

Small Bowel Bacterial Overgrowth in Patients with Irritable Bowel Syndrome: The First Study in Iran

Mehdi HayatBakhsh Abbasi¹, MohammadJavad Zahedi¹, Sodaif Darvish Moghadam¹,
Sara Shafieipour^{1*}, Mahroo HayatBakhsh Abbasi¹

1. Clinical Research Unit, Afzalipour Hospital, Kerman University of Medical Sciences, Kerman, Iran

ABSTRACT

BACKGROUND

Small intestinal bacterial overgrowth (SIBO) may have a role in the pathophysiology of irritable bowel syndrome (IBS). So, the aim of this study was to assess the association between SIBO and IBS by using glucose breath test (GBT) in Kerman city as the first study in Iranian population.

METHODS

107 patients with IBS and 107 healthy individuals were enrolled in our study. All the participants underwent GBT. A peak of H₂ values >20 p.p.m above the basal value after glucose ingestion was considered suggestive of SIBO. SPSS software version 17 was used for data analysis. P value < 0.05 was considered as statistically significant.

RESULTS

Of the 107 patients with IBS, 40 had positive GBT (37.4%) compared with 14 (12.1%) out of the 107 control participants (p < 0.001). Dominant symptoms in patients with IBS were diarrhea in 36 (33.6%), constipation in 12 (11.2%), abdominal pain in 22 (20.6%), bloating in 28 (26.2%), and change in bowel habit in 9 (8.4%) patients. There was not statistically significant difference among any of this IBS subgroups and positive GBT (p = 0.44).

CONCLUSION

There is a positive association between IBS and SIBO. We suggest a Placebo-controlled bacterial eradication study for identifying the role of SIBO in IBS.

KEYWORDS

Intestinal bacterial overgrowth; Small intestinal bacterial over growth; Glucose breath test; Iran

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INTRODUCTION

According to ROME III criteria, irritable bowel syndrome (IBS) is characterized by chronic inconstant abdominal discomfort or pain without known organic disease associated often with changes in bowel habit. Similar to the other parts of the world, IBS is one of the most common causes of referral to gastrointestinal clinics in Iran, which has partially negative effects on the patients' quality of life.¹⁻⁴

*Corresponding Author:

Sara Shafieipour, MD
Clinical Research Unit, Afzalipour Hospital, Kerman University of Medical Sciences, Kerman, Iran
Telefax: + 98 343 3222270
Email: shafieipour@kmu.ac.ir
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Although there are various hypotheses about the pathophysiology of this disorder, the exact underlying cause has remained unclear. Bloating is a common complaint among patients with IBS and some hypotheses suggest the increased small intestinal gas production due to small intestinal bacterial overgrowth (SIBO) in such patients.⁵⁻⁷ Moreover, some studies show the role of rifaximin in the improvement of IBS associated symptom including diarrhea and bloating.⁸⁻¹¹

Some studies were performed to assess the role of SIBO in IBS. Most of these studies use the lactulose or glucose breath test, but there was a controversy among the results of these studies.¹²

Although Pimentel and colleagues showed positive lactulose breath test (LBT) in 78% of patients with IBS in United States.¹³ In a study by Bratten et al., SIBO was not more common in 224 patients with IBS compared with 40 healthy individuals by using LBT.¹⁴ Also Posserud and colleagues showed the presence of SIBO in only 4% of both patients and control individuals by using culture of jejunal aspirate.¹⁵

Identifying the possible role of SIBO in pathophysiology of symptoms in patients with IBS may lead to new treatment options such as antibiotics in such patients. So, the aim of this study is to assess the association between SIBO and IBS by using glucose breath test (GBT) in Kerman city, the center of the largest province in Iran. To the best of our knowledge, there is not any other study on this issue in Iranian population.

MATERIALS AND METHODS

Study population

In a case-control study, from February 2013 to January 2014, 107 consecutive patients who were diagnosed as having IBS according to Rome III criteria and had referred to three gastroenterology clinics in Kerman city, were enrolled in our study.

Exclusion criteria were: previous known gastrointestinal disease, connective tissue disease, diabetes mellitus or thyroid disease, narcotic abuse, positive laboratory tests for celiac and HIV diseases,

laxative, Proton pump inhibitors (PPIs) or antibiotic consumption within the previous 8 weeks, medical history of intestinal surgery (except appendectomy), and previous GBT. The control populations were healthy individuals without a history of IBS who were matched according to sex and age to the IBS group. These individuals were selected from those who voluntarily had referred to the hemotransfusion center in Kerman city.

Glucose breath test

Under standard conditions that discussed below GBT was performed. The participants should be at least 12 hours fast with restricted carbohydrate diet during the previous 24 hours without a history of laxative using in previous 30 days. At least 30 min before and during the test smoking and physical exercise were discontinued. Brushing and mouth washing was advised on the day of testing. After ingestion of 1 g/kg glucose dissolved in 150 ml water, two breath samples were obtained at baseline and at 20, 40, 60, 80, and 100 minutes. If the H₂ levels was >20 ppm when the baseline was <10 ppm or increased by >12 ppm when the baseline was ≥10 ppm, the diagnosis of SIBO was considered.

