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# Demographic, Anthropometric and Socioeconomic Characteristics of Functional Constipation in Eastern Croatia

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**A B S T R A C T**

*Aim of the research is to establish the prevalence of constipation in Osječko-baranjska County, to establish its specific characteristics and to determine the effect of demographic, anthropometric and socioeconomic factors. It is a cross-sectional study conducted in 2010. on systematic sample of 900 subjects between 20 and 69 years of age. Every subject was sent an invitation letter and a Rome III diagnostic questionnaire for one of the disorders. A scoring algorithm was used to confirm or exclude the diagnosis of functional constipation. The chi-square test ($\chi^2$ test), t-test and logistic regression were used for analysis. The prevalence of constipation in our study was 22.19%, which is higher than the prevalence in most other countries, where it ranges from 5% to 18%. In our study statistically significant variables were: place of current residence (urban), education level (high school), marital status (divorced people), a larger number of household members and a lower health status by self-assessment. According to t-test persons with constipation on average are older, have higher average BMI and lower average grade valued financial status of households and their health. There were a greater number of subjects that had at least one alarm symptom or some of the psychosocial factors and they often suffered from a chronic disease. Functional constipation presents a significant health problem. Rome III survey questionnaire proved to be an acceptable method for diagnosing this functional disorder in clinical-consilliary and primary health care, and for persons showing signs of alarm and needing further diagnostic treatment.*

***Key words**: constipation, prevalence, risk factors, Eastern Croatia*

## Introduction

Functional gastrointestinal disorders represent a broad group of different diseases of the digestive system with a relatively high incidence and prevalence in the general population of developed countries. Among the most common functional bowel disorders are functional constipation, irritable bowel syndrome and functional dyspepsia. According to research, every fourth person of modern Western societies has symptoms of functional gastrointestinal disorders[1]. The most common symptoms are pain, nausea, vomiting, bloating, diarrhea, constipation, difficult passage of food or feces, or any combination[2]. When these symptoms are experienced as severe, or when they impact on daily life physicians will search for inflammatory, infectious, neoplastic, and other structural abnormalities to make a specific diagnosis and offer specific treatment. Yet as has been common in medical practice[3], when no structural etiology is found, the patient is diagnosed as having »functional« symptoms. Significant improvement of research methods has provided evidence of clinical product interaction of psychosocial

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factors and disturbed bowel physiology, which contributed that functional gastrointestinal disorders are now recognized as a clinical entity. Rome III criteria and Rome III diagnostic questionnaires for functional gastrointestinal disorders were concluded in year 2006. Literature data indicate that the prevalence of constipation is higher in women than in men. Prevalence increases in age over 50 years of life and the highest is over the 70th years of life[4]. Based on the results of 21 studies, the prevalence of constipation in Europe was 16.6%, and in Australia and New Zealand 15.3%. Female sex, age, socioeconomic status and education were associated with the prevalence of constipation[5].

There are no large population studies in Croatia, which determine the impact of various factors on functional constipation syndrome and show the differences in the representation of this functional disorder in certain geographic areas. In our country there are no data on the characteristics of functional constipation and the influence of various factors on the prevalence of functional constipation.

The aim of this study was to detect the prevalence of functional constipation in Croatia in the Osječko-baranjska County and to determine the impact of various anthropometric, demographic, socioeconomic and psychosocial factors on its occurrence.

## Materials and Methods

This cross-sectional study was conducted on population, aged from 20–70 years, which were insured at the Regional Office of the Croatian Health Insurance in Osijek. Participants were chosen by the method of systematic sampling (900 of them to get answers from at least 600 patients) in 12 urban and 6 rural primary care facilities in Osječko-baranjska County in Croatia. The control group was a group of the same gender, similar age, urban or rural areas of housing, education and without the symptoms of functional constipation. Each subject received to his or hers home address an invitation letter and Rome III diagnostic questionnaire for constipation with a request to complete the questionnaire and to send it back in the enclosed and addressed envelope[6–8]. With a special scoring algorithm may be confirmed or exclude the diagnosis of the functional disorders of the gastrointestinal tract.

