 700 IBS patients were included in the study (467 women and 233 men) and were available for analysis. 87 (12.4%) met the Rome III criteria for IBS [mean age 30.4 ± 12.65; 95 (79.8%) women]. 55 (63.21%) of them reported gastrointestinal symptoms (self-reported food intolerance) after ingestion of food in general (gastrointestinal symptoms after ingestion of three or more foods, including gluten) and 44 (50.5%) who were designated as Group I IBS.

613 volunteers who did not meet the Rome III criteria for IBS, 215 (36.6 ± 21) women, mean age 36.6 ± 2; 162 (26.42%) reported self-reported food intolerance in general. They were designated as Group II without IBS. In both groups, positive responses to food intolerance in general were not concentrated in one or two foods, but were dispersed across several foods present in the Brazilian dietary pattern. None of the volunteers, with or without IBS, reported intolerance to only one food. In Group I, 44 (50.5%) volunteers reported other digestive symptoms not associated with foods or recurrent attacks compatible with a diagnosis of IBS, while in Group II, only 16.9% (104) of the volunteers frequently complained of other digestive symptoms. A personal history of self-reported food intolerance and other associated digestive differed significantly when the two groups were compared ($P < 0.04$).

DISCUSSION AND CONCLUSION

Irritable bowel syndrome (IBS) is one of the most common gastrointestinal diseases characterized by recurrent symptoms and multifactorial etiopathogenesis. There are no biological markers available for diagnosis of IBS [1-5]. With an estimated global prevalence of 10% to 20% [1-5], in European countries and the United States it ranges from 9% to 22%. In Latin America, there are few studies that have estimated the prevalence and burden of FGIDs, and most have been conducted in selected populations. Data for this region are limited, emphasizing the need for more rigorously conducted population-based studies reporting the prevalence of IBS in South America. Estimating the global prevalence of IBS is essential to understanding the burden and distribution of the disease. The incidence and prevalence of IBS have been studied systematically, but there are significant

Revista ARACÊ
ISSN: 2358-2472

variations in the results that may be due to study designs or geographic regions. The contrasts between the different studies highlight the importance of diagnostic criteria, study methodology, and subject populations, all important factors that may influence the reported frequencies of IBS and clinical subtypes of IBS. [22-62]

Our cross-sectional study included 700 university volunteers who completed a clinical epidemiological questionnaire and a Portuguese version of the Rome III modular questionnaire. The prevalence of IBS in this group was 12.4%. The factors highlighted by this study, when comparing the two groups of volunteers, were those related to the higher prevalence of IBS in women, the higher frequency of other gastrointestinal symptoms, and self-reported food intolerance. The prevalence rate was similar to that found in European countries and the USA. [19-24] However, prevalence varies between countries due to different diagnostic criteria used in studies and the use of different diagnostic criteria.

The prevalence of IBS was higher in women, as reported in most worldwide studies. [4, 22-62] Most reported global prevalence studies have found a female predominance for IBS. Of the total number of volunteers evaluated with IBS, 280 (70%) were women. These findings raise a relevant question. Do women pay more attention to their own health, seek more health services, and agree to participate in medical research more often than men? The answer is affirmative and deserves further studies on the subject.

From a pathophysiological perspective, it is believed that sex hormones may promote gender differences by affecting stress hormones, the immune response, gut-brain interactions, intestinal barrier functionality, and the gut microbiome [1,4,6-8,15]

When we evaluated the groups in relation to the prevalence of general food intolerance (gastrointestinal symptoms after ingestion of three or more foods), we found that the number of positive responses regarding general food intolerance was higher in volunteers diagnosed with IBS when compared to Group II. These results also confirm that food self-intolerance is significantly associated with IBS. Often, many patients with IBS report that their symptoms are triggered by the ingestion of certain food groups. Our results are in agreement with most studies. Several food groups, such as fermentable oligosaccharides, disaccharides, monosaccharides, polyols and gluten/wheat, have been recognized as possible triggers of symptoms compatible with the diagnosis of IBS [1,63-71]. These findings have therapeutic implications for IBS patients who identify the group of food intakes that trigger their symptoms.

