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Prevalence, Diagnostics and Treatment of Small Intestinal Bacterial Overgrowth in the Clinical Practice in Southern Federal District of the Russian Federation

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Aim: to optimize the provision of medical care to patients with small intestinal bacterial overgrowth (SIBO) in the Southern Federal District based on clarification of data on the epidemiology of the syndrome (disease), unification of approaches to diagnostics and treatment.
Materials and methods. We analysed the questionnaires sent to the main gastroenterologists of the federal subjects included in the Southern Federal District, which contained questions in epidemiology, diagnostics and treatment SIBO in different districts.
Results. A survey of chief gastroenterologists of the Southern Federal District has demonstrated that there is no accurate data on the prevalence of SIBO in the Southern Federal District. Verification of the diagnosis in all regions is carried out using various modifications of the breath test. Most often, SIBO is suspected and patients with functional gastrointestinal diseases (32.4 %) and diverticular disease (36.5 %) are sent for a breath test. In the group of people with a predominance of hydrogen-producing microbiota, there are fewer men than women (30.8 % vs. 69.2 %), in the group with a predominance of methane-producing microflora, the ratio of men and women was 27.4 % vs. 72.6 %, and in the group with a predominance of hydrogen- and methane-producing microbiota, this ratio was 16.6 % vs. 83.4 %, respectively.
Antibacterial therapy after confirmation of the diagnosis is carried out in accordance with national clinical guidelines; probiotics, mainly *Saccharomyces boulardii*, are prescribed to prevent antibiotic-associated diarrhea.
Conclusions. The widespread introduction of various versions of the breath test into the work of healthcare institutions will make it possible to overcome diagnostic difficulties in relation to verification of this diagnosis, substantiate and individualize the approach to prescribing antibacterial and probiotic therapy.
Keywords: small intestinal bacterial overgrowth, prevalence, breath test, etiological treatment
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Частота, диагностика и лечение синдрома избыточного бактериального роста по данным клинической практики в Южном федеральном округе Российской Федерации

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Цель: оптимизировать оказание медицинской помощи пациентам с синдромом избыточного бактериального роста (СИБР) в Южном федеральном округе на основании уточнения данных о частоте его распространения и унификации подходов к диагностике и лечению.
Материалы и методы. Проведен анализ анкет, заполненных главными гастроэнтерологами регионов, входящих в Южный федеральный округ. Они включают вопросы об эпидемиологии, диагностике и лечении СИБР.
Результаты. Проведенный опрос главных гастроэнтерологов регионов, входящих в Южный федеральный округ, продемонстрировал, что точные данные о распространенности СИБР в Южном федеральном округе отсутствуют. Верификация диагноза во всех регионах осуществляется с использованием различных модификаций дыхательного теста. Чаще всего высказывают подозрение на СИБР и выписывают направление на дыхательный тест для пациентов с функциональными заболеваниями пищеварительной системы (32,4 %) и дивертикулярной болезнью (36,5 %). В группе пациентов с превалированием водород-продуцирующей микробиоты мужчина было меньше, чем женщин (30,8 % против 69,2 %). В группе с преобладанием метан-продуцирующей микрофлоры соотношение мужчин и женщин составило 27,4 и 72,6 %, а в группе с водород- и метан-продуцирующей микробиотой данное соотношение было 16,6 и 83,4 % соответственно.
Антибактериальную терапию после подтверждения диагноза проводили в соответствии с национальными клиническими рекомендациями, для профилактики антибиотикоассоциированной диареи назначали пробиотики, в подавляющем большинстве случаев — *Saccharomyces boulardii*.
Выводы. Широкое внедрение различных вариантов дыхательного теста в работу учреждений системы здравоохранения позволит преодолеть диагностические трудности в отношении верификации диагноза СИБР, обосновать и индивидуализировать подход к назначению антибактериальной и пробиотической терапии.
Ключевые слова: синдром избыточного бактериального роста, распространенность, дыхательный тест, этиологическое лечение
Конфликт интересов: авторы заявляют об отсутствии конфликта интересов.