**TABLE 1**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO GENDER AND SYMPTOMS OF CONSTIPATION

| Sample | Gender | With Symptoms | | Without Symptoms | | Total | p* |
|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | |
| Dyspepsia | M | 75 | 24.3 | 234 | 75.7 | 309 | >0.05 |
| | F | 71 | 20.3 | 278 | 79.7 | 349 | |
| | T | 146 | 22.2 | 512 | 77.8 | 658 | |

p* – for $\chi^2$-test

### *Statistics*

Most of the variables of the questionnaire are nominal variables. In order to determine their relationship, we made the intersection the variables. The dependence or independence of two nominal variables can be obtained from the analysis of their contingency tables using the $\chi^2$-test. We used the t-test to analyze the following variables in patients with functional constipation comparing to patients without functional constipation: gender, age, height, weight, education, occupation, residence, economic status, living in the household, presence of chronic diseases, satisfaction with health status and psychosocial disorders. We used the logistic regression to examine the risk of appearance of dyspepsia syndrome in relation to the correlated variables.

The software SPSS Statistics 17.0 and Statistica 8.0 were used. Graphical presentations were made by using Microsoft Excel 2003 and Statistica 8.0 application. These applications were installed at the Department of Physics, University of Josip Juraj Strossmayer in Osijek.

A p-value of $<0.05$ was considered statistically significant.

## Results

There were 658 participants involved in the research on functional constipation (73.11% of the polls were taken back in need of further processing), 309 or 46.96%

**TABLE 2**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO AGE GROUPS AND SYMPTOMS OF CONSTIPATION

| Sample | Gender | Age groups | | | | | | | | | | | | p*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20–34 years | | | 35–49 years | | | 50–69 years | | | Total | | | |
| | | Yes* | % | N** | Yes* | % | N** | Yes* | % | N** | Yes* | % | N** | |
| Constipation | M | 18 | 18.9 | 95 | 24 | 27.6 | 87 | 33 | 26.0 | 127 | 75 | 24.3 | 309 | >0.05 |
| | F | 14 | 13.6 | 103 | 18 | 18.4 | 98 | 39 | 26.4 | 148 | 71 | 20.3 | 349 | >0.05 |
| | T | 32 | 16.2 | 198 | 42 | 22.7 | 185 | 72 | 26.2 | 275 | 146 | 22.2 | 658 | <0.05 |

Yes* – number of people with the symptoms of dyspepsia; N** – total number (with and without symptoms); p*** – for $\chi^2$-test

**TABLE 3**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO WHETHER THEY WERE BORN IN SLAVONIJA AREA AND CONSTIPATION SYMPTOMS

| Sample | Gender | Born in Slavonija area | | | Born outside of Slavonija area | | | Total | | | p*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Yes* | % | N** | Yes* | % | N** | Yes* | % | N** | |
| Constipation | M | 55 | 21.8 | 252 | 20 | 35.1 | 57 | 75 | 24.3 | 309 | >0.05 |
| | F | 54 | 19.3 | 280 | 17 | 24.6 | 69 | 71 | 20.3 | 349 | >0.05 |
| | T | 109 | 20.5 | 532 | 37 | 29.4 | 126 | 146 | 22.2 | 658 | <0.05 |

Yes* – number of people with the symptoms of dyspepsia; N** – total number (with and without symptoms); p*** – for $\chi^2$-test

**TABLE 4**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO THE CURRENT PLACE OF RESIDENCE (RURAL AREA, TOWN) AND CONSTIPATION SYMPTOMS

| Sample | Gender | Current place of residence | | | | | | | | | p*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rural area | | | Town | | | Total | | | |
| | | Yes* | % | N** | Yes* | % | N** | Yes* | % | N** | |
| Constipation | M | 26 | 20.5 | 127 | 49 | 26.9 | 182 | 75 | 24.3 | 309 | <0.05 |
| | F | 22 | 14.9 | 148 | 49 | 24.4 | 201 | 71 | 20.3 | 349 | |
| | T | 48 | 17.5 | 275 | 98 | 25.6 | 383 | 146 | 22.2 | 658 | |