Revista ARACÊ
ISSN: 2358-2472

In our study, the frequency of other digestive symptoms was significantly higher in volunteers who met the criteria for the diagnosis of IBS. Also, in a recent study we reported that the proportion of patients undergoing endoscopic (ED) procedures were women and the prevalence of dyspeptic symptoms and the percentage of normal esophagogastroduodenoscopy were significantly higher in women than in men [4]. Studies of individual dyspeptic symptoms have demonstrated sex-related differences in prevalence, as well as in gastric emptying and visceral sensitivity [1, 13-15]. Female sex has also been associated with a higher prevalence of functional digestive diseases [4-6,16-20]. The mechanisms involved in the pathophysiological changes found in FGID appear to be multiple and are still unclear [9-11,20,21]. A unifying hypothesis for the more frequent generation of these symptoms in women could be the phenomenon of visceral hypersensitivity identified in most patients with FGDI associated with differences in the effects of female hormones, since estrogen and progesterone receptors are present throughout the gastrointestinal tract [12-14]. Our results reinforce that the mechanisms of digestive symptoms are multifactorial and the new concept of disorders of brain-gut interaction (GBI) [1,8,15].

The factors highlighted in our study are consistent with previous studies specifically designed to study the prevalence of IBS worldwide. However, it is worth noting that prevalence varied between some of the countries studied [65]. The contrasts between these different studies highlight the importance of diagnostic criteria, study methodology, and subject populations, all important factors that can influence the reported frequencies and clinical features of IBS. The Rome Foundation and the World Gastroenterology Organization (WGO) [21] on the global perspective of IBS concluded that it was necessary to conduct population-based studies to estimate the frequency of this functional bowel disorder worldwide. We believe that our study contributes to the literature in the specific area and consequently to better clinical and therapeutic management of irritable bowel syndrome (IBS).

Revista ARACÊ
ISSN: 2358-2472

REFERENCES

1. Huang, K. Y., Wang, F. Y., Lev, M., Ma, X. X., Tang, X. D., & Lev, M. (2023). Irritable bowel syndrome: Epidemiology, overlap disorders, pathophysiology and treatment. *World Journal of Gastroenterology*, *29*(26), 4120–4135. https://doi.org/10.3748/wjg.v29.i26.4120

2. Soares, R. L. (2014). Irritable bowel syndrome: A clinical review. *World Journal of Gastroenterology*, *20*(34), 12144–12160. https://doi.org/10.3748/wjg.v20.i34.12144

3. Cremonini, F., & Talley, N. J. (2005). Irritable bowel syndrome: Epidemiology, natural history, health care seeking and emerging risk factors. *Gastroenterology Clinics of North America*, *34*(2), 189–204. https://doi.org/10.1016/j.gtc.2005.02.008

4. Soares, R. L. S., Costa, M. C., Saad, M. A. N., Salles, M. M. S., & Paes, J. (2017). Prevalence of normal endoscopic findings in women with dyspeptic symptoms in a Brazilian community. *Annals of Clinical and Experimental Metabolism*, *2*(3), 1024. ISSN: 2572-2492.

5. Ballou, S. K., & Keefer, L. (2013). Multicultural considerations in the diagnosis and management of irritable bowel syndrome: A selective summary. *European Journal of Gastroenterology & Hepatology*, *25*(10), 1127–1133. https://doi.org/10.1097/MEG.0b013e3283632bf2

6. Napolitano, M., Fasulo, E., Ungaro, F., Massimino, L., Sinagra, E., Danese, S., & Mandarino, F. V. (2023). Gut dysbiosis in irritable bowel syndrome: A narrative review on correlation with disease subtypes and novel therapeutic implications. *Microorganisms*, *11*(10), 2369. https://doi.org/10.3390/microorganisms11102369

7. Wang, L., Alammar, N., Singh, R., Nanavati, J., Song, Y., Chaudhary, R., & Mullin, G. E. (2020). Gut microbial dysbiosis in the irritable bowel syndrome: A systematic review and meta-analysis of case-control studies. *Journal of the Academy of Nutrition and Dietetics*, *120*(4), 565–586. https://doi.org/10.1016/j.jand.2019.05.015

