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THE USE OF PROBIOTIC MONOCULTURE *SACCHAROMYCES BOULARDII* IN MAINTAINING THE HEALTH OF DIGESTIVE SYSTEM

KORIŠĆENJE PROBIOTIČKE MONOKULTURE *SACCHAROMICES BOULARDII* U ODRŽAVANJU ZDRAVLJA DIGESTIVNOG SISTEMA

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Key words

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Ključne reči

digestivne bolesti, dijareja, probiotska monokultura, *Saccharomyces boulardi*.

Abstract

Background/purpose: One of the most important probiotic monocultures is *Saccharomyces boulardii*, which is recommended for use in case of diarrhea, prevention of antibiotic-associated diarrhea, and prevention of *Clostridium difficile*-associated diarrhea. Bulardi® (Abela Pharm, Belgrade, Serbia) is a dietary supplement that contains 5 billion colony forming units per one capsule. The aim of study was to examine the use of probiotic monoculture *Saccharomyces boulardii* in maintaining the health of digestive system. **Patients and Methods:** The study was conducted as a clinical study on 3 144 respondents. *Saccharomyces boulardii* was applied equally in both genders, in all age groups of respondents, but most usually between 31 and 50 years old. **Results:** The most common indication for prescribing *Saccharomyces boulardii* were diarrheal syndrome, antibiotic-associated diarrhea, and eradication of *Helycobacter pylori* infection. The most patients had other diagnoses, like blood, blood-forming organs and immune disorders, diseases of the endocrine system, as well as diseases of the genitourinary system. Monoculture probiotic *Saccharomyces boulardii* is commonly used for 2 to 4 weeks, in a dose of 1 capsule per day, or as needed. In most of the respondents there was an improvement of symptoms. **Conclusion:** In most of the patients there was an improvement of symptoms, and considering that most of the respondents had multiple diagnoses, the fact that the probiotic had no side effects among patients indicates that is safe and effective for use in patients whose health is damaged by diseases that are not related to the digestive system.

INTRODUCTION

The rate of infectious intestinal diseases, diarrhea and gastroenteritis in the Republic of Serbia showed an increase from 2014. The registered incidence rate was 116.65 per 100 000 inhabitants [1]. The main therapies in the case of digestive diseases which are usually accompanied with diarrhea are probiotics. Probiotics are able to complete recolonization and renewal symbiosis microflora of the digestive system. They are safe and are not pathogenic, invasive or carcinogenic. One of the most important probiotic monocultures is *Saccharomyces boulardii*. Several meta-analyses and a large number of randomized trials showed that *Saccharomyces boulardii* is resistant to antibiotics and recommended its use during every antibiotic treatment [2]. It is effective in preventing new episodes of diarrhea [2]. *Saccharomyces boulardii* is well tolerated [3]. This probiotic yeast effective-

ly treated the intestinal flora caused by gastrointestinal takeover (overgrowth) by „bad" bacteria in adults and it has more than ten times bigger cell's surface than any other probiotic strains. It binds a larger number pathogenic microorganisms and speeding their elimination from the body. It also prevents the establishment and growth of pathogenic bacteria in the intestines. It has a positive effect on the removal of harmful microorganisms such as *Vibrio cholera, Salmonella, Shigella* and *Escherichia coli*. Also, it produces factors that neutralize bacterial toxins and modulates the host cell, acting on a signaling of cells and leading to proinflammatory responses during bacterial infections [2]. *Saccharomyces boulardii* in meta-analysis of 21 study on 4.780 respondents, shows a reduction in the risk of diarrhea in patients using antibiotics without side effects and reduces the risk of *Clostridium difficile* diarrhea in children by 75% [3]. On the 2 220 respondents in meta-analysis confirmed that Saccharomyces boulardii with triple therapy, increases the rate of eradication of *Helicobacter pylori*, reduces the risk of side effects of triple therapy - including proton pump inhibitor, clarithromycin, and amoxicillin or metronidazole (56% less risk), reduces the incidence of diarrhea by 49% and nausea by 40% [4]. *Saccharomyces boulardii* has a protective effect, destroys pathogenic intestinal flora, stimulates and builds a healthy microflora [5]. Also, it should be emphasized that *Saccharomyces boulardii* is highly recommended for use in case of diarrhea, prevention of antibiotic-associated diarrhea, prevention of infection and prevention of *Clostridium difficile*-associated diarrhea [6]. Bulardi® (manufactured by AbelaPharm, Belgrade, Serbia) is a dietary supplement that contains 5 billion colony forming units per one capsule. The aim of this study was to examine the use of probiotic monoculture *Saccharomyces boulardii* in maintaining the health of the digestive system.

