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Irritable Bowel Syndrome in Croatia

Petra Grubić[1], Dragan Jurčić[1,2], Barbara Ebling[3], Rudika Gmajnić[4], Bojana Nikolić[5], Sanda Pribić[4], Ante Bilić[1,6] and Maja Tolušić Levak[7]

[1] University of Zagreb, University Hospital »Sveti Duh«, Department of Gastroenterology and Hepatology, Internal Clinic, Zagreb, Croatia
[2] »J. J. Strossmayer« University, School of Medicine, Osijek, Croatia
[3] »J. J. Strossmayer« University, University Hospital Center Osijek, Internal Clinic, Osijek, Croatia
[4] »J. J. Strossmayer« University, School of Medicine, Department of Family Medicine, Osijek, Croatia
[5] Health Centre Čazma, Croatia
[6] University of Zagreb, School of Medicine, Zagreb, Croatia
[7] »J. J. Strossmayer« University, School of Medicine, Department of Histology and embriology, Osijek, Croatia

A B S T R A C T

There are three epidemiological studies of irritable bowel syndrome (IBS) that were conducted in Croatia (in the area of Zagreb in 2002, Bjelovarsko-bilogorska County in 2008, and finally in Osječko-baranjska County in 2011). The aim of this study is to analyze the anthropometric, demographic and socioeconomic characteristics of IBS in Croatia comparing these three studies. The studies included a questionnaire based on Rome criteria. Study population matched the adult population of Croatia according last available census (1991, 2001 resp.). Studies showed a high prevalence of IBS and some common factors relevant for development of IBS were determined such as gender, body mass index and lower level of education. There is a need for further investigations in coastal Croatia applying a uniform questionnaire on anthropometric, demographic and socioeconomic characteristics of IBS and Rome III criteria, diagnostic questionnaires and scoring algorithm for functional gastrointestinal disorders developed by Rome Foundation applicable in clinical practice and population studies, regarding the significant high prevalence of IBS in our country.

***Key words**: functional gastrointestinal disorders, IBS, epidemiology, Croatia*

Introduction

IBS belongs to the group of functional gastrointestinal disorders (FGID) which represent a wide group of different disorders of relatively high incidence and prevalence in population of developed countries generally characterized by the lack of any structural or tissue abnormality. The most frequent FGIDs are irritable bowel syndrome (IBS), dispepsia and constipation. IBS is characterized by pain or discomfort in the medium or lower abdominal segment, connected with a disturbance in the emptying of the bowel and changes in the consistency and frequency of the stool. The pathogenesis of IBS remains unknown. These patients are considered to suffer from disturbances in bowel sensor and motor function, central nervous system impairments, psychological disturbances and effects of stress[1–4].

Although structural diseases can be identified by pathologists and at times cured by medical technology, the nonstructural symptoms that we describe as »functional« remain enigmatic and less amenable to explanation or effective treatment. There are physiological, intrapsychic, and sociocultural factors that amplify perception of these symptoms so they are experienced as severe with subsequent impact on daily life activities. The FGIDs do not fit a simple pathophysiologic model. Rather, they result from complex interactions of biological, psychological, and social factors[2,3].

The diagnostic criteria for identification and classification of FGID have been developed because of a current lack of diagnostic biologic markers. They have been developed by Rome Foundation and are known as Rome criteria. The Rome I and Rome II criteria and diagnostic questionnaires have been made according to the evidence-based approach and, based on the experience of their application in practice, new Rome III criteria have

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been made These are symptom-based diagnostic criteria that are not explained by other pathologically based disorders. The FGIDs are classified into six major domains for adults: esophageal (category A); gastroduodenal (category B); bowel (category C); functional abdominal pain syndrome (FAPS) (category D); biliary (category E); and anorectal (category F). The functional bowel disorders (category C) include IBS (C1), functional bloating (C2), functional constipation (C3), functional diarrhea (C4) and unspecified functional bowel disorder (C5)[4–9].

Nowadays we have to deal with the great incidence of these disorders. According to some researches every fourth person in modern western society exhibits the symptoms of FGID. It is estimated that this group represents half of the visits to gastrointestinal clinics[4].