8. Padhy, S. K., Sahoo, S., Mahajan, S., & Sinha, S. K. (2015). Irritable bowel syndrome: Is it "irritable brain" or "irritable bowel"? *Journal of Neurosciences in Rural Practice*, *6*(4), 568–577. https://doi.org/10.4103/0976-3147.169802

9. Hausteiner-Wiehle, C., & Henningsen, P. (2014). Irritable bowel syndrome: Relations with functional, mental, and somatoform disorders. *World Journal of Gastroenterology*, *20*(20), 6024–6030. https://doi.org/10.3748/wjg.v20.i20.6024

10. Lee, Y. Y., Waid, A., Tan, H. J., Chua, A. S., & Whitehead, W. E. (2012). Rome III survey of irritable bowel disease. *World Journal of Gastroenterology*, *18*(44), 6475–6480. https://doi.org/10.3748/wjg.v18.i44.6475

11. Sperber, A. D., Dumitrascu, D., Fukudo, S., Gerson, C., Ghoshal, U. C., Gwee, K. A., ... & Whitehead, W. (2017). The global prevalence of IBS in adults remains elusive due to

Revista ARACÊ
ISSN: 2358-2472

the heterogeneity of studies: A Rome Foundation working team literature review. *Gut*, *66*(6), 1075–1082. https://doi.org/10.1136/gutjnl-2015-311240

12. Quigley, E. M., Abdel-Hamid, H., Barbara, G., Bhatia, S. J., Boeckxstaens, G., De Giorgio, R., ... & Tzeuton, C. (2012). A global perspective on irritable bowel syndrome: A consensus statement of the World Gastroenterology Organisation Summit Task Force on irritable bowel syndrome. *Journal of Clinical Gastroenterology*, *46*(5), 356–366. https://doi.org/10.1097/MCG.0b013e318247157c

13. Gwee, K. A., & Chua, A. S. (2006). Functional dyspepsia and irritable bowel syndrome, are they different entities and does it matter? *World Journal of Gastroenterology*, *12*(17), 2708–2712. https://doi.org/10.3748/wjg.v12.i17.2708

14. Yang, Q., Wei, Z. C., Liu, N., Pan, Y. L., Jiang, X. S., Tantai, X. X., ... & Wang, J. H. (2022). Predictive value of alarm symptoms in Rome IV irritable bowel syndrome: A multicenter cross-sectional study. *World Journal of Clinical Cases*, *10*(2), 563–575. https://doi.org/10.12998/wjcc.v10.i2.563

15. El-Salhy, M. (2012). Irritable bowel syndrome: Diagnosis and pathogenesis. *World Journal of Gastroenterology*, *18*(37), 5151–5163. https://doi.org/10.3748/wjg.v18.i37.5151

16. Olmos, J. A. I. G., Guzmán, M., Gadea, O., et al. (2010). Irritable bowel syndrome: Prevalence, comorbidity and impact. A population-based study. *Gut*, *59*(Supplement 3), A361.

17. Ringel, Y., Sperber, A. D., & Drossman, D. A. (2001). Irritable bowel syndrome. *Annual Review of Medicine*, *52*, 319–338. https://doi.org/10.1146/annurev.med.52.1.319

18. Schmulson, M., Corazziari, E., Ghoshal, U. C., Myung, S. J., Gerson, C. D., Quigley, E. M., ... & Sperber, A. D. (2014). A four-country comparison of healthcare systems, implementation of diagnostic criteria, and treatment availability for functional gastrointestinal disorders. *Neurogastroenterology & Motility*, *26*(10), 1368–1385. https://doi.org/10.1111/nmo.12402

19. Canavan, C., West, J., & Card, T. (2014). The epidemiology of irritable bowel syndrome. *Clinical Epidemiology*, *6*, 71–80. https://doi.org/10.2147/CLEP.S40245

20. Wang, X., Luscombe, G. M., Boyd, C., Kellow, J., & Abraham, S. (2014). Functional gastrointestinal disorders in eating disorder patients: Altered distribution and predictors using ROME III compared to ROME II criteria. *World Journal of Gastroenterology*, *20*(43), 16293–16299. https://doi.org/10.3748/wjg.v20.i43.16293

21. Quigley, E. M., Sperber, A. D., & Drossman, D. A. (2011). WGO—Rome foundation joint symposium summary: IBS—the global perspective. *Journal of Clinical Gastroenterology, 45*(8), 1–2.