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Introduction

The prevalence of small intestinal bacterial overgrowth (SIBO) in the Russian Federation has not been sufficiently studied [1] but this problem is attracting increasing attention from scientists, healthcare providers and practicing physicians. Most researchers emphasize that in real clinical practice, this syndrome is usually not diagnosed timely [2]. The etiopathogenesis of SIBO includes many factors, including those that are important for other gastrointestinal diseases. The relationships most thoroughly studied are between SIBO and irritable bowel syndrome [3], functional dyspepsia [4], non-alcoholic fatty liver disease [5], inflammatory bowel diseases [6], chronic pancreatitis [7], and celiac disease [8].

Specific diagnostics of SIBO is based on the cultural method and various types of breath tests [1, 9]. There are no precise data about diagnostic methods using in different regions of the Russian Federation today.

To obtain new information on the SIBO epidemiology in the regions of the Russian Federation and optimize approaches to its diagnosis and treatment on December 16, 2023, in Moscow, under the auspices of the Chief Gastroenterologist of the Russian Federation, academician V.T. Ivashkin, the Expert Council “Syndrome of small intestinal bacterial overgrowth in the practice of doctors of various specialties” was held. The reports by chief gastroenterologists of the federal districts of the Russian Federation on the epidemiology, diagnosis and treatment of SIBO in the Russian Federation were presented [10]. This study was conducted in preparation for the Expert Council.

The aim of the study

To optimize the provision of medical care to patients with SIBO in the Southern Federal District based on clarification of the SIBO frequency, unification of approaches to its diagnosis and treatment, and increasing the commitment of doctors to the implementation of national clinical guidelines.

Materials and methods

The Chief Freelance Gastroenterologist of the Southern Federal Region has developed a questionnaire that includes questions on the SIBO prevalence, methods of its diagnosis and treatment. It was sent to Chief Gastroenterologists of the Southern Federal Region (Adygea, Kalmykia, Crimea, Krasnodar Region, Astrakhan, Volgograd, Rostov Regions, Sevastopol). When answering the questions, the data of federal statistical registration forms about the number of diseases registered

in patients living in the service area of the medical organization (form No. 12) and registries of patients with SIBO maintained at the V.I. Vernadsky Crimean Federal University, the Regional Consultative and Diagnostic Center (Rostov-on-Don), City Clinical Emergency Hospital No. 25 (Volgograd) and Regional Clinical Hospital No. 2 (Krasnodar) were taken into account.

Results of the study

There is no exact data on the epidemiology of SIBO in the Southern Federal Region. There is no nosological form of SIBO in the federal statistical registration forms of diseases registered in patients living in the service area of a medical organization (form No. 12) and data about departments of medical organizations providing medical care in inpatient settings (form No. 14) are absent. The main freelance specialists (gastroenterologists) indicated that in their regions, SIBO is diagnosed based on a breath test as part of paid services or voluntary health insurance. Interregional differences consisted only in the type of breath test and the load on the equipment available in healthcare institutions to conduct the study during the year. In the Regional Consultative and Diagnostic Center (Rostov-on-Don), a hydrogen breath test with lactulose is carried out (at least 1800 studies per year), in the Volgograd Region, in the City Clinical Hospital of Emergency Medical Care No. 25, a hydrogen-methane breath test is used, the load on the device is 200 studies per year, 700 studies have been carried out over 3 years.

Since 2007, at the Clinical Research Center of the Department of Therapy, Gastroenterology, Cardiology and General Medical Practice (Family Medicine) of the Medical Institute named after S.I. Georgievsky, V.I. Vernadskiy Crimean Federal University, a hydrogen breath test has been carried out to diagnose SIBO. In 2015, as part of the development program of the Crimean Federal University, a monitor for simultaneous monitoring of hydrogen (H_2) and methane (CH_4) GastroCHEK was purchased, which allows expanding the methodology and conduct a hydrogen-methane lactulose breath test. Since 2018, a registry of patients referred to that test has been maintained. According to the registry, 317 hydrogen-methane breath tests were performed as part of a comprehensive differential diagnosis in patients with flatulence, bowel disorder, as well as in patients with non-alcoholic fatty liver disease, cholelithiasis. The group of patients studied included 117 (36.9 %) men and 200 (63.1 %) women aged 18 to 78 years. The results of four studies were questionable, because of poor preparation for the study. Among all the patients tested, 41.8 % men and 62.5 % of women had a positive result for SIBO.