PATIENTS AND METHOD

The study was conducted as a cross-sectional clinical study during the period between September and December 2016, and it was included a total of 3 144 respondents - users of health centers in major cities throughout the Republic of Serbia (Belgrade, Novi Sad, Nis, Kragujevac, Arandjelovac, Kragujevac, Bor and Zajecar; 1647 males and 1497 females.). All the respondents were selected in the first visit by history and clinical examination that indicated the need of use of probiotic monoculture. Inclusion criteria in the study were that patients are users of the specific health center, age 18 years or above and that they had certain symptoms or signs being associated with indications for the use of probiotics. The indications include acute or chronic diarrhea, antibiotic-associated diarrhea, inflammatory bowel disease (Crohn's disease, ulcerative colitis), *Clostridium difficile* infections, irritable colon, *Helycobacter pylori* infection, compromised immunity or compromised general health. Excluding criteria were patients younger than 18 years of age, as well as deficiency of the defined symptoms for the use of probiotic monoculture.

The survey instrument was a questionnaire adapted for this study. Completing the questionnaire was carried out by the attending doctors in selected health institutions surveyed by filling in the blank response items. The questions referred to the demographic characteristics of the respondents (gender and age), primary indication for prescribing probiotic monoculture, the presence of other diseases, the period of prescription and the prescribed daily dose of probiotic. In the control visit it was recorded patient's condition (improvement of symptoms) and the presence of adverse effects caused by the prescribed probiotic monoculture or by combination of this probiotic monoculture with already prescribed medications.

Data obtained from the questionnaires were entered into SPSS 17.0 software program on which it was performed basic statistical analysis. The results are shown in percentage and numerical, in the form of figures and tables.

RESULTS

In the study participated a total of 3 144 respondents (1 647 males and 1 497 females) - Figure 1. When it comes to respondents' age, most respondents were in the age group from 31 to 50 years (34.7%) - Figure 2. In a smaller percentage (33.9%) were respondents who belong to the age group of 51 to 75 years - Figure 2.

In the case of indicative areas for the use of probiotic monoculture *Saccharomyces boulardii* the most common indications among respondents were acute or chronic diarrhea (28.5%), antibiotic-associated diarrhea (22.9%) and *Helycobacter pylori* eradication (19.7%) - Table 1.

Of the total number of respondents, in addition to the primary diagnosis (for which it was prescribed probiotic monoculture), 3 020 patients (96.1%) had additional diagnosis - Table 2. The largest number of respondents had a disease of

Table 1. *Indications for the use of Saccharomyces boulardii*

Indication	n (%)
Acute or chronic diarrhea	892 (28.5)
Antibiotic-associated diarrhea	658 (20.9)
Inflammatory bowel diseases	230 (7.4)
Clostridum difficile infection	198 (6.2)
Irritable colon	357 (11.4)
Helycobacter pylori eradication	621 (19.7)
Improving immunity and general health	188 (5.9)
Total number of respondents	3 144 (100.0)
n - number of respondents; % - percente of respondents	

Table 2. *Diagnosis of respondents*

Diagnosis	n (%)
No other diagnosis	124 (4.1)
Neoplasms	150 (4.8)
Diseases of blood, blood-forming organs and immunity disorders	875 (27.8)
Endocrine diseases	697 (22.1)
Diseases of circulatory system	224 (7.1)
Diseases of respiratory system	192 (6.1)
Diseases of the musculoskeletal and connective tissue	208 (6.6)
Diseases of genitourinary system	674 (21.4)
Total number of respondents	3 144 (100.0)
n - number of respondents; % - percente of respondents	