Unfortunately, although there are many studies on IBS in western world, complete epidemiologic data on IBS in Croatia have been lacking to date. There are three studies carried out in continental northern Croatia, without data from the rest of the country, especially from coastal Croatia where Mediterranean culture affects the lifestyle and customs of the people forming a specific sociocultural environment.

Aim of study

This study focuses on comparing results from different studies carried on in Croatia, in the hope of identifying new insights about anthropometric, demographic and socioeconomic characteristics of IBS that would be specific for Croatian population, as well as sources of disagreement among those results, or other interesting relationships that may come to light.

Materials and Methods

There are three epidemiological studies of irritable bowel syndrome conducted in Croatia (in the area of Zagreb in 2002, Bjelovarsko-bilogorska County in 2008, and finally in Osječko-baranjska County in 2011) that we have compared[4,10,11].

All study designs included a questionnaire which was sent by post to random selected health care users. Data for the studies were taken from primary care physicians files. Almost every person had a file at a local family physician because health insurance in Croatia was ensured by the state. The fact that someone is registered at a general physician does not $\overline{X}$ that he/she is visiting the physician regularly. In this way, the sample actually represented the general population, not only health care users. Health care centers as well as health care users were randomly selected. The aim of selection was to get a sample matching the Croatian population as close as possible. In the study in the area of Zagreb the last available census was from 1991 and in the studies in Osječko-baranjska and Bjelovarsko-bilogorska County from 2001 resp. In all three studies population was selected by gender (in area of Zagreb 247 females that is 49.4% and 253 males that is 50.6%; in Bjelovarsko-bilogorska County 161 females that is 60.98% and 103 males that is 39.01%; in Osječko-baranjska 357 female that is 50.78% and 346 males that is 49.22%), by age (in the area of Zagreb and in Bjelovarsko bilogorska county were formed four age group I 18 to 34, II 35 to 49, III 50 to 64 and IV more than 65; in Osječko-baranjska I 20–34, II 35–49, III 50–69 and IV more than 70), by education (in area of Zagreb and Bjelovarsko-bilogorska County IV groups – I without formal education or with elementary school, II secondary school, III two year non-university collage and IV university degree; in Osječko-baranjska County I not finished primary school education, II primary school education, III secondary school education, IV higher education, V university education), by place of residence (town or village), by BMI (normal weight up to 24.9kg/m^2, overweight 25–29.9 kg/m^2, obesity 30 kg/m^2 and more).

Questionnaire had two parts. The first part consisted of demographic, anthropometric and socioeconomic information. The second part was based on internationally validated Rome diagnostic criteria. Rome II questionnaire was applied in area of Zagreb (the only valid at that time) and Rome III was applied in the research in Osječko-baranjska and Bjelovarsko-bilogorska County. Revisions of the diagnostic criteria for IBS have led to varying prevalence estimates in the same population. The Rome III criteria are less restrictive and require a lower symptom frequency than Rome II criteria for IBS[12]. The questions in connection with anthropometric, demographic and socioeconomic characteristics were not completely harmonized. Statistical analysis was performed by using χ^2-test, t-test and logistic regression model.

Results

Research in the area of Zagreb showed a high prevalence of IBS (28%) where prevalence in males was 10% and prevalence in females was 18%. The higher incidence of IBS in female population was also confirmed by χ^2--test. Age, education and life in an urban or rural region had no effects on the prevalence of irritable bowel syndrome. But when male and female were analyzed separately for the prevalence of IBS according to age groups it showed that females in the age from 50 to 64 years were especially vulnerable to IBS. The model of logistic regression showed the effect of gender and BMI: women had 165% higher risk of IBS, and the increase of BMI by 5kg/m2 increased the risk of IBS by 36%.