Revista ARACÊ
ISSN: 2358-2472

22. Sperber, A. D., Dumitrascu, D., Fukudo, S., Gerson, C., Ghoshal, U. C., Gwee, K. A., & Whitehead, W. (2016). The global prevalence of IBS in adults remains elusive due to the heterogeneity of studies: A Rome Foundation working team literature review. *Gut, 0*, 1–8.

23. Canavan, C., West, J., & Card, T. (2014). The epidemiology of irritable bowel syndrome. *Clinical Epidemiology, 6*, 71–80.

24. Lovell, R. M., & Ford, A. C. (2012). Global prevalence of and risk factors for irritable bowel syndrome: a meta-analysis. *Clinical Gastroenterology and Hepatology, 10*(7), 712–721.e4.

25. Quigley, E. M., Sperber, A. D., & Drossman, D. A. (2011). WGO—Rome foundation joint symposium summary: IBS—the global perspective. *Journal of Clinical Gastroenterology, 45*(8), 1–2.

26. Khoshkrood-Mansoori, B., Pourhoseingholi, M. A., Safaee, A., et al. (2009). Irritable bowel syndrome: a population-based study. *Journal of Gastrointestinal and Liver Diseases, 18*, 413–418.

27. Zeeshan, M. H., Vakkalagadda, N. P., Sree, G. S., et al. (2022). Irritable bowel syndrome in adults: Prevalence and risk factors. *Annals of Medicine and Surgery (London), 81*, 104408. https://doi.org/10.1016/j.amsu.2022.104408

28. Qumseya, B. J., Tayem, Y., Almansa, C., et al. (2014). Irritable bowel syndrome in middle-aged and elderly Palestinians: its prevalence and effect of location of residence. *American Journal of Gastroenterology, 109*(5), 723–739. https://doi.org/10.1038/ajg.2014.27

29. Costanian, C., Tamim, H., & Assaad, S. (2015). Prevalence and factors associated with irritable bowel syndrome among university students in Lebanon: findings from a cross-sectional study. *World Journal of Gastroenterology, 21*(12), 3628–3635. https://doi.org/10.3748/wjg.v21.i12.3628

30. Porter, C. K., Gloor, K., Cash, B. D., & Riddle, M. S. (2011). Risk of functional gastrointestinal disorders in U.S. military following self-reported diarrhea and vomiting during deployment. *Digestive Diseases and Sciences, 56*(11), 3262–3269. https://doi.org/10.1007/s10620-011-1762-3

31. Pitzurra, R., Fried, M., Rogler, G., Rammert, C., Tschopp, A., Hatz, C., Steffen, R., & Mutsch, M. (2011). Irritable bowel syndrome among a cohort of European travelers to resource-limited destinations. *Journal of Travel Medicine, 18*(4), 250–256. https://doi.org/10.1111/j.1708-8305.2011.00529.x

32. Becker-Dreps, S., Morgan, D., Peña, R., Cortes, L., Martin, C. F., & Valladares, E. (2010). Association between intimate partner violence and irritable bowel syndrome: A population-based study in Nicaragua. *Violence Against Women, 16*(7), 832–845. https://doi.org/10.1177/1077801210374816

Revista ARACÊ
ISSN: 2358-2472

33. Abid, S., Rehman, H., Awan, S., Artani, A., & Siddiqui, I. (2022). Epidemiology of functional gastrointestinal disorders using ROME III adult questionnaire, a population-based cross-sectional study in Karachi-Pakistan. *PLoS One, 17*(6), e0268403. https://doi.org/10.1371/journal.pone.0268403

34. Valerio-Ureña, J., Vásquez-Fernández, F., Jiménez-Pineda, A., Cortázar-Benítez, L. F., Azamar-Jácome, A. A., Duarte-Velázquez, M. E., & Torres-Medina, V. (2010). Prevalence of irritable bowel syndrome in Veracruz City, Mexico: A community-based survey. *Revista de Gastroenterología de México, 75*(1), 36–41.