Yes* – number of people with constipation symptoms; N** – total number (with and without symptoms); p*** – for $\chi^2$-test

among them were male and 349 or 53.04% female participants (Table 1). The average age was 45.12 years. Symptoms of functional constipation were reported in 146 participants or 22.19% of the respondents, 75 or 24.27% were males and 71 or 20.34% were females, it has not been confirmed a correlation between gender and symptoms of constipation ($\chi^2$=1.465, p=0.226) (Table 1). Symptoms of constipation increases with age, signs of constipation at the age of 20–34 years had 32 or 16.16%, at the age of 35–49 years 42 or 16.90%, at the age of 50–69 years 72 or 26, 18% of respondents. Proportion of male subjects with the risk of constipation was highest in middle age group and lowest in the youngest age group. Proportion of female subjects with risk of constipation was highest in the oldest age group, and the lowest in the youngest age group. Chi-square test ($\chi^2$-test*)* analysis shows that it can be accepted as a presumption the existence of dependence between the age groups in the case of both sexes and symptoms of constipation ($\chi^2$=6.734, p=0.035), and lack of dependence between ages and symptoms of constipation in men ($\chi^2$=2.187, p=0.335) and females ($\chi^2$=6.43, p=0.04) (Table 2). There is a larger proportion of respondents born outside the region of Slavonia who have symptoms of constipation 37 or 29.37% in comparison to subjects who were born in Slavonia 109, or 20.49%, $\chi^2$-test indicates the existence of dependencies between Slavonia as area of birth and symptoms of constipation ($\chi^2$=4.649, p=0.031). Although the proportion of male and female respondents born outside the region of Slavonia, which have a risk of constipation, is higher than those who were born in Slavonia it was not possible to accept the existence of dependencies between Slavonia as area of birth and symptoms of constipation in male as well as female respondents (Table 3). There is a larger proportion of subjects, observed both males and females, who live in the city with symptoms of constipation 98 or 25.59% as compared to those who live in the countryside 48 or 17.45%, and women who live in the city 49 or 24.38% compared to women living in the countryside 22 or 14.86%, $\chi^2$-test confirmed the existence of dependence between current residence and symptoms of constipation observed in subjects of both genders together ($\chi^2$=6.132, p=0.013) and female subjects. ($\chi^2$= 4.76, p=0.029). Although the proportion of males with risk of constipation who live in the city is higher than the proportion of male subjects who live in countryside 26.92 vs. 20.47%, the dependence between current residence and the risk of constipation in males was not confirmed ($\chi^2$=1.693, p=0.193) (Table 4). The largest percentage of subjects with risk of constipation was found in group with incomplete primary school (6 or 50.0%), and the lowest in group with completed high school (80 or 20.20%), but it has not been proven correlation between education and symptoms of constipation in case of both genders together ($\chi^2$=6.938, p=0.139) (Table 5). According to marital status, the highest proportion of participants who are at risk of constipation comes from a group of divorced (8 or 35.71%) and the lowest in the group of persons who live in extramarital cohabitation (1 or 10.00%), there was no existence of dependencies between marital status and symptoms of constipation ($\chi^2$=9.069, p=0.059) (Table 6). According to t-test results, people with constipation symptoms are older on average, have higher BMI and they also assess their health status with

**TABLE 5**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO LEVEL OF EDUCATION AND CONSTIPATION SYMPTOMS

| Level of education | Gender | Constipation | | |
|---|---|---|---|---|
| | | Yes* | % | N** |
| Uncompleted Elementary School | M | 2 | 40.0 | 5 |
| | F | 4 | 57.1 | 7 |
| | T | 6 | 50.0 | 12 |
| Elementary School | M | 12 | 32.4 | 37 |
| | F | 8 | 19.5 | 41 |
| | T | 20 | 25,6 | 78 |
| High School | M | 40 | 21.7 | 184 |
| | F | 40 | 18.9 | 212 |
| | T | 80 | 20.2 | 396 |
| Bachelor | M | 9 | 29.0 | 31 |
| | F | 5 | 16.7 | 30 |
| | T | 14 | 23.0 | 61 |
| University | M | 12 | 23.1 | 52 |
| | F | 14 | 23.7 | 59 |
| | T | 26 | 23.4 | 111 |
| Total | M | 75 | 24.3 | 309 |
| | F | 71 | 20.3 | 349 |
| | T | 146 | 22.2 | 658 |
| p*** | M | | | |
| | F | | >0.05 | |
| | T | | | |