The study that was conducted in Bjelovarsko-bilogorska County showed a prevalence of IBS 26.52%, 22.33% in males, 29.19% in females and χ^2-test confirmed there was a statistically significant difference. It was also determined that the females with IBS are older in average than males. A greater risk of developing IBS was recorded in persons with high BMI. IBS was more frequently recorded in persons with a lower level of education, those living in rural regions, those living in houses, those having more meals per day, those feeling unpleasant, those who experienced some stressful event, and in younger population that live in town and are mar-

TABLE 1
THE PREVALENCES OF IBS IN CONTINENTAL CROATIA

	Zagreb	Bjelovarsko-bilogorska county	Osječko-baranjska county
Total (N)	500	264	703
Male (N)	253	103	346
Female (N)	247	161	357
IBS + (N)	141	70	205
IBS prevalence (%)	28%	26.52%	29.16%

TABLE 2
THE IMPACT OF GENDER ON IBS PATIENTS

	Zagreb	Bjelovarsko-bilogorska county	Osječko-baranjska county
IBS+ total (N)	141	70	205
Male IBS+ (N) (%)	50 (35.46%)	23 (32.86%)	74 (36.10%)
Female IBS+ (N)(%)	91 (64.54%)	47 (67.14%)	131 (63.90%)

ried and higher educated. Persons with IBS were more frequently allergic to nutrients and ambrosia.

In Osječko-baranjska County research IBS was recorded in 29.16% of the subjects, in men in 21.39% and in women in 36.69%.There was a greater prevalence of IBS in females, confirmed by χ^2-test and Yates's correction. According to the t-test persons with signs of IBS were on average shorter, weighed less and had a lower BMI than those not showing signs of IBS. By applying the linear regression model one can conclude that, when it came to risk of IBS, three variables had statistical significance: gender, number of members in household and estimate of health condition.

Discussion

The recorded prevalence of IBS in Croatia is higher in comparison with the results elsewhere in the world (Table 1, Figure 1). Prevalence of IBS varies from 9 to 22% in the general population and is affected by the diagnostic criteria used. IBS affects 14–24% females and 5–19% males in western countries[13]. The differences could be due to the lack of harmonization of criteria and questionnaires and the data collection method. There is a need to identify some common risk factors that would explain so high prevalence in our region.

Most of IBS studies found greater prevalence in females than in males, which was confirmed in our studies (Table 2, Figure 2). The reason why women suffer from IBS more than man is unexplained. It could be that activation of central networks involved in the processing of visceral afferent input differs between male and female IBS patients. In the study of Houghton LA et al. (2002) was shown that IBS symptomatology is exacerbated at menses and, in contrast with healthy women, rectal sensitivity changes with the menstrual cycle. These cyclical changes in sensitivity suggest that women with IBS respond differently to fluctuations in their sex hormonal environment compared with healthy females. Although, in the study of Kim HS (2006) significant gender differences in pain sensitivity were not detected so it suggests that this difference may be related to another set of pathophysiological factors, and not to gender-related differences in visceroperception[14–17]. In the study in the area of Zagreb women in the age from 50 to 64 years were especially vulnerable to IBS and it may be owing to the termination of their professional and active family life (»empty-nest syndrome«).

The correlation between different age groups and prevalence of IBS wasn't proven in any of the studies. Results elsewhere in the world showed that IBS occurs most frequently in younger age groups[4,18].

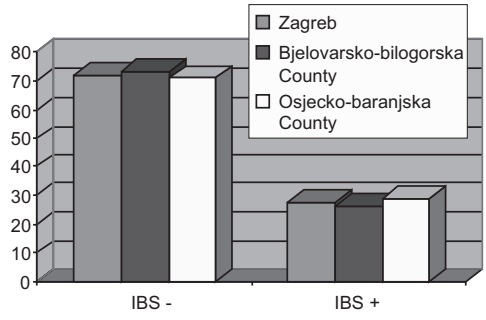

Fig. 1. The overall prevalence of IBS in continental Croatia.

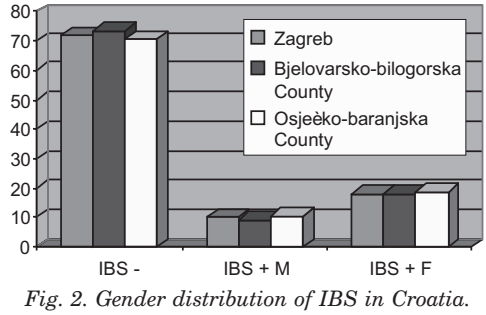

Fig. 2. Gender distribution of IBS in Croatia.

