

CLINICAL CHARACTERISTICS OF CHRONIC ADENOIDITIS IN CHILDREN AGED 3–6 YEARS WITH PROBIOTIC SUPPORT

Izumov A.O.¹,
Karavozova A.E.¹,
Menshchikova V.E.¹,
Ryabichenko T.I.^{1,2},
Obukhova O.O.²,
Kartseva T.V.¹,
Selyatitskaya V.G.²

¹ Novosibirsk State Medical University;
Russia (Krasny Prospekt, 52, Novosibirsk
630091, Russian Federation)

² Federal Research Center for
Fundamental and Translational Medicine
(Timakov Str., 2, Novosibirsk 630060,
Russian Federation)

Corresponding author:

Valeria E. Menshchikova

e-mail: vaidurova_valerya@mail.ru

ABSTRACT

Background. The prevalence of chronic tonsil diseases is constantly increasing among children of different ages. To date, the treatment of pediatric patients with chronic diseases of the upper respiratory tract remains controversial and requires new therapeutic approaches.

Aim. To study the clinical and anamnestic characteristics of chronic adenoiditis in children aged 3–6 years and to evaluate the effectiveness of including a probiotic drug in postoperative rehabilitation.

Methods. A total of 100 children aged 3–6 years with chronic inflammatory processes of the nasopharynx were examined. The patients were divided into 2 comparable groups, depending on the treatment and rehabilitation measures received. A parent survey was conducted to assess the severity of clinical symptoms before treatment and 30 days after adenotomy.

Results. The frequency and duration of viral infections in children with chronic adenoiditis were assessed. Before surgery, 62 % of children had acute respiratory infections (ARIs) once every 2 months or more, and 62 % had ARI episodes lasting more than 7 days. According to the survey results, after treatment there was a statistically significant decrease in the frequency of the following symptoms in children in both study groups: difficulty in nasal breathing, snoring, cough, and bad breath. In the main group, there was a marked decrease in the intensity of nasal breathing difficulty (by 84 %) and in the frequency of sleep disorders (by 58 %) after probiotic treatment.

Conclusion. The post-treatment survey data demonstrate regression of clinical symptoms in both groups. However, with respect to symptoms such as decreased intensity of nasal breathing and reduced frequency of sleep disorders, higher therapeutic efficacy was observed when a probiotic was used as an adjunct to adenotomy.

Keywords: chronic adenoiditis, adenotomy, probiotics, *Bifidobacterium longum* MC-42, clinical manifestations

Received: 11.11.2025

Accepted: 26.05.2026

Published: 23.07.2026

For citation: Izumov A.O., Karavozova A.E., Menshchikova V.E., Ryabichenko T.I., Obukhova O.O., Kartseva T.V., Selyatitskaya V.G. Clinical characteristics of chronic adenoiditis in children aged 3–6 years with probiotic support. *Acta biomedica scientifica*. 2026; 11(3): 108-116. doi: 10.29413/ABS.2026-11.3.13

КЛИНИЧЕСКАЯ ХАРАКТЕРИСТИКА ТЕЧЕНИЯ ХРОНИЧЕСКОГО АДЕНОИДИТА У ДЕТЕЙ 3–6 ЛЕТ НА ФОНЕ ПРОБИОТИЧЕСКОЙ ПОДДЕРЖКИ

Исюмов А.О.¹,
 Каравозова А.Е.¹,
 Менщикова В.Е.¹,
 Рябиченко Т.И.^{1,2},
 Обухова О.О.²,
 Карцева Т.В.¹,
 Селятицкая В.Г.²

¹ ФГБОУ ВО «Новосибирский государственный медицинский университет» Минздрава России, (630091, г. Новосибирск, Красный проспект, 52, Россия)
² ФГБНУ «Федеральный исследовательский центр фундаментальной и трансляционной медицины» (ФИЦ ФТМ) (630060, г. Новосибирск, ул. Тимакова, 2, Россия)

Автор, ответственный за переписку:
Менщикова Валерия Евгеньевна
 e-mail: vaidurova_valerya@mail.ru

РЕЗЮМЕ

Обоснование. Распространенность хронических заболеваний миндалин постоянно увеличивается среди детей различных возрастов. На сегодняшний день вопросы лечения пациентов детского возраста с хроническими заболеваниями верхних дыхательных путей остаются дискуссионными и требуют новых подходов к терапии.