Yes* – number of people with the symptoms of dyspepsia; N** – total number (with and without symptoms); p***– for $\chi^2$-test

**TABLE 6**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO MARITAL STATUS AND CONSTIPATION SYMPTOMS

| | Dyspepsia | | |
|---|---|---|---|
| Marital status | Yes* | % | N** |
| single | 24 | 15.3 | 157 |
| married | 102 | 24.1 | 423 |
| extramarital cohabitation | 1 | 10.0 | 10 |
| divorced | 10 | 35.7 | 28 |
| widow/widower | 9 | 22.5 | 40 |
| Total | 146 | 22.2 | 658 |
| p*** | | >0.05 | |

Yes* – number of people with the symptoms of dyspepsia; N** – total number (with and without symptoms); p*** – for $\chi^2$-test

lower ratings compared to persons without constipation symptoms (Table 7). Analyzing the results of the logistic regression model in patients with constipation symptoms, it can be concluded that people who live in the city have 1.947 times greater risk of constipation than those who live in rural areas. Persons with a high school education compared to those with primary school have 0.229 times greater risk of constipation. By increasing the number of household members for a single person, constipation risk increases 1.187 times, and if the health assessment increases by one grade, the odds of the risk will be increased 0.628 times (Table 8). Chi-squared test showed the existence of dependency between being anemic and constipation symptoms (Table 9). There is a larger proportion of subjects with constipation symptoms, which over the last three months unintentionally lost weight by more than 4.5 kilograms, 7 (25.00%) compared to 130 (22.06%) of those who are not unintentionally lose more than 4, 5 kilograms, but it is not confirmed the existence of dependencies between unintentional weight loss and constipation risk ($\chi^2$=0.134, p=0.714) (Table 10). $\chi^2$-test indicates the existence of dependence between the presences of tension (stress) feelings in pa-

**TABLE 7**
BASIC DESCRIPTIVE STATISTICAL INDICATORS TOGETHER WITH T-TEST RESULTS

| Variable | Constipation | | | | | |
|---|---|---|---|---|---|---|
| | Constipation symptoms | | | | t-test | |
| | No | | Yes | | t | p |
| | $\overline{X}$ | SD | $\overline{X}$ | SD | | |
| Age | 44.113 | 14.493 | 48.671 | 14.208 | –3.367 | 0.001 |
| years living at the current place of residence | 31.564 | 16.644 | 34.086 | 19.733 | –1.379 | 0.169 |
| height (cm) | 172.278 | 9.945 | 171.870 | 9.982 | 0.436 | 0.663 |
| weight (kg) | 76.360 | 14.911 | 78.890 | 16.020 | –1.777 | 0.076 |
| BMI (kg/m$^2$) | 25.477 | 4.552 | 26.665 | 4.638 | –2.766 | 0.006 |
| number of household members | 3.098 | 1.642 | 3.247 | 1.925 | –0.851 | 0.396 |
| assessment of household financial status | 3.727 | 0.832 | 3.322 | 0.968 | 4.591 | 0.000 |
| self-assessment of one's health | 3.045 | 0.619 | 2.897 | 0.794 | 2.074 | 0.039 |