TABLE 3
THE IMPACT OF BMI ON IBS POPULATION

	Zagreb	Bjelovarsko-bilogorska county	Osječko-baranjska county
BMI	Increase of BMI by 5 kg/m^2 increases the risk of IBS by 36%.	A greater risk of devolping IBS in persons with BMI>25.	Persons with IBS on average have lower BMI.

TABLE 4
PERCENTAGE OF IBS + PATIENTS REGARDING THEIR LEVEL OF EDUCATION

	IBS + patients		
	Bjelovarsko-bilogorska county (%)	Osječko-baranjska county (%)	Zagreb (%)
Not finished primary school education	3	0.98	14.18
Primary school education	24	14.63	
Secondary school education	46	57.07	57.45
Higher education	20	11.22	12.77
University education	7	24.10	15.60

In the study of Zagreb area it was pointed out higher BMI as a possible risk factor for IBS. This was confirmed in the subsequent research in Bjelovarsko-bilogorska County. Investigating the habits and health problems of obese people could be a key in searching possible factors that contribute to IBS. The results in Osječko-baranjska County were opposite to previous mentioned (Table 3). Persons with signs of IBS had a lower BMI than those not showing signs of IBS. BMI is a factor that can be modified by dietary intake and that is why there is a need to clarify the connection between BMI and IBS.

The correlation between level of education and the prevalence of IBS was not confirmed in the research in Zagreb and Osječko-baranjska County, but in Bjelovarsko-bilogorska IBS was more frequently recorded in persons with lower level of education (Table 4). The world data are contradictory; some researches didn't find connection between level of education and in some other IBS is more frequent in those with lower education[13,19,20].

There was no difference in the occurrence of IBS between rural and urban population in area of Zagreb and, although somewhat greater share of subjects showing signs of IBS among those who live in rural regions compared to those who live in towns, statistical analysis showed that the hypothesis of the existence of correlation between the current place of residence and prevalence of IBS cannot be accepted in Osječko-baranjska County. On the contrary to previous mentioned studies the research in Bjelovarsko-bilogorska županija showed that IBS was more frequently recorded in persons living in rural regions (Table 5). Most researches on IBS were carried on urban population or included both urban and rural population[11]. In the study of Masud HA et al. prevalence of IBS in a rural community was almost identical to most other countries[21]. It is worth to mentioned that low socioeconomic class should be considered a risk factor for both upper and lower gastrointestinal symptoms according to the study of Bytzer et al.[22].

In both Osječko-baranjska and Bjelovarsko-bilogorska County the hypothesis of existence of correlation between marital status and prevalence of IBS was not proven by statistical $\overline{X}$s. In the world literature there are different data[13,20,23]. The latter was not investigated in area of Zagreb.

According to psychosocial characteristics, the results in Osječko-baranjska County showed that with a higher self-estimated level of health condition the risk of IBS decreases. Statistic evaluation in Bjelovarsko-bilogorska County showed that there is a difference in the sense of satisfaction between IBS positive and IBS negative persons. More persons with IBS, than those without it, do not feel satisfied (Figure 3).

TABLE 5
DISTRIBUTION OF IBS REGARDING PLACE OF LIVING

	Bjelovarsko-bilogorska county	
	IBS + (%)	IBS – (%)
Village	60	37
Town	40	63

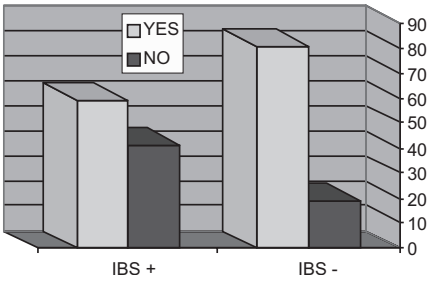

Fig. 3. Answers to the question do you feel satisfied in Bjelovarsko-bilogorska County population.