Of the 313 results obtained, 170 (54.3 %) were positive, including 107 (62.9 %) positive tests with a predominance of hydrogen-producing microflora; 51 (30 %) with a predominance of methane-producing microbiota; methane- and hydrogen-producing microflora — 12 (7.1 %). In the group of patients with a predominance of hydrogen-producing microbiota, there were 33 (30.8 %) men (mean age — 36.5 years) and 74 (69.2 %) women (mean age — 42 years); in the group with a predominance of methane-producing microflora, there were 14 (27.4 %) men (mean age — 45.2 years) and 37 (72.6 %) women (mean age — 47 years); in the group with a predominance of hydrogen- and methane-producing microbiota — 2 (16.6 %) men (mean age — 39 years) and 10 (83.4 %) women (mean age — 53.5 years), respectively.

In the Krasnodar Region, a hydrogen-methane breath test with lactulose is carried out as part of voluntary health insurance and paid services. If SIBO is suspected based on the clinical picture of the disease, the examination plan includes routine blood tests (with determination of the level of folic acid and cyanocobalamin if indicated) and feces, esophagogastroduodenoscopy with biopsy from the duodenum; then the patient is referred for a breath test as a paid service.

The analysis performed demonstrated that among outpatient gastroenterological patients, based on the results of a clinical study, SIBO was suspected in 25.2 % of cases (Table 1). 838 patients were recommended to undergo hydrogen-methane lactulose breath test, which was performed only in 365 patients and was positive in 138 (37.8 %). Based on the data we obtained, it can be stated that most often, based on clinical symptoms, an assumption is made about the presence of SIBO and patients are referred for a breath test with diverticular disease (19 out of 52 patients, i.e. 36.5 %) and individuals with functional diseases of the digestive system (178 out of 550, i.e. 32.4 %). Unfortunately, the inability to conduct a breath test in all patients with clinical manifestations of SIBO to verify this diagnosis does not allow obtaining accurate data on the true prevalence of this clinically significant syndrome.

We analyzed the treatment options for SIBO in 838 patients with positive breath test results (Table 2). Most patients were prescribed rifaximin as etiologic treatment (508 (60.6 %) patients), 101 (12.1 %) patients received ciprofloxacin, 73 (8.7 %) people received metronidazole, 156 (18.6 %) — a combination of antibiotics. Almost all patients (798 (95.2 %) patients) were

Table 1. Structure of patients treated in the outpatient service of the Gastroenterological Center of the Regional Clinic Hospital No. 2 (Krasnodar) and the proportion of patients with SIBO in 2022

Таблица 1. Структура нозологических форм у пациентов, проходивших обследование и лечение в поликлинической службе гастроэнтерологического центра Краевой клинической больницы № 2 (г. Краснодар), и удельный вес пациентов с СИБР за 2022 г.

Nosological form ***Нозологическая форма***	**Total number of patients, abs. (%)** ***Всего пациентов, чел. (%)***	**Patients with suspected SIBO referred for breath testing** ***Пациенты с подозрением на СИБР, направленные на дыхательный тест***	**SIBO according to breath test** ***СИБР по результатам дыхательного теста***
Gastroesophageal reflux disease *Гастроэзофагеальная рефлюксная болезнь*	1077 (32.4)	321 (9.7)	34 (1.0)
Duodenal ulcer, gastric ulcer *Язвенная болезнь желудка и двенадцатиперстной кишки*	258 (7.8)	45 (1.4)	13 (0.4)
Erosive gastritis, duodenitis *Эрозивный гастрит, дуоденит*	92 (2.8)	19 (0.6)	5 (0.2)
Diverticular disease *Дивертикулярная болезнь*	52 (1.6)	19 (0.6)	2 (0.1)
Chronic pancreatitis *Хронический панкреатит*	786 (23.6)	201 (6.0)	34 (1.0)
Functional gastrointestinal disorders (functional dyspepsia, irritable bowel syndrome) *Функциональные заболевания пищеварительной системы (функциональная диспепсия, синдром раздраженного кишечника)*	550 (16.5)	178 (5.4)	25 (0.8)
Ulcerative colitis, Crohn's disease *Язвенный колит, болезнь Крона*	135 (4.1)	23 (0.7)	14 (0.4)
Liver cirrhosis *Цирроз печени*	92 (2.8)	14 (0.4)	6 (0.2)
Chronic hepatitis *Хронический гепатит*	40 (1.2)	9 (0.3)	3 (0.1)
Nonalcoholic fatty liver disease *Неалкогольная жировая болезнь печени*	43 (1.3)	9 (0.3)	2 (0.1)
Benign neoplasms (polyps of the stomach and intestines) *Доброкачественные новообразования (полипы желудка и кишечника)*	5 (0.2)	0 (0)	0 (0)
Malignant neoplasms *Злокачественные новообразования*	2 (0.1)	0 (0)	0 (0)
Total / *Всего*	3325 (100.0)	838 (25.2)	138 (4.2)