$\overline{X}$ – mean, SD – standard deviation

**TABLE 8**
LOGISTIC REGRESSION MODEL PARAMETHERS – CONSTIPATION

| Constant and variables | Constipation | | | | | |
|---|---|---|---|---|---|---|
| | B | Standard error | Wald | Degree of freedom | p | Exp(B) |
| Constant | 0.973 | 10.178 | 0.009 | 1.000 | 0.924 | 2.647 |
| Gender: female | –0.468 | 0.305 | 2.347 | 1.000 | 0.126 | 0.627 |
| Age | 0.013 | 0.010 | 1.778 | 1.000 | 0.182 | 1.013 |
| Place of birth: outside Slavonija area | 0.271 | 0.246 | 1.212 | 1.000 | 0.271 | 1.311 |
| Current place of residence: town | 0.667 | 0.226 | 8.728 | 1.000 | 0.003 | 1.947 |
| Height | –0.003 | 0.059 | 0.003 | 1.000 | 0.959 | 0.997 |
| Weight | –0.011 | 0.059 | 0.036 | 1.000 | 0.849 | 0.989 |
| BMI | 0.050 | 0.176 | 0.080 | 1.000 | 0.777 | 1.051 |
| Level of education | | | 7.585 | 4.000 | 0.108 | |
| – elementary school | –1.280 | 0.694 | 3.402 | 1.000 | 0.065 | 0.278 |
| – high school | –1.474 | 0.671 | 4.831 | 1.000 | 0.028 | 0.229 |
| – bachelor | –1.393 | 0.742 | 3.529 | 1.000 | 0.060 | 0.248 |
| – university | –0.960 | 0.712 | 1.818 | 1.000 | 0.178 | 0.383 |
| Marital status | | | 5.425 | 4.000 | 0.246 | |
| – married | 0.194 | 0.330 | 0.347 | 1.000 | 0.556 | 1.214 |
| – extramarital cohabitation | –0.590 | 1.137 | 0.269 | 1.000 | 0.604 | 0.554 |
| – divorced | 1.068 | 0.516 | 4.281 | 1.000 | 0.039 | 2.91 |
| – widow/widower | 0.015 | 0.553 | 0.001 | 1.000 | 0.978 | 1.015 |
| Number of household members | 0.171 | 0.066 | 6.660 | 1.000 | 0.010 | 1.187 |
| Assessment of material status | –0.238 | 0.155 | 2.354 | 1.000 | 0.125 | 0.788 |
| Self-assessment of one's health | –0.466 | 0.113 | 17.148 | 1.000 | 0.000 | 0.628 |

**TABLE 9**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO BEING ANEMIC AND CONSTIPATION SYMPTOMS

| Being anemic | Constipation | | | | | |
|---|---|---|---|---|---|---|
| | Constipation symptoms | | | | | |
| | No | | Yes | | Total | |
| | No. | % | No. | % | No. | |
| NO | 482 | 79.3 | 126 | 20.7 | 608 | |
| YES | 30 | 60.0 | 20 | 40.0 | 50 | p<0.01 |
| Total | 512 | 77.8 | 146 | 22.0 | 658 | |

Yes* – number of people with constipation symptoms; N** – total number (with and without symptoms); p*** – for $\chi^2$-test

**TABLE 10**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO WHETHER THAY HAVE UNINTENTIONALLY LOST WEIGHT OF MORE THAN 4.5 KG IN THE PAST THREE MONTHS AND CONSTIPATION SYMPTOMS

| Unintentional weight loss | Constipation | | | | | |
|---|---|---|---|---|---|---|
| | Constipation symptoms | | | | | |
| | No | | Yes | | Total | |
| | No. | % | No. | % | No. | |
| NO | 491 | 77.9 | 139 | 22.1 | 630 | |
| YES | 21 | 75.0 | 7 | 25.0 | 28 | p>0.05 |
| Total | 512 | 77.8 | 146 | 22.0 | 658 | |

Yes* – number of people with constipation symptoms; N** – total number (with and without symptoms); p*** – for $\chi^2$-test

tients with constipation symptoms. Chi-squared test shows that dependency exists between feeling tension ($\chi^2$=15,837, p=0.000), feeling indisposed and miserable ($\chi^2$=12.578, p=0.000), feeling hopeless and constipation symptoms, as well as between desire to commit suicide ($\chi^2$=4.152, p=0.042), presence of pain interfering with normal activities ($\chi^2$=25.558 p=0.000), harassment ($\chi^2$= 18.622, p=0.000) and constipation symp- toms in participants (Table 11). Chi-squared test shows that the dependency between stool forms (Bristol stool scale) and constipation symptoms can be accepted ($\chi^2$=72.878, p= 0.000) (Table 12). Subjects with constipation symptoms often suffer from the following chronic diseases: diabetes mellitus in 40.00%, 28.79% in the cardiovascular, respiratory at 28.57%, musculoskeletal in 28.79% and mental illness in 15.38% of cases.