Цель исследования. Изучить клинико-анамнестические характеристики течения хронических воспалительных заболеваний аденоидов у детей 3–6 лет с оценкой эффективности включения в программу послеоперационной реабилитации пробиотического средства.

Методы. Обследовано 100 детей в возрасте 3–6 лет с хроническими воспалительными процессами носоглотки. Пациентов разделили на 2 сопоставимые группы в зависимости от проводимых лечебных и реабилитационных мероприятий. Проведено анкетирование родителей для определения степени выраженности клинических симптомов до лечения и через 30 дней после проведенной аденотомии.

Результаты. Оценивалась частота возникновения и длительность течения вирусных инфекций у детей с хроническим аденоидитом, которые до операции: 80 % переносили острые респираторные инфекции (ОРИ) 1 раз в 2 месяца и чаще, 62 % выздоравливали более чем за 7 дней. По результатам анкетирования после лечения наблюдали статистически значимое снижение частоты встречаемости следующих симптомов у детей в исследуемых группах: затрудненное носовое дыхание, храп, кашель, неприятный запах изо рта. В основной группе наблюдается выраженное снижение интенсивности затруднения дыхания через нос (на 84 %) и частоты встречаемости нарушений сна (на 58 %) после лечения пробиотиком.

Заключение. Данные анкетирования после лечения демонстрируют эффективность в аспекте регресса клинической симптоматики в обеих группах. Однако по таким симптомам, как снижение интенсивности затруднения дыхания через нос и частота встречаемости нарушений сна, определена более высокая лечебная эффективность применения пробиотического препарата на фоне аденотомии.

Ключевые слова: хронический аденоидит, аденотомия, пробиотические препараты, *Bifidobacterium longum* MC-42, клинические проявления

Статья поступила: 11.11.2025
 Статья принята: 26.05.2026
 Статья опубликована: 23.07.2026

Для цитирования: Исюмов А.О., Каравозова А.Е., Менщикова В.Е., Рябиченко Т.И., Обухова О.О., Карцева Т.В., Селятицкая В.Г. Клиническая характеристика течения хронического аденоидита у детей 3–6 лет на фоне пробиотической поддержки. *Acta biomedica scientifica*. 2026; 11(3): 108–116. doi: 10.29413/ABS.2026-11.3.13

BACKGROUND

Adenoids (pharyngeal tonsil) and tonsils (palatine, tubal, and lingual) are accumulations of lymphoid tissue that form the Pirogov – Waldeyer ring. These structures play a crucial role in screening microorganisms that enter the human body through the upper respiratory tract, as well as in eliminating local pathogens by activating immune system effector cells and memory cells [1]. However, these anatomical structures can also act as reservoirs for pathogenic and opportunistic bacteria. This can lead to the development of recurrent and chronic respiratory tract infections, through the formation of persistent bacterial biofilms. In this process, microorganisms attach to the tonsillar surfaces and create a matrix that protects them from the host immune response and makes them resistant to antibiotics [2].

The prevalence of both allergic and chronic inflammatory tonsil diseases is increasing in most countries, affecting adult patients and children from all age groups [3]. Chronic diseases of the nasal and oropharyngeal regions are a result of persistent infections in the tonsils. This may be due to either high virulence of the respiratory tract microbiome, or to a combination of sensitization (or sensitization alone), primary ciliary dyskinesia, or congenital immune system defects. To date, there is a lack of reliable statistical data on the actual prevalence of chronic inflammatory conditions involving the palatine tonsils and adenoids in the Russian Federation.

Particular attention is given to the issue of children with frequent and prolonged recurring infections, which is particularly relevant for preschool and early school-age children (up to the age of 10) [4]. The high incidence of acute respiratory infections (ARIs) at this age is due to the anatomical features of the upper respiratory tract (in particular, the narrowness of the lumen) and the excessive hypertrophy of lymphoid tissue associated with the development of the immune system [5]. It has been shown that the presence of chronic inflammatory processes in the nasal cavity of children is also linked to changes in the composition of the local microbiota. Local inflammation limits the range of microbial species capable of colonizing the nasopharynx, and a dysbiotic environment may promote the adhesion and proliferation of new specific bacterial groups [6]. It is known that opportunistic bacteria may be transiently or persistently present on the mucosal surfaces of various parts of the pharyngeal region even in healthy children. These microorganisms include representatives of the following genera and species: *Neisseria*, *Streptococcus pyogenes*, *Haemophilus influenzae*, *Staphylococcus aureus*, *Actinomyces*, *Bacteroides*, *Prevotella*, and others [2].

