

# IRRITABLE BOWEL SYNDROME PREVALENCE AND THE ROLE OF DIET IN ADULT POPULATION

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## Summary

Irritable bowel syndrome (IBS) is one of the most common functional gastrointestinal disorders with a very strong psychosomatic component in the etiology. The prevalence is higher in women and many IBS patients say that food triggers their symptoms. The aim of this study was to determine the prevalence of IBS symptoms (GSRS-IBS questionnaire) and the role of diet and dietary habits on IBS symptoms in adults. An observational online study with the study-specific questionnaire was completed by 109 adults (84.4% women, 15.6% men), average age 26 years (21-63 years). 12.8% of study participants had high IBS score (44-75 points). Participants with high IBS score tend to overeat (93.0% sometimes, 7.0% always) and skip meals (36.0%) which was proven to worsen IBS symptoms. Coffee consumption also worsens IBS symptoms, as well as the consumption of all drinks (without water) and sweets. IBS score was higher in participants who said that some food provokes symptoms. Beans (lentil, pea, bean) were proven to increase the risk for high IBS score, while strong spices (soup cube, chilli, curry) increase the risk of high IBS only in women (univariate logistic regression).

**Keywords:** irritable bowel syndrome, IBS score, diet, dietary habits, risk factors

## Introduction

Irritable bowel syndrome (IBS) is a functional gastrointestinal disorder characterized with the recurrent abdominal pain followed by altered bowel movements (Bilić et al., 2015). IBS poses a significant healthcare burden (through direct or indirect expenses) because it is one of the most common reasons for sick leave and directly decreases person's quality of life (Lovell and Ford, 2012; Halland and Saito, 2015).

The pathophysiology of IBS is characterized by complete absence of histological, endoscopic or radiological manifestations of the digestive tract disorder (Ikechi et al., 2017). Mechanisms involved in the development of IBS are very complex, and intertwines biological and psychological factors (Saha, 2014; El-Salhy, 2015). Due to the fact that functional gastrointestinal disorders are classified only according to the symptoms manifested, Rome IV classification system was developed to enable clinical diagnosis of IBS (Drossman and Hasler, 2016). Rome IV criteria expands the concept of IBS by underlying alterations in the interaction between the enteric nervous system (gut and digestion in general) and brain. This interaction is related to disturbances in the gut motility, visceral hypersensitivity, leaky gut syndrome, and consequently has negative impact on the immune response, leads to dysbiosis, and alters processing of stimuli in the central nervous system (Schmulson and Drossman, 2017). Mentioned changes, along with visceral hyperalgesia (increased pain sensitivity) and post-infective state represented individually and variably are some of the possible etiological factors involved in IBS (El-Salhy, 2012; El-Salhy, 2015; Sikander et al., 2009).

Many IBS patients claim that their diet is linked to the symptoms they are experiencing, and that certain food worsens their symptoms (Krogsgaard et al., 2017). Today's standard for IBS diet therapy is the so called FODMAP diet characterized by elimination of foods rich in fermentable oligo-, di- and monosaccharides and polyols (Banjari et al., 2017). This diet seems efficient in improving the symptoms in IBS patients (fewer symptoms) (Sheperd et al., 2008).

IBS prevalence is higher among women, regardless of age and ethnic group, but almost half of those reporting IBS symptoms are up to 35 years old (Canavan et al., 2014). Various psychological disorders accompany 70 to 90 % of IBS patients (depression, anxiety and others), and they are positively correlated with worse IBS symptoms. Still, their interrelation in the pathophysiology of IBS is unclear (Longstreth et al., 2006; Bilić et al., 2015). Learned behaviour from parents is among possible etiological factors, while having a mother with IBS represents an independent risk factor for IBS (Levy et al., 2001).

Global prevalence of IBS is 11.2% (Lovell and Ford, 2012), and 11.5% for Europe (Hungin et al., 2003). Epidemiological studies conducted in continental part of Croatia showed that the prevalence of IBS was high; 28.00% for the area of Zagreb, 26.52% for Bjelovar-Bilogora County and 29.16% for Osijek-Baranja County (Grubić et al., 2014).

## Subjects and methods

The aim of this study was to determine the prevalence of high IBS score in adult population, and analyse the role of dietary habits on IBS score.

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### Study Participants

An observational online study was carried out on general population from the area of Republic of Croatia. The research was conducted as a one-time anonymous study. Target group were women aged 20 to 40 years, but no restriction on gender was set. The questionnaire was created specifically for the purposes of this study by using a publicly-available program (Google Forms). All answers were automatically stored in tabular form (MS Office Excel). Social networks were used for the recruitment of potential participants. The questionnaire was completed by 109 adults, out of which only three had confirmed diagnosis of IBS.