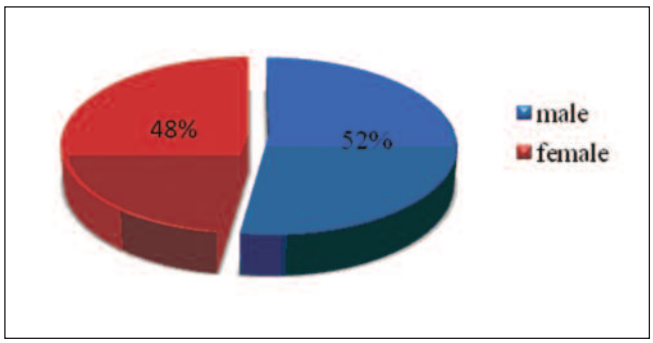

Figure 1. *Distribution of respondents by gender*

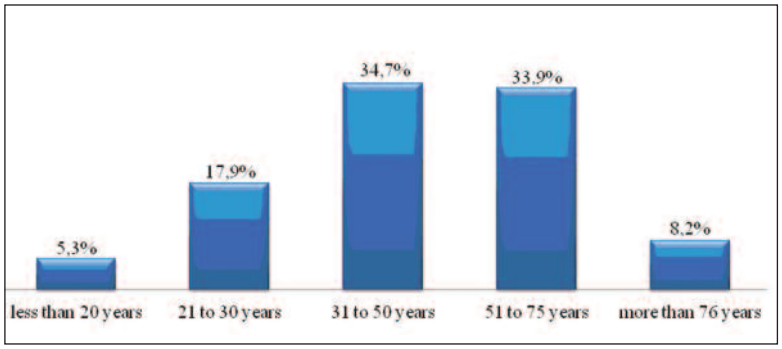

Figure 2. *Distribution of respondents by age group*

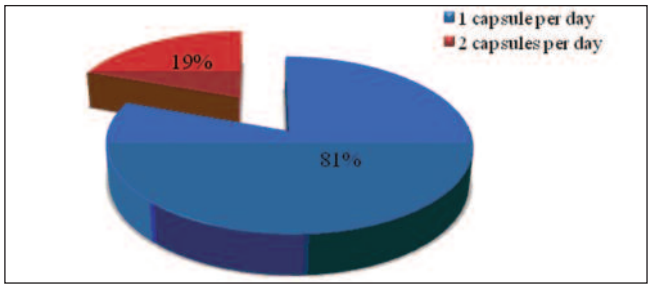

Figure 3. *Dose of probiotic monoculture among respondents*

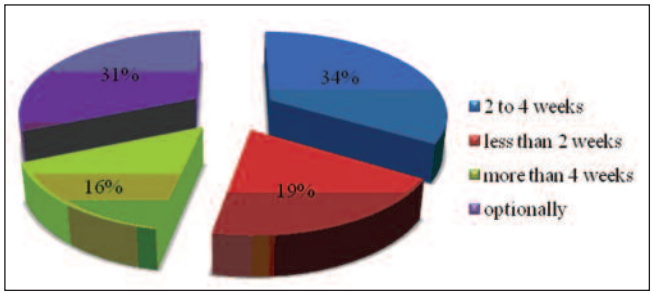

Figure 4. *Duration of use of probiotic Saccharomyces boulardii among respondents*

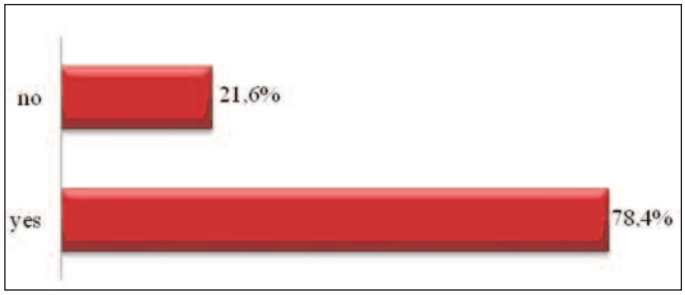

Figure 5. *Improvement of symptoms after use of Saccharomyces boulardii among respondents*

the blood-forming organs and immunity disorders (27.8%), endocrine disorders (22.1%) and diseases of the genitourinary system (21.4%) - Table 2.

Regarding the dose of probiotic monoculture *Saccharomyces boulardii*, the majority of respondents were prescribed one capsule per day (81%), while in 19% of subjects administered two capsules per day - Figure 3.