Chronic inflammatory diseases in children often manifest as recurrent sore throat, difficulty swallowing, snoring, mouth breathing, and sleep disturbances. The most severe manifestation of these conditions is obstructive sleep apnea. As children grow older, these symptoms are accompanied by persistent bad breath, changes in voice, and difficulty swallowing [2]. These clinical manifestations

significantly reduce the quality of life for children, negatively affecting their social development and ability to participate in school activities. This justifies the need for more effective treatment methods.

To date, the diagnosis and management of pediatric patients with chronic tonsil diseases remains a controversial area and requires innovative therapeutic approaches. Traditional treatment of children with persistent infections associated with tonsil hypertrophy often involves surgical intervention, although this is not always successful [5]. Accumulated knowledge of the composition and physiological characteristics of the indigenous microbiota of the oropharyngeal region supports the use of drugs that maintain the balance of the upper airway microbiocenosis. These drugs can not only alleviate or eliminate symptoms of the disease, but also stimulate and maintain local reparative processes and prevent recurrence of the underlying condition [7]. Previous studies have demonstrated the positive impact of probiotics, in particular *S. salivarius*, on the clinical symptoms of children with tonsillitis [8]. This led to the search for other probiotic agents that could influence the dynamics of the clinical course of inflammatory diseases of the upper respiratory tract. The effectiveness of the *Bifidobacterium longum* MC-42 strain has been shown in the practice of otolaryngologists and is included in the methodological recommendations for physicians and otolaryngologists "Chronic Pharyngeal Infection Foci and Associated Somatic Pathology" [9]. However, the authors have not found any studies in the Russian or international literature on the use of this *Bifidobacterium* strain in the postoperative period as part of complex therapy for children with chronic upper respiratory tract inflammation, which confirms the novelty of this study.

AIM

To study the clinical and anamnestic characteristics of chronic adenoiditis in children aged 3–6 years and to evaluate the effectiveness of including a probiotic drug in the postoperative rehabilitation program.

METHODS

Study Conditions

The study involved 100 children aged 3 to 6 years (57 % male, 43 % female) with chronic inflammatory processes of the nasopharynx (ICD-10 code: J35.9 Chronic disease of tonsils and adenoids). The diagnosis was confirmed by otorhinolaryngology specialists. All 100 participants received surgical treatment at the City Children's Emergency Clinical Hospital in the Novosibirsk region.

Group Characteristics

Prior to treatment, patients were randomly assigned into two groups using a computer-generated randomization process. The two groups were equal in size (1:1 ratio).

Group 1 (the control group) consisted of patients who underwent adenoidectomy surgery under general anesthesia.

Group 2 (the main group) included patients who underwent adenoidectomy surgery under general anesthesia and received postoperative nasopharyngeal irrigation with a probiotic solution for a period of 30 days after surgery. This irrigation was administered for 14 days transnasally and orally and for 16 days only orally.

Description of the Medical Intervention

To provide probiotic support, patients were administered a liquid dietary supplement (food additive) containing *Bifidobacterium longum* MC-42, which is recommended for use in infants and children (SGR RU.77.99.88.003. E00157304.16 dated April 12, 2016, produced in accordance with TU 9224-010-70517093-2015). The number of active bifidobacteria *B. longum* MC-42 in 1 cm³ of the product at the end of its shelf life is 5×10^8 CFU/g in the natural environment of their metabolites (volatile short-chain fatty acids, etc.). The product was stored at $4 \pm 2^\circ\text{C}$. The probiotic was administered to patients *per os* and intranasally at a dose appropriate for pediatric use. The dose corresponded to the recommended daily intake of the probiotic supplement for children aged 3 to 6 years, ranging from 4 to 6 mL per day. The use of the dietary supplement was conducted in accordance with Methodological Recommendations approved by the Coordination and Methodology Council for Postgraduate Education of the Novosibirsk State Medical University on April 6, 2018 (Protocol No. 98) [9]. According to the results of laboratory tests, the dietary supplement meets the standards of the Voluntary Certification System for Food Products and Dietary Supplements established by the GOST R Certification System under the Federal Agency for Technical Regulation and Metrology. The product is intended to normalize the microbiota and improve the barrier function of the human mucous membrane.