**TABLE 11**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO PSYCHOSOCIAL DISORDERS AND CONSTIPATION SYMPTOMS

| | Constipation | | | | | |
|---|---|---|---|---|---|---|
| | Constipation symptoms | | | | | |
| | NO | | YES | | Total | |
| Tension | No. | % | No. | % | No. | |
| NO | 445 | 80.9 | 105 | 19.1 | 550 | |
| YES | 67 | 62.0 | 41 | 38.0 | 108 | p<0.01 |
| Total | 512 | 77.8 | 146 | 22.0 | 658 | |
| Misery and indisposition | | | | | | |
| NO | 472 | 79.7 | 120 | 20.3 | 592 | |
| YES | 40 | 60.6 | 26 | 39.4 | 66 | p<0.01 |
| Total | 512 | 77.8 | 146 | 22.0 | 658 | |
| Suicidal intentions | | | | | | |
| NO | 496 | 78.5 | 136 | 21.5 | 632 | |
| YES | 16 | 61.5 | 10 | 38.5 | 26 | p<0.05 |
| Total | 512 | 77.8 | 146 | 22.0 | 658 | |
| Severe physical pain | | | | | | |
| NO | 509 | 78.8 | 137 | 21.2 | 646 | |
| YES | 3 | 25.0 | 9 | 75.0 | 12 | – |
| Total | 512 | 77.8 | 146 | 22.0 | 658 | |
| Pain that interferes with everyday activities | | | | | | |
| NO | 537 | 85.1 | 94 | 14.9 | 631 | |
| YES | 16 | 50.0 | 16 | 50.0 | 32 | p<0.01 |
| Total | 553 | 83.4 | 110 | 16.6 | 663 | |
| Hopelessness | | | | | | |
| NO | 445 | 80.9 | 105 | 19.1 | 550 | |
| YES | 67 | 62.0 | 41 | 38.0 | 108 | p<0.01 |
| Total | 512 | 77.8 | 146 | 22.0 | 658 | |
| Harassment | | | | | | |
| NO | 486 | 78.4 | 134 | 21.6 | 620 | |
| YES | 26 | 68.4 | 12 | 31.6 | 38 | p<0.01 |
| Total | 512 | 77.8 | 146 | 22.0 | 658 | |

Yes* – number of people with the symptoms of dyspepsia; N** – total number – with and without symptoms; p*** – for $\chi^2$-test

**TABLE 12**
DISTRIBUTION OF PARTICIPANTS ACCORDING TO STOOL FORMS AND CONSTIPATION SYMPTOMS

| Stool forms | Constipation | | |
|---|---|---|---|
| | YES* | % | N** |
| Hard | 39 | 65.0 | 60 |
| Soft | 90 | 17.0 | 530 |
| Mushy | 8 | 21.1 | 38 |
| p*** | | <0.01 | |

Yes* – number of people with constipation symptoms; N** – total number – with and without symptoms; p*** – for $\chi^2$-test

## Discussion and Conclusion

Our study included 658 subjects (309 males or 46.96% and 349 or 53.04% females). Prevalence of constipation was recorded in 22.19% of the respondents, with 24.27% of males and females in 20.34% of cases. Chi-square test showed no correlation between gender and symptoms of constipation ($\chi^2$=1.465, p=0.226). According to the results the prevalence of constipation in our region is higher than the prevalence of constipation in most other countries, but not higher in women as in other studies, and it is statistically insignificantly higher in males. In Brazil, according to Rome III criteria, the incidence of constipation is higher than in our study, it has been recorded in 26.9% of cases, in females 2.5 times higher than in males (36.8 vs. 13.9%)[9]. In Europe, for example, the prevalence of constipation was observed in 16.6%, and in Australia in 15.5% of cases[10]. The differences in prevalence studies performed in the world are partly caused by inconsistencies criteria for constipation, questionnaires and data collection methods. For example, in a study of the representation of constipation and risk factors conducted in Greece by Rome III criteria, the prevalence of constipation has been recorded in approximately 15% of the general population, more common in females than in males, 21% versus 11%[11]. According to the published results on the representation of constipation in the USA, UK, Germany, France, Italy, Brazil and South Korea, 12.3% of adults have constipation, range: from 5% in Germany and 18% in the USA[12]. In intensive care units constipation occurs in 70% of cases[13]. Our research has confirmed the connection between the symptoms of constipation with increasing age groups of respondents, but only in the case of both genders are shown together. At the age of 20–34 years constipation symptoms had 32 patients (16.16%), aged 35–49 years 42 patients (16.90%) and in the age group of 50–69 years 72 (26.18%) of the respondents ($\chi^2$=6.734, p=0.035). Similar results were obtained in studies in Greece, Argentina and China[14]. Such dependency has not been established between the age groups and constipation symptoms in males ($\chi^2$=2.187, p=0.335). However, in some studies, such as in Colombia and Brazil, such dependence has been recorded in male population only[14]. Our researching has shown that the constipation symptoms has a larger proportion of respondents (both gender together) born outside the region of Slavonia in comparison to subjects who were born in Slavonia, 29.37 to 20.49%. ($\chi^2$=4.649, p=0.031). A higher proportion of respondents with constipation symptoms live in the city 98 (25.59%) compared to respondents who live in the countryside 48 (17.45%). Chi-square test confirmed the existence of dependence between current residence (both gender together) and symptoms of constipation. The largest percentage of males with constipation symptoms was found for the group with incomplete primary school, and the lowest for the group with a high