35. Al Saadi, T., Idris, A., Turk, T., & Alkhatib, M. (2016). Epidemiology and risk factors of uninvestigated dyspepsia, irritable bowel syndrome, and gastroesophageal reflux disease among students of Damascus University, Syria. *Journal of Epidemiology and Global Health, 6*(4), 285–293. https://doi.org/10.1016/j.jegh.2016.07.001

36. Hernández-Velásquez, D. A., Rodríguez-Martínez, E., Montoya-Meneses, J. D., González-Ceballos, J. S., Mosquera-Pérez, K., Patiño-Mazuera, L., ... Machado-Alba, J. E. (2023). Clinical characteristics and treatment of irritable bowel syndrome in a Colombian population: A cross-sectional study. *Drugs - Real World Outcomes, 10*(4), 651–658. https://doi.org/10.1007/s40801-023-00395-x

37. Okeke, E. N., Agaba, E. I., Gwamzhi, L., Achinge, G. I., Angbazo, D., & Malu, A. O. (2005). Prevalence of irritable bowel syndrome in a Nigerian student population. *African Journal of Medicine and Medical Sciences, 34*(1), 33–36.

38. Li, M., Lu, B., Chu, L., Zhou, H., & Chen, M. Y. (2014). Prevalence and characteristics of dyspepsia among college students in Zhejiang Province. *World Journal of Gastroenterology, 20*(13), 3649–3654. https://doi.org/10.3748/wjg.v20.i13.3649

39. Morgan, D. R., Benshoff, M., Cáceres, M., Becker-Dreps, S., Cortes, L., Martin, C. F., ... Peña, R. (2012). Irritable bowel syndrome and gastrointestinal parasite infection in a developing nation environment. *Gastroenterology Research and Practice, 2012*, 343812. https://doi.org/10.1155/2012/343812

40. Park, H. (2011). Functional gastrointestinal disorders and overlap syndrome in Korea. *Journal of Gastroenterology and Hepatology, 26*(Suppl 3), 12–14. https://doi.org/10.1111/j.1440-1746.2011.06644.x

41. Siddiqui, S., Misra, S. P., Dwivedi, M., & Pant, S. (2017). Irritable bowel syndrome and bronchial asthma: Are they associated in the Indian population? *Journal of Clinical and Diagnostic Research, 11*(2), OC21–OC23. https://doi.org/10.7860/JCDR/2017/22530.9351

42. Alshaikh, A. A., Alamri, S. M., Riaz, F., Mahmood, S. E., Shlwan, M. A. M., Naser, A., ... Ghazy, R. M. (2024). Exploring the burden of irritable bowel syndrome among university students in Saudi Arabia: A study on prevalence, psychological associations, and well-being. *Medicine, 103*(19), e38099. https://doi.org/10.1097/MD.0000000000038099

Revista ARACÊ
ISSN: 2358-2472

43. Lule, G. N., & Amayo, E. O. (2002). Irritable bowel syndrome in Kenyans. *East African Medical Journal, 79*(7), 360–363. https://doi.org/10.4314/eamj.v79i7.8839

44. Rahman, M. M., Mahadeva, S., & Ghoshal, U. C. (2017). Epidemiological and clinical perspectives on irritable bowel syndrome in India, Bangladesh, and Malaysia: A review. *World Journal of Gastroenterology, 23*(37), 6788–6801. https://doi.org/10.3748/wjg.v23.i37.6788

45. Dong, Y. Y., Zuo, X. L., Li, C. Q., Yu, Y. B., Zhao, Q. J., & Li, Y. Q. (2010). Prevalence of irritable bowel syndrome in Chinese college and university students assessed using Rome III criteria. *World Journal of Gastroenterology, 16*(33), 4221–4226. https://doi.org/10.3748/wjg.v16.i33.4221

46. Arnaout AY, Nerabani Y, Douba Z, Kassem LH, Arnaout K, Shabouk MB, Zayat H, Mayo W, Bezo Y, Arnaout I, Yousef A, Zeina MB, Aljarad Z; PRIBS Study Team.The prevalence and risk factors of irritable bowel syndrome (PRIBS study) among adults in low- and middle-income countries: A multicenter cross-sectional study.Health Sci Rep. 2023 Oct 4;6(10):e1592. doi: 10.1002/hsr2.1592. eCollection 2023 Oct.PMID: 37808932 Free PMC article.