### Questionnaire

The questionnaire included general and socioeconomic characteristics, body mass and height, and questions regarding other medical conditions, regular use of medications, use of supplements. Participants were asked to assess their physical activity level, smoking habits, and their dietary habits (e.g. breakfast skipping, overeating, number of meals, etc.). Also, consumption of beverages (coffee, tea, alcohol, juices) and spicy foods, and use of spices (e.g. "Vegeta", salt, pepper, chilli) were assessed. Gastrointestinal symptom rating scale for IBS (GSRs-IBS) was integrated in the questionnaire (Wiklund et al., 2017). On a 7 grade Likert scale participants had to assess their subjective experience of gastrointestinal symptoms they had felt for past 7 days prior completing the questionnaire. Participants' answers were scored and represent IBS score. Minimum score is 13 and maximum 91 points. Higher score indicates more IBS symptoms present in a person. Finally, participants were asked to assess consumption of foods listed in the literature as possible propagators of the IBS symptoms. Monthly consumption of these

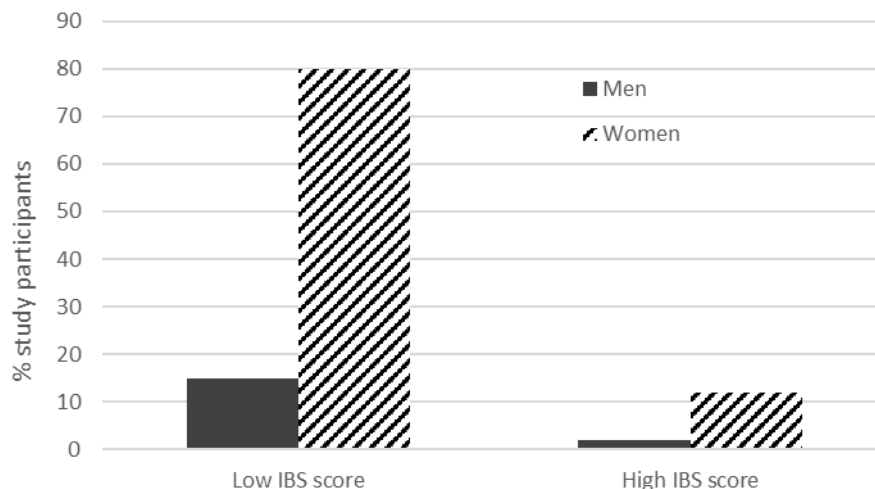
foods, in a form of a semi-quantitative food frequency questionnaire (sFFQ) was assessed (2 or more times a day, once a day, 3 to 5 times a week, 1 to 2 times a week, 1 to 2 times in two weeks, 1 to 2 times in a month and rarely or never).

### Statistical analysis

Statistical analysis was performed with Statistica (version 13.4, StatSoft Inc., SAD), at significance level 0.05 and 0.01. Graph plotting was performed with MS Office Excel tool (version 2013, Microsoft Corp., SAD). Normality of data distribution was tested by the non-parametric Kolmogorov-Smirnov test for the comparison of medians and arithmetic mean, and histograms plotting. Spearman's correlation test and Mann-Whitney U test for the comparison of variables depending on the IBS score were used. Univariate logistic regression was performed and variables that were shown as significant were tested with multivariate logistic regression.

### Results and discussion

Total of 109 participants, 92 women (84.4%) and 17 men (15.6%), average age 26 years (24 – 35, minimum 21 and maximum 63 years) completed the questionnaire. Based on the GSRs-IBS scores, participants were divided into two groups. The first group achieved low IBS score (scores of 13 to 44) while the second group had high IBS score (from 44 to 75). The majority of study participants had low IBS score (87.1%), with almost equally represented men and women in both categories. However, more women than men had high IBS score (14.1% of women in comparison to 11.8% of men) (Fig. 1). The prevalence of high IBS score in study population is in line with previously mentioned epidemiologic data for IBS (Lovell and Ford, 2012).