school degree, but without correlation between the degree of education and constipation ($\chi^2$=6.938, p=0.139) and ($\chi^2$=3.078, p=0.545). Correlation between education levels and constipation symptoms in females was also not confirmed ($\chi^2$=6.819, p=0.146). The largest percentage of respondents with constipation symptoms was among divorced (35.75%) and lowest in the group of people living in cohabitation (10.00%), but there were no correlation between marital status and constipation symptoms ($\chi^2$=9.069, p=0.059). Studies show that gender, age, general poor health, education, socioeconomic status, diet low in cellulose fibers, physical inactivity, longer immobility and use of anticholinergic drugs are important factors in developing constipation in the adult population. Etiology of constipation in older people is often caused by multiple factors[4,5,15]. Frequent use of opiates and psychotropic drugs, NSAIDs are also important factors in acute and chronic opstipation[16]. Among the most common diseases that cause constipation are diabetes, hypothyroidism, diabetic neuropathy, traumatic lesions of the spinal cord, and intestinal neuropathy[17]. In Brazil, low socioeconomic status was a risk factor for both genders and age over 60 years for males[15]. Studies in the United States point to three factors for developing constipation: rural way of life, living in colder, northern areas and low socioeconomic status[18]. In our study for functional constipation statistically significant variables were: place of current residence (urban), education level (high school), marital status (divorced people), a larger number of household members and a lower health status by self-assessment. According to t-test persons with constipation on average are older, have higher average BMI and lower average grade valued financial status of households and their health. Analysis by using logistic regression model shows that people who live in the city have 1.947 times higher chance of constipation than those who live in the countryside. Chances that a person with a high school education has a risk of constipation, in compared to a person with incomplete primary education is lower for 0.229 times. Divorced individuals compared to unmarried/single persons are 2.91 times more likely to have constipation. Also, with the increasing number of household members for one person chances for constipation increases 1.187 times. Our subjects with constipation are often suffered from the following chronic diseases: diabetes in 40.00%, 28.79% in the cardiovascular, respiratory at 28.57%, musculoskeletal in 28.79% and mental illness in 15.38% of cases. Analysis of the stool according to Bristol Stool Form Scale showed that persons with constipation most rarely had soft stools (16.98%), and most respondents had a hard stool (65.00%). Chi-square test showed the existence of dependence between stool forms and constipation symptoms ($\chi^2$=72.878, p=0.000). Researchs indicates that constipation usually occurs between the ages of 40 and 49 years and colon cancer at the age of 70–79 years. Constipation usually occurs 10 years before the risk of colon cancer. It is considered that by establishing a regular bowel movement can be prevented occurrence of constipation and a risk of developing colon cancer[19]. In our study, there were a larger proportion of subjects with constipation who had at least one alarm symptom. There is a larger percentage of respondents with constipation symptoms who were diagnosed anemia (13.70 vs. 5.86% in the control group), and the $\chi^2$ test showed a correlation between signs of anemia and constipation ($\chi^2$=8.779, p=0.003). We did not confirm a correlation between unintentional weight loss of more than 4.5 kilograms and symptoms of constipation (4.79% subjects vs. 4.10% in in the control group) ($\chi^2$=0.134, p=0.714). Psychiatric disorders and sexual abuse also are risk factors for developing opstipation[20]. In our study, higher proportion of subjects with constipation had a feeling of tension throughout the week, also those who had a sense of low mood and felt miserable and in those with a desire for suicide. A higher proportion of subjects had pain that are interfering with normal activities and those who have been emotionally, physically or sexually abused, 31.58% according to 21.61% of control group ($\chi^2$=2.06, p=0.151). It should be mentioned also, that in our study patients with constipation suffered from mental diseases in 15.38% cases and 7.14% of them taking medication for these diseases.