47. Nakov R, Dimitrova-Yurukova D, Snegarova V, Uzunova M, Lyutakov I, Ivanova M, Madzharova K, Valkov H, Hristova R, Ivanov K, Kosturkov I, Valcheva G, Nakov N, Nakov V.Prevalence of Irritable Bowel Syndrome, Functional Dyspepsia and their Overlap in Bulgaria: a Population-Based Study.J Gastrointestin Liver Dis. 2020 Sep 9;29(3):329-338. doi: 10.15403/jgld-2645.PMID: 32919417

48. Li CY, Li SC.Treatment of irritable bowel syndrome in China: a review.World J Gastroenterol. 2015 Feb 28;21(8):2315-22. doi: 10.3748/wjg.v21.i8.2315.PMID: 25741137 Free PMC article. Review.

49. Oshima T, Miwa H.Epidemiology of Functional Gastrointestinal Disorders in Japan and in the World.J Neurogastroenterol Motil. 2015 Jul 30;21(3):320-9. doi: 10.5056/jnm14165.PMID: 26095436 Free PMC article.

50. Häuser W, Lempa M.[Irritable bowel syndrome]. Review. Schmerz. 2004 Apr;18(2):130-5. doi: 10.1007/s00482-003-0273-3.PMID: 15067533 German.

51. A systematic review of the prevalence and risk factors of irritable bowel syndrome among medical students. Ibrahim NK. Turk J Gastroenterol. 2016;27:10–16. - PubMed

52. The prevalence of irritable bowel syndrome among Chinese university students: a systematic review and meta-analysis. Yang W, Yang X, Cai X, et al. Front Public Health. 2022;10:864721. - PMC - PubMed

53. Aurelio López-Colombo, Douglas Morgan, Dalia Bravo-González, Alvaro Montiel-Jarquín, Socorro Méndez-Martínez, and Max Schmulson, “The Epidemiology of Functional Gastrointestinal Disorders in Mexico: A Population-Based Study,” Gastroenterology Research and Practice, vol. 2012, Article ID 606174, 8 pages, 2012. https://doi.org/10.1155/2012/606174

Revista ARACÊ
ISSN: 2358-2472

54. D. F. Gòmez A lvarez, J. G. Morales Vargas, L. M.A. Rojas Medina, S. C. M´ ujica Oviedo, P. A. Camacho L´opez, andG. E. Rueda Jaimes, “Factores sociosanitarios y prevalenciadel síndrome del intestino irritable segun los criterios diagnosticos de Roma III en una poblacion general de Colombia,”Gastroenterologia y Hepatologia, vol. 32, no. 6, pp. 395–400, 2009.

55. R. S.-V. G. Prochazka, M. Ojeda, S. Vila et al., “Prevalence ofirritable bowel syndrome in students of a university in Lima-Peru,” The American Journal of Gastroenterology, vol. 101,supplement, p. S476, 2006.

56. Lessa, Montenegro;Chein,M; Silva, D;Poli Neto O et al Irritable bowel syndrome in women with chronic pelvic pain in a Northeast Brazilian city /.Rev. bras. ginecol. obstet; 35(2): 84-89, fev. 2013.

57. Vergara,I Beatriz M; Toma P R. Frecuencia del SII en una población de Montevideo.Arch. med. interna (Montevideo); 25(4): 91-96, 2003

58. Pedreira M.Prevalência de síndrome do intestino irritável em estudantes. Revista Brasileira de Neurologia e Psiquiatria. 2013 ago;7(2):51-53

59. Soares, R. L. S., Santos, J. D., & Rocha, V. R. S. R. (2005). Prevalence of irritable bowel syndrome in a Brazilian Amazon community. Neurogastroenterology and Motility, 17(6), 883-883.

60. Nelissen, L G; Koppen, I J N; Follett, F R; Boggio-Marzet, C;.Prevalencia de los trastornos funcionales digestivos entre los adolescentes de Buenos Aires,, Argentina. Rev Gastroenterol Mex; 83(4): 367-374, 2018 .