Survey Administration

Parental interviews were conducted, complaints and medical histories were collected, and the children were clinically examined by an otorhinolaryngologist. A parental survey was conducted to determine the severity of clinical symptoms prior to treatment and 30 days after rehabilitation measures to clarify the medical history. The survey included the following parameters: difficulty in nasal breathing, coughing, hearing loss, runny nose, nasal voice, sleep disturbances, snoring, and bad breath. Each proposed criterion was rated by the parents before and after treatment on a scale of 0 to 10, with 0 indicating absence and 10 indicating a pronounced symptom. In addition, the frequency and average duration of acute respiratory infections among children of all study groups was analyzed.

Eligibility Criteria

Inclusion Criteria:

- Age 3 to 6 years;
- Previously diagnosed with chronic inflammatory disease of the tonsils and adenoids, with grades 2 and 3 hypertrophy (ICD 10 code: J35.9).

Non-inclusion Criteria:

- Presence of allergic rhinitis, bronchial asthma, acute viral infections, primary ciliary dyskinesia, congenital immune response defects, systemic and oncological diseases, or severe somatic conditions in the acute phase.

Study Outcome Measures

Primary Outcome Measure

Anamnestic and clinical-functional features of the course of chronic inflammatory diseases of the palatine tonsils and adenoids in children.

Statistical Procedures

Sample Size Calculation

A preliminary calculation of the required sample size was not performed.

Statistical Methods

Statistical analysis was conducted using the STATISTICA v.10 software (StatSoft Inc, USA). Descriptive statistics included the number of individuals and the percentage of the sample (%). Differences between groups were analyzed using the two-tailed Fisher's exact test, with multiple comparisons adjusted for the Bonferroni correction. Repeated observations before and after treatment were analyzed using the two-tailed z-test for related samples. The significance level was set at 5 % ($p \leq 0.05$), with the minimum probability of the null hypothesis being true.

Ethical Review

All patient information was anonymized and access to the original data was limited. The study was conducted as part of a thesis and was approved by the Local Ethics Committee of the Novosibirsk State Medical University (Protocol No. 111, dated November 29, 2018).

RESULTS

Study Sample Formation

The study involved 100 children aged 3 to 6 years with chronic tonsil and adenoid diseases, verified by otolaryngologists. The groups were comparable in terms of sex and age. In Group 1 (the main group), 58 % of the participants were male and 42 % were female, with a mean age of 5.42 years. In Group 2 (the control group), 56 % of the participants were male and 44 % female, with a mean age of 5.2 years.

The indications for surgical treatment were determined by attending physicians based on the following criteria: persistent difficulty in nasal breathing for more than 3 months, despite conservative treatment; snoring with apnea (respiratory arrest against the background of snoring with continued attempts at chest excursion followed by a noisy inhalation) as reported by legal representatives; and prolonged exudative otitis media lasting more than 3 months, also despite conservative treatment.

Main Results of the Study

The frequency and duration of acute respiratory infections (ARIs) in children with chronic inflammatory conditions of the tonsils and adenoids

All legal representatives reported difficulty attending organized children's groups due to recurrent diseases.

Prior to treatment and rehabilitation measures, there was no statistically significant difference in the frequency of viral infections of the upper respiratory tract among patients in all groups ($p > 0.05$): 80 % of patients experienced ARIs once every 2 months or more frequently (Table 1).

The duration of acute respiratory infections (ARIs) in the children of all examined groups varied from 3–4 days to 14 days or more: in 62 % of cases, the recovery from respiratory tract infections required more than 7 days (Table 2).

Clinical Symptoms and Their Severity

Before treatment, 98 % of the individuals included in the study reported nasal breathing difficulty, with no significant difference in the severity of this symptom between the compared groups ($p > 0.05$). Of these, 18 % rated the severity at 7–8 points and 7 % rated it at 9–10 points. After treatment, there was a significant increase in the number of participants reporting complete absence of nasal breathing difficulty (0 points): 52 % in Group 1 ($p < 0.0001$) and 84 % in Group 2 ($p < 0.0001$), respectively (Fig. 1). Ratings of 7–10 for this symptom were not observed after treatment. The most significant reduction in the severity of nasal breathing difficulty after treatment was seen in Group 2 ($p_{1-2} = 0.0027$).