prescribed probiotics for the prevention of antibiotic-associated diarrhea, and in most cases, *Saccharomyces boulardii* (456 (54.4 %) patients), as the strain with the largest evidence base for reducing the risk of developing antibiotic-associated diarrhea and infection caused by *C. difficile* [1].

Conclusion

Information on the epidemiology of SIBO in the Southern Federal Region, as well as in other regions of the Russian Federation, is insufficient. SIBO is a pathogenetic basis for digestive disorders and the development of malabsorption. The data obtained confirms the idea that the

Table 2. Medicines used for a verified diagnosis of SIBO in the outpatient service of the Gastroenterological Center of the Region Clinic Hospital No. 2 (Krasnodar)

Таблица 2. Лекарственные препараты, применяемые при верифицированном диагнозе СИБР в поликлинической службе гастроэнтерологического центра Краевой клинической больницы № 2 (г. Краснодар)

Medicine ***Лекарственный препарат***	**Number of patients, abs. (%)** ***Количество пациентов, чел. (%)***
Rifaximin (400 mg, 3 times a day, 14 days) *Рифаксимин (400 мг, 3 раза в день, 14 дней)*	508 (60.6)
Ciprofloxacin (500 mg, twice a day, 10 days) *Ципрофлоксацин (500 мг, 2 раза в день, 10 дней)*	101 (12.1)
Metronidazole (250 mg, 3 times a day, 10 days) *Метронидазол (250 мг, 3 раза в день, 10 дней)*	73 (8.7)
Combination of antibiotics *Комбинация антибиотиков*	156 (18.6)
Probiotics *Пробиотики*	798 (95.2)
Saccharomyces boulardii (250 mg, twice a day, during all period of antibiotics treatment) *Saccharomyces boulardii (250 мг, 2 раза в день, на период приема антибиотиков)*	456 (54.4)
Total / *Всего*	838 (100.0)

clinical picture of SIBO is nonspecific [1] and can overlap with the clinical manifestations of other chronic non-infectious diseases. According to our data, patients with functional diseases of the digestive system, such as functional dyspepsia, irritable bowel syndrome (32.4 %) and individuals with diverticular disease (36.5 %), are most often suspected of having SIBO and are referred for a breath test. The data obtained coincides with the literature [1]. Unfortunately, the data we have is insufficient to assess the relationship between the severity of digestive diseases and the presence of SIBO. Widespread implementation of various breath test options in the practice of healthcare institutions allows to overcome diagnostic difficulties in verifying this diagnosis, substantiate and individualize the approach to prescribing antibacterial and probiotic therapy. Today, the Department of Propaedeutics of Internal Diseases, Gastroenterology and Hepatology, the Microbiota Reference Center of Sechenov University and the Scientific Society for the Study of the Human Microbiome under the auspices of the Chief Gastroenterologist of the Russian Federation, Academician V.T. Ivashkin, are combining efforts to conduct scientific research in this area, coordinate the work of practicing doctors, representatives of the industrial society to increase the detection of this syndrome, clarify the risk factors for its development, optimize approaches to individualized prevention, diagnosis, treatment and subsequent observation of this complex contingent of patients. Our data shows the need for a wider introduction of hydrogen-methane lactulose breath test into standards (clinical guidelines) for providing medical care to patients with diseases of the digestive system that improve significantly treatment results and individualize therapy.

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