61. Madrid-Silva AM, Defilippi-Caffri C, Landskron-Ramos G, Olguín-Herrera F, Reyes-Ponce A, Castro-Lara A, Larraín-Corp S, Martínez-Roje N, Cortés-Espinoza J. Prevalencia de síntomas de intestino irritable en población asistente a centros comerciales de Santiago de Chile [The prevalence of irritable bowel symptoms in a population of shopping mall visitors in Santiago de Chile]. Rev Gastroenterol Mex. 2013 Oct-Dec;78(4):203-10. Spanish. doi: 10.1016/j.rgmx.2013.07.004. Epub 2013 Nov 27. PMID: 24290320.

62. G. B. M. L. Sander, C. F. Francesconi, M. H. I. Lopes, and J. Madi, “Unexpected high prevalence of non-investigate dyspepsia in Brazil: a population based study,” Gut, vol. 56,supplement 3, p. A195, 2007.

63. Litleskare S, Wensaas KA, Eide GE, Hanevik K, Kahrs GE, Langeland N, Rortveit G. Perceived food intolerance and irritable bowel syndrome in a population 3 years after a giardiasis-outbreak: a historical cohort study. BMC Gastroenterol. 2015 Nov 19;15:164. doi: 10.1186/s12876-015-0393-0. PMID: 26585714; PMCID: PMC4653841.Douglas R. Morgan, Matthew Benshoff, Mercedes Cáceres, et al. Irritable bowel syndrome and gastrointestinal parasite infection in a developing nation environment Gastroenterology Research and Practice, vol. 2012, Article ID 343812, 6 pages, 2012. https://doi.org/10.1155/2012/343812

Revista ARACÊ
ISSN: 2358-2472

64. Foxx-Orenstein AE, Clarida JC.Irritable bowel syndrome in women: the physician-patient relationship evolving.J Am Osteopath Assoc. 2001 Dec;101(12 Suppl Pt 2):S12-6.PMID: 11794749 Review.

65. Grazioli B, Matera G, Laratta C, Schipani G, Guarnieri G, Spiniello E, Imeneo M, Amorosi A, Focà A, Luzza F.Giardia lamblia infection in patients with irritable bowel syndrome and dyspepsia: a prospective study.World J Gastroenterol. 2006 Mar 28;12(12):1941-4. doi: 10.3748/wjg.v12.i12.1941.PMID: 16610003 Free PMC article.

66. Soares RL, Figueiredo HN, Maneschy CP, Rocha VR, Santos JM.Correlation between symptoms of the irritable bowel syndrome and the response to the food extract skin prick test. Braz J Med Biol Res. 2004 May;37(5):659-62.

67. Soares,RLS; . Figueiredo,HN; Moreira FilhoPF;Oliveira RF;Hamilton N; Gonçalves CD ; MicuciA; Bromonschenkel I;Parada BA;Rodrigues CC.The prevalence and clinical characteristics of atopic manifestations in patients with irritable bowel syndrome in a Brazilian urban community. Gastroenterology Insights 2010; 2:e11

68. Irritable bowel syndrome, food intolerance and non- celiac gluten sensitivity.A new clinical challenge . Arq Gastroenterol • 2018. v. 55 nº 4 out/dez.

69. Prevalence of Self-Reported Gluten Sensitivity (SRGS) in Irritable Bowel Syndrome (IBS) in a Brazilian Community. This abstract was presented at the 3RD Meeting of Federation of Neurogastroenterology and Motility -29 August-1 September 2018-Amsterdan

70. SOARES, ROSA L S; SAAD, MARIA AUXILIADORA N ; DOS SANTOS, MARCIA S ; DOS SANTOS, ANA MARIA R ; LIMA, BALARINI GIOVANNA APARECIDA; MENEZES, GLAUBER MARCIUS . The prevalence of self-reported gluten sensitivity (SRGS) in irritable bowel syndrome (IBS)in a Brazilian community. A pilot study. LUMEN ET VIRTUS, v. 15, p. 106-115, 2024. DOI 10.56238/levv15n38-006

71. Cuomo R, Andreozzi P, Zito FP, Passananti V, De Carlo G, Sarnelli G.Irritable bowel syndrome and food interaction.World J Gastroenterol. 2014 Jul 21;20(27):8837-45. doi: 10.3748/wjg.v20.i27.8837.PMID: 25083057 Free PMC article. Review.