Exploring the representation of constipation in the Osječko-Baranjska County shows that this disorder due to representation in the population is an important health issue. The prevalence of constipation in our study was 22.19%, which is higher than the prevalence in most other countries, where it ranges from 5% to 18%. Scientific contribution of our research is in determining the prevalence of functional constipation, its specific characteristics and determination of demographic, anthropometric and socioeconomic factors to the observed syndrome. The results are original and regionally specific because until now there were no such data for our region which is of a great importance for the practice. The high prevalence of constipation indicates the need for further investigations, not only in other Croatian regions, but also in the world, so that data could be compared with each other, which would be helpful in creating a plan for prevention and early detection of this functional disorder.

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## DEMOGRAFSKE, ANTROPOMETRIJSKE I SOCIOEKONOMSKE ZNAČAJKE FUNKCIJSKE KONSTIPACIJE U ISTOČNOJ HRVATSKOJ

### S A Ž E T A K

Cilj istraživanja bio je utvrditi proširenost opstipacije na području Osječko-baranjske županije, njezinih specifičnih karakteristika kao i determinaciju utjecaja demografskih, antropometrijskih i socioekonomskih čimbenika. Radi se o presječnoj studiji provedenoj 2010. na sistematskom uzorku ispitanika (900 ispitanika) u dobi od 20–69 godina, izabranih u 12 ambulanta liječnika obiteljske medicine na gradskim i 6 na seoskim područjima. Svakom ispitaniku poslano je pozivno pismo i Rome III dijagnostički upitnik za funkcijsku opstipaciju. Algoritmom bodovanja potvrđena je ili isključena dijagnoza. U analizi je korišten $\chi^2$-test, t-test i logistička regresija. Prevalencija opstipacije zabilježena je kod 146 od ukupno 658 ili u 22,19% ispitanika, kod 75 muških ili 24,27% i 71 ili 20,34% ženskih ispitanika. Prevalencija opstipacije u našem istraživanju (22,19%) je viša od prevalencije u većini drugih zemalja, gdje se kreće od 5% do 18%. Prevalencija nije viša u žena kao u drugim zemljama, nego je statistički neznačajno viša u muškaraca. Veći je udio ispitanika rođenih izvan područja Slavonije (oba spola zajedno). Značajno je bio veći udio ispitanika koji žive u gradu sa simptomima opstipacije, u odnosu na ispitanike koji žive na selu. Najveći je udio ispitanika s opstipacijom u skupini razvedenih, a najmanji u skupini osoba koje žive u izvanbračnoj zajednici**.** Osobe s rizikom od opstipacije u prosjeku su starije, imaju veću prosječnu vrijednost BMI te manjom prosječnom ocjenom vrednuju materijalno stanje domaćinstva i svoje zdravstveno stanje. Veći je udio ispitanika koji su imali najmanje jedan simptom alarma, neke od psihosocijalnih čimbenika, a često boluju od kroničnih bolesti. Veći je udio ispitanika koji su imali osjećaj napetosti, osjećaj neraspoloženja ili jadnog osjećanja i postojanje želje za suicidom te onih koji su bili emocionalno, tjelesno ili seksualno zlostavljani. Funkcijska opstipacija predstavlja važan zdravstveni problem. Rome III anketni upitnici prihvatljivi su u dijagnostici tog poremećaja u poliklinički-konzilijarnoj i primarnoj zdravstvenoj zaštiti te onih bolesnika sa znacima alarma kojima treba daljnja dijagnostička obrada.