TABLE 6
OVERVIEW OF DIFFERENT RISK FACTORS IN INVESTIGATED AREAS

Risk factors	Zagreb	Bjelovarsko-bilogorska county	Osječko-baranjska county
Gender	Yes (female)	Yes (female)	Yes (female)
Age Groups	No	No	No
BMI	Yes (high BMI)	Yes (high BMI)	Yes (lower BMI)
Education	No	Yes (lower education)	No
Urban//rural community	No	Yes (rural)	No
Marital status	N/A	No	No
Health condition	N/A	N/A	Yes (lower self-estimed level)
Stress	N/A	Yes	Yes
Number of members in household	N/A	No	Yes (increased number of members)
Allergy	N/A	Yes	N/A
Back pain	N/A	Yes	N/A

Stress affects gastrointestinal motillity[24]. IBS positive persons in Bjelovarsko-bilogorska County were more often exposed to stressful events. Chi-squared test (χ^2-test) showed correlation between abuse and IBS in the research in Osječko-baranjska County as well as the correlation between feeling of anxiety, depression and suicidal wish during the week which preceded the survey. The results correspond to the hypothesis that IBS positive persons experience more stressful events on average[25].

Based on the results reached in Osječko-baranjska County one can conclude that number of members in household is statistically significant. With the increase of the number of household by one person the chance of risk of IBS increases 1.139 times. In Bjelovarsko-bilogorska County there was no significant difference between number of members in household and IBS

Interesting are the findings in Bjelovarsko-bilogorska County considering the relation between allergy to any food ingredients or ambrosia, pain in the back and IBS. The results showed the correlation between allergies, pain in the back and IBS. The hypothesis that allergy to food is correlated with IBS had already been proposed in different studies[26–28] but there are no information dealing with ambrosia and IBS. IBS is more common in people with asthma[29–31]. In the research of Halder et al. back pain was related with increased risk for abdominal pain in one-year period[32].

We should note that there is a lack of harmonization of the definition of IBS and questionnaires as well as data collection method in the conducted studies in the world.

Conclusion

There is a need for further investigations in coastal Croatia applying Rome III criteria and a uniform questionnaire on anthropometric, demographic and socioeconomic characteristics of IBS in Croatia. Different results are expected due to different eating habits and sociocultural impact of Mediterranean environment as we know that IBS has been described as a biopsychosocial condition, in which colonic dysfunction is affected by psychological and social factors as well.

Identifying the risk factors for developing IBS and comparing different findings are useful to prevent the disease and affect the great prevalence of IBS in our country, as well as understand the pathophysiology of functional gut disorders which is still an ongoing process (Table 6).

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M. Tolušić Levak

»J. J. Strossmayer« University, School of Medicine, Department of Histology and Embriology, Josipa Huttlera 4, 31000 Osijek, Croatia
e-mail: mtolusic@mefos.hr

SINDROM IRITABILNOG CRIJEVA U HRVATSKOJ

S A Ž E T A K

Tri su epidemiološke studije o sindromu iritabilnog crijeva (SIC-a) provedene na području Hrvatske (područje Zagreba iz 2002., Bjelovarsko-bilogorske županije iz 2008. te Osječko-baranjske županije iz 2011.). Cilj ovog istraživanja je analiza antropometrijskih, demografskih i psihosocijalnih karakteristika SIC-a uspoređujući navedene studije. U istraživanjima su se koristili Rimski III dijagnostički kriteriji. Studijska populacija bila je reprezentativna obzirom na posljednje provedene popise stanovništva u Hrvatskoj (iz 1991. i 2001.) Rezultati su pokazali visoku prevalenciju SIC-a u Hrvatskoj i neke zajedničke čimbenike važne za razvoj SIC-a poput spola, indeksa tjelesne mase i razine obrazovanja. Potrebna su daljnja istraživanja u primorskoj Hrvatskoj obzirom na značajno visoku prevalenciju SIC-a u našoj zemlji koristeći ujednačene upitnike o antropometrijskim, demografskim i socioekonomskim čimbenicima koji utječu na pojavnost i karakteristike SIC-a te Rimske III kriterije, dijagnostičke upitnike i algoritam bodovanja za funkcijske poremećaje probavnog sustava (FPPS-a) primjenjive u kliničkoj praksi i populacijskim studijama.