Before treatment, snoring was observed in 81 % of all patients. A high severity of snoring (9–10 on the scale) was reported by 7 % of study participants, and 17 % reported a moderate severity (7–8). After surgical intervention, there was a significant reduction in snoring severity in both groups. After treatment, 78 % of patients in Group 1 reported the absence of snoring, compared to 4 % prior to treatment ($p < 0.0001$), and 66 % of patients in Group 2 reported no snoring after treatment, compared to 8 % before treatment ($p < 0.0001$). None of the patients reported a severity of 7–10 for snoring after the treatment.

Before any treatment, 80 % of the examined children exhibited nasal voice. After therapy, there was a significant increase in the number of respondents who reported the absence of this symptom in each group. In Group 1, this number increased from 14 % prior to treatment to 76 % 30 days following the intervention ($p < 0.0001$). In Group 2, it increased from 18 % to 86 % ($p < 0.0001$). Before treatment, 48 % of respondents reported nasal voice severity of 4 or higher. After treatment, only 3 % of participants provided such a rating.

Before treatment, sleep disturbances were present in 75 % of all patients. This number decreased significantly after therapy, with a distribution as follows. Before interventions, this symptom was observed in 14 % of patients in Group 1 and in 20 % of patients in Group 2. After treatment, these figures were 78 % ($p < 0.0001$) and 98 % ($p < 0.0001$), respectively (Fig. 2). The severity of sleep disturbances was low: before treatment, 45 %

TABLE 1

FREQUENCY OF ACUTE RESPIRATORY VIRAL INFECTIONS IN PRESCHOOL CHILDREN WITH CHRONIC INFLAMMATORY DISEASES OF THE TONSILS AND ADENOIDS

Group	Group 1 (n=50) [1]	Group 2 (n=50) [2]
Frequency of ARIs	n (%)	n (%)
once every 2 weeks	6 (12%)	10 (20%)
once a month	14 (28%)	19 (38%)
once every 2 months	20 (40%)	11 (22%)
once every 3 months	7 (14%)	4 (8%)
once every 6 months	2 (4%)	5 (10%)
once a year	0 (0%)	1 (2%)

TABLE 2

DURATION OF ARI IN PRESCHOOL CHILDREN WITH CHRONIC INFLAMMATORY DISEASES OF THE TONSILS AND ADENOIDS

Group	Group 1 (n=50) [1]	Group 2 (n=50) [2]
Duration of ARIs	n (%)	n (%)
3–4 days	1 (2%)	4 (8%)
5–7 days	12 (24%)	21 (42%)
7–10 days	16 (32%)	14 (28%)
10–14 days	12 (24%)	9 (18%)
≥ 14 days	9 (18%)	2 (4%)

of all respondents reported scores between 1 and 3 inclusive. After treatment, only 1 participant (0.67 %) rated sleep disturbance severity as 4 or higher. The most significant improvements were observed in Group 2 ($p_{1-2} = 0.0114$).

Before any medical and/or surgical intervention, 63 % of all individuals examined had a prolonged runny nose (74 % in Group 1 and 52 % in Group 2). There were no significant differences in the severity of the clinical manifestations between the groups ($p > 0.05$). After treatment, there was a significant change in the proportion of patients with a score of 0 for rhinorrhea in Group 1, from 26 % before treatment to 82 % after treatment ($p < 0.0001$).

Before hospitalization and treatment, coughing was observed as a symptom in 51 % of all individuals examined. It was most frequently rated by patients as 1–3 points in 26 % of Group 1 and 34 % of Group 2. The number of patients who reported complete absence of this symptom (score of 0) significantly increased after surgical intervention in both groups. In Group 1, it increased

from 60 % to 92 % ($p = 0.0002$). In Group 2, it increased from 56 % to 92 % ($p < 0.0001$).

In addition to the above-mentioned symptoms, prior to treatment initiation, 35 % of all patients exhibited bad breath, and 28 % reported hearing loss. After 30 days of treatment, the number of patients experiencing bad breath significantly decreased by 30 % in Group 1 ($p = 0.0001$) and by 36 % in Group 2 ($p < 0.0001$), while the number of patients reporting hearing loss significantly decreased by 24 % in Group 1 ($p = 0.0005$) and by 28 % in Group 2 ($p = 0.0003$).