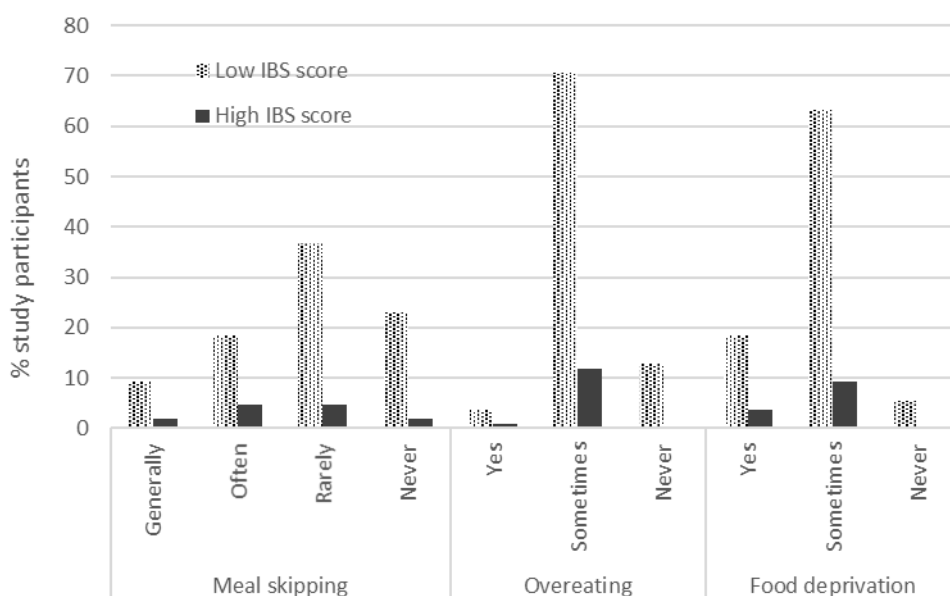


**Fig. 1.** Gender-based distribution of study participants according to their IBS score (N=109)

Median Body Mass Index (BMI) of study participants (BMI) was 22.1 (20.2 – 24.9) kg/m<sup>2</sup> with no statistical difference or correlation between BMI and the category of IBS score. The relationship between BMI and IBS is still unclear. Presence of gastrointestinal symptoms could lead to lower food intake consequently leading to malnutrition, therefore IBS patients would have lower BMI (El-Salhy, 2015). This was confirmed in a study by Kubo et al. (2011). However, Simrén et al. (2001) found that patients with IBS are mainly normal weighted or overweight. Results of a comprehensive review by Pickett-Blakely (2014) showed that obesity worsens IBS symptoms.

Among participants in the low IBS score, 27.4% said they have at least one more medical condition and 28.4% are regularly taking medications. In the high

IBS score category, 35.7% said they have at least one more medical condition and 42.8% of them are regularly taking medications. A weak correlation was found between IBS score and presence of another medical condition ( $r=0.192$ ) as well as for the use of medications ( $r=0.241$ ). Studies have shown that a broad range of medical conditions accompany IBS, from gastroesophageal reflux, genitourinary symptoms, fibromyalgia, headache, back pain and other. Still, IBS is often misdiagnosed or not recognized timely and the question is whether other conditions are consequences or causes of IBS (Saha, 2014). Importantly, between 20 and 30% of IBS patients are prone to self-medication, mainly to antacids, which are ineffective for the symptoms experienced (Kua et al., 2012; Niknam et al., 2016).



**Fig. 2.** Frequency of meal skipping, overeating and food deprivation in study participants according to their IBS score (N=109)

Participants do not differ in the average number of meals per day according to the IBS score category. However, 93.0% of participants with high IBS score sometimes overeat, even 71.0% tend to deprive of food, and 36.0% said they often skip meals (Fig. 2). Studies have shown that IBS patients tend to skip meals which can cause disturbances in gastrointestinal motility and contribute to the symptoms of IBS. It has also been confirmed that the relative risk for IBS is 2-4 times greater in persons who tend to overeat because large amounts of food in one meal can provoke symptoms of IBS (Cozma-Petruț et al., 2017). The results of this research confirm these statements; weak negative correlation

between food deprivation and higher IBS score was found (Table 1). In other words, meal skipping is related to higher IBS score, i.e. indicates more symptoms of IBS present.

Higher consumption of all types of drinks (except water) shows strong positive correlation with IBS score. Also, participants who indicated that some food provokes gastrointestinal symptoms (is not well tolerated) have higher IBS scores (Table 1). Additionally, weak correlation was found between the consumption of sweets (ice cream, chocolate, fruit yoghurt, milk deserts and creamy cakes) and higher IBS score (Table 1). This particular result can indicate the need for compensation for altered

function of serotonin, which has been found in IBS patients, and serotonin has a major role in

gastrointestinal motility (Saha, 2014; Sikander et al., 2009).

**Table 1.** Correlations between some diet characteristics and IBS score of study participants

Diet characteristics	IBS score
Food deprivation	-0.193*
Coffee	0.284**
Beverages (except water)	0.328**
Sweets	0.199*
Some food is not well tolerated	0.300**

Spearman's correlation test, \*\*correlation is significant at  $p < 0.01$

\*correlation is significant at  $p < 0.05$

Univariate logistic regression showed that the consumption of beans (lentil, pea, bean) is the only positive predictor for high IBS score (OR = 1,880, 95% CI = 1,009 – 3,503;  $P = 0,047$ ). Interestingly, the use of strong spices represent positive predictor for high IBS score only in women (OR = 2,748, 95% CI = 1,015 – 7,443;  $P = 0,047$ ).

These results on specific foods and IBS symptoms are in line with literature findings. Beans have high content of galactans that can induce gas production and consequently increase intrainestinal pressure, spices contain flavour enhancers which can also provoke gastrointestinal symptoms, and sweets can cause symptoms because of the high sugar content or lactose contained in milk-based products (El-Salhy, 2015; El-Salhy and Gundersen, 2015; Fedewa and Rao, 2014).

## Conclusions

The prevalence of high IBS score determined is in accordance with previous findings. A number of diet characteristics have been identified as positive predictors of high IBS score. However, the results on the impact of specific foods are still unclear and more research on larger populations should be conducted to elucidate their role in IBS. Presented results favour the complexity of IBS pathophysiology and present valuable contribution to the field of IBS. Some of the findings could be used in practice for the education of IBS patients, especially regarding the foods that should be avoided to alleviate IBS symptoms.

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