Statistical analysis

Frequency and percentage were used for categorizing qualitative variables. Pearson's Chi square test (X²) and Fisher's exact test were used to compare age, sex and GBT differences between each group. SPSS software version 17 was used for data analysis. *P* value < 0.05 was considered as statistically significant.

Ethical issues

All participants consented to participate and the Ethical Review Committee of the Faculty of Medicine, Kerman University of Medical Sciences approved this study.

RESULTS

A total of 214 participants (107 patients with IBS

and 107 healthy individuals) were enrolled in our study. There was no statistically significant difference between the two groups regarding to sex and age (table1).

Of the 107 patients with IBS, 40 (37.4%) patients had positive GBT with respect to 14 of 107 control subjects (12.1%). The difference between groups was statistically significant ($p < 0.001$, table1).

Dominant symptoms in patients with IBS were diarrhea in 36(6/33%), constipation in 12 (2/11%), abdominal pain in 22 (6/20%), bloating in 28(26.2%), and change in bowel habit in 9(8.4%) patients(table2). There was not statistically significant difference among any of this IBS subgroups and those with positive GBT ($p = 0.44$, table3).

DISCUSSION

The results of this study showed that 37.4% of the patients with IBS compared with 12.1% of healthy subjects had positive GBT. So, there might be a positive association between IBS and SIBO in this first study in Iran. Although there are some evidences for association between SIBO and patients with IBS, but a systematic review in 2009, which included 12 studies, failed to resolve this obscurity due to the variation in defining IBS, type of tests used for SIBO diagnosis, and explanation of the test results. 12 Results of these studies show that the prevalence of SIBO in patients with IBS is about 4-78% compared with 1-40% in healthy subjects.

In Asia, limited studies have been performed to assess SIBO in patients with IBS. In a study by Park and colleagues in Korea abnormal LBT was not significantly different between IBS and other functional bowel disease compared with healthy individuals. 16 Prevalence of SIBO in north Indian patients and Pakistan was 11.1% and 14%, respectively. 17,18 Factors such as diet habits, narcotic use, geography, lifestyle, immunodeficiency, and change in bowel motility affect enteric bacteria colonization and can cause SIBO. 19 All these factors may explain the different prevalence of SIBO in IBS patients in the world.

In clinical practice, there are three available methods for diagnosis of SIBO. None of them are perfect

Table1: Demographic characteristics and positive GBT in patients with IBS and control group.

Variable	Parameter	IBS -	IBS +	p-value
Age	<45	(86%) 92	86(80.4%)	0.27
	45	(14%) 15	21(19.6%)	
Sex	male	57(53.3%)	54(50.5%)	0.63
	female	50(46.7%)	53(49.5%)	
GBT	-	94(87.9%)	67(62.6%)	>0.001
	+	(12.1%) 13	40(37.4%)	

Table2: Frequency of symptoms in patients with IBS.

Type of symptom dominance	IBS +
Diarrhea	36(33.6%)
Constipation	12(11.2%)
Abdominal pain	22(20.6%)
Bloating	28(26.2%)
Change in bowel habit	9(8.4%)
Total	107(100%)

Table3: Frequency of positive GBT in any types of symptoms in patients with IBS.

Types of symptoms	GBT +	p-value
Diarrhea	12(30%)	0.44
Constipation	3(7.5%)	
Abdominal pain	11(27.5%)	
Bloating	12(30%)	
Change in bowel habit	2(5%)	

and all have some limitations.²⁰ Traditionally, culture of the jejunal aspirate was defined as the gold standard for this purpose but high price, aggressiveness, possible sample contamination, low accessibility, and finally inability for diagnosis of distal small bowel bacterial overgrowth and culture all species of bacteria limit its application as a routine laboratory test.²⁰⁻²² Breath tests indirectly assesses SIBO by measuring certain exhaled gases producing from bacterial fermentation of orally ingested substrates. Although there are no greatly agreement upon interpretation, preparation, and performance of breath testing, low cost, more safety, and availability are characteristics that made it the first choice for SIBO diagnosis in clinical practice.

Both GBT and LBT are the most common breath tests with distinct limitations. Sensitivity of GBT

varied from 17% to 68% and its specificity was between 44% to 86% compared with 20% to 93% and 30% to 86%, respectively for LBT in clinical trials. Low sensitivity of GBT may be due to rapid absorption of glucose in the proximal part of the small intestine but lactulose is absorbed in distal bowel, so this constraint does not exist for LBT. Also, the specificity of all tests is low, because of inability to dissociation between SIBO and rapid intestinal transit time.^{20,23-26}

The strength of this study was to exclude the subjects with recent PPIs use. In a systematic review, including 12 studies, only 3 studies considered this limitation.^{12,27-29} A Meta-analysis in 2013 by Lo WK and colleagues, showed concurrent use of PPIs inhibited gastric acid secretion, which might lead to SIBO.³⁰

Our study has two major limitations. Firstly, we may overestimate the prevalence of SIBO in IBS because we included patients who had referred to some tertiary centers in Kerman that had usually severe and refractory disease. The second limitation is false-positivity of GBT in rapid small bowel transit, which was discussed above.

In conclusion, the results of this study showed a positive association between IBS and SIBO in the first study in Iran by using the GBT. We suggest a placebo-controlled bacterial eradication study for identifying the role of SIBO on IBS pathophysiology.

CONFLICT OF INTEREST

The authors declare no conflict of interest related to this work.

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