DISCUSSION

Summary of the Main Results

The study examined the most prevalent clinical symptoms of chronic inflammatory conditions of the palatine tonsils and adenoids, observed in more than $\frac{3}{4}$ of cases, including nasal breathing difficulty, snoring, nasal voice, and sleep disturbances. More than half of the patients experienced prolonged runny nose and coughing. The most severe manifestations, rated 9–10 points on a severity scale, included snoring and nasal breathing difficulty. Almost all children who underwent removal of hypertrophied pharyngeal tonsils showed improvement in their clinical condition. However, when it comes to symptoms such as decreased severity of nasal breathing difficulties and frequency of sleep disturbances, higher therapeutic effectiveness was observed when the *Bifidobacterium longum* MC-42 strain was included in the diet after adenotomy.

Discussion of the Main Result

The data from the survey conducted after the medical procedures support the effectiveness of adenotomy in reducing clinical symptoms, both in the absence of probiotic correction to the nasopharyngeal microbiome (Group 1) and in the presence of nasopharyngeal irrigation with a probiotic solution during the postoperative period (Group 2). Based on our findings, the most

efficient treatment and rehabilitation approach for restoring nasal breathing and sleep quality was the administration of the probiotic agent after adenotomy (Group 2).

It has been established that surgical treatment of adenoidal hypertrophy, when performed according to appropriate indications, has a positive impact on the quality of life for children [10]. The literature on improving the management of chronic adenoidal inflammation indicates that adenotomy is the most commonly performed surgical procedure in children at otorhinolaryngological departments [11]. In certain clinical cases, partial adenotomy may be necessary, as adenoidal tissue plays an important role in inducing mucosal and systemic immune responses [10]. Furthermore, an analysis of 22 randomized controlled trials that compared the effectiveness of complete versus partial removal of the palatine tonsils and adenoidal tissues in children revealed that tonsillotomy results in faster recovery within 4 days and a reduction in postoperative complications that require medical intervention within the first week after surgery [12]. Due to the lack of clear criteria for defining adenoid and palatine tonsil regrowth (recurrence), it is impossible to assess its prevalence in the general population. However, up to 25.7 % and up to 11.9 % of operated children undergo repeat adenotomy or tonsillotomy / tonsillelectomy, respectively [13]. This emphasizes the importance of monitoring clinical symptoms and providing long-term follow-up for children after surgical intervention. Additionally, it suggests the need for further research into optimal methods of postoperative rehabilitation.

Conservative treatment methods for adenoiditis, such as irrigation therapy and topical antimicrobial agents, have been proven to be effective and are included in Russian clinical guidelines with a level of evidence A [14]. The use of bacterial lysates, immunomodulators, and naturopathic and homeopathic agents has been discussed in the medical community [15]. In this study, we analyzed the effectiveness of probiotic agents

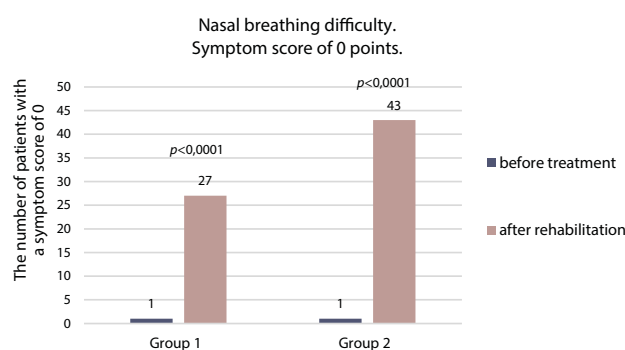


FIG. 1.

Assessment of nasal breathing difficulty by 0 points before and after the treatment. p is the reliability of the differences between the analyzed parameters before and after treatment

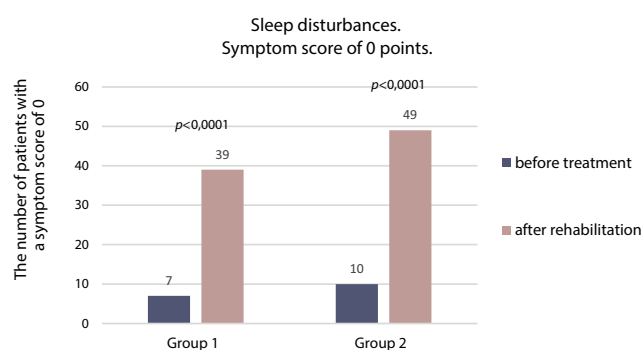


FIG. 2.

Assessment of sleep disorders by 0 points before and after the treatment. p is the reliability of the differences between the analyzed parameters before and after treatment

in correcting the microecological state of the nasopharynx. The results obtained reliably confirm a reduction in the severity of