Regarding duration of the probiotic administration, the most common was the use in a period of 2 to 4 weeks (33.6%), or as needed (31.3%) - Figure 4.

In the second (control) visit, at 2 465 (78.4%) respondents, improvement of symptoms was recorded - Figure 5. In addition, in all observed respondents there were no adverse events associated with use of probiotic monoculture *Saccharromyces boulardii* alone or in combination with other prescribed medications.

DISCUSSION

The most common age groups of the respondents were between 31 and 50 years (34.7%) and from 51 to 75 years (33.9%). The research sample corresponds to the statistical data on the age of the population in the Republic of Serbia. The age structure of the population according to the 2002 census confirms the fact that the population of the Republic of Serbia in the trend of progressive aging. Individuals older than 65 years of age make 16.5% of the total population of the Republic of Serbia [7].

The most common primary diagnosis among respondents was acute or chronic diarrhea (28.5%) and antibiotic-associated diarrhea (20.5%). Diarrhea is certainly one of the most common and most important symptoms of the digestive diseases. Data from the literature show that in the period between 2010 and 2014, there is the trend of reducing number of patients registered with diarrhea (8 878 patients in 2010; 8 357 patients in 2014) [7], but this is still a large number of the affected population. Moreover, in this period was registered increasing number of deaths associated with diarrhea and gastroenteritis, causa infectiosus suspecta [7].

As for the other diagnoses, most of the respondents had a diagnosis of the blood-forming organs and immunity disorders (27.8%), endocrine disorders (22.1%) and genitourinary system diseases (21.4%). In case of endocrine disorders, the most common was diabetes mellitus. Previous studies have shown that diabetes mellitus is one of the most common diseases of the population of Serbia with 8.1% representation showing a tendency of further growth. One reason for the increase in incidence is certainly the aging population [8].

Monoculture probiotic *Saccharomyces boulardii* is commonly used for 2 to 4 weeks, in a dose of 1 capsule per day, or as needed. This is the period of time when it comes to normalization of intestinal flora and the complete elimination of antibiotics from the organism after its application. In most patients there was an improvement of symptoms, and considering that most of the respondents had a combined diagnosis, the fact that the probiotic had no side effects among patients indicates that it is safe and effective for use in patients whose health is damaged by diseases that

Sažetak

Uvod/cilj. Jedna od najznačajnijih probiotskih monokultura je *Saccharomyces boulardii,* koja se preporučuje u slučaju dijareje, prevenciji antibiotske dijareje, kao i prevenciji dijareje uzrokovane *Clostridium difficile*. Bulardi® (Abela Pharm, Beograd, Srbija) je dijetetski suplement koji sadrži 5 milijardi kultura po kapsuli. Cilj istraživanja bio je da se ispita efikasnost upotrebe probiotske monokulture *Saccharomyces boulardii* u očuvanju zdravlja digestivnog trakta. **Pacijenti i metod.** Istraživanje je sprovedeno kao klinička studija na 3 144 ispitanika. *Saccharomyces boulardii* je primenjen pojednako kod oba pola, u svim starosnim grupama ispitanika, ali najviše u starosnom dobu od 31 do 50 godina. **Rezultati.** Najčešća indikacija za ordiniranje *Saccharomyces boulardii* bio je dijarejni sindrom, antibiotska dijareja i eradikacija infekcije *Helicobacter pylori*. Većina ispitanika je imala i druge dijagnoze, a najčešće poremećaje krvi, krvotvornih organa i imuniteta, bolesti endokrinog sistema, kao i bolesti genitourinarnog sistema. Probiotska monokultura *Saccharomyces boulardii* je najčešće korišćena 2 do 4 nedelje, u dozi od jedne kapsule dnevno, ili po potrebi. Kod većine ispitanika došlo je do poboljšanja simptoma. **Zaključak.** Kod većine ispitanika došlo je do poboljšanja simptoma, a uzimajući u obzir da je većina ispitanika imala više dijagnoza, činjenica da probiotik nema neželjenih efekata kod pacijenata ukazuje na njegovu bezbednu i efikasnu primenu kod pacijenata kojima je zdravlje narušeno bolestima koje nisu samo u vezi sa digestivnim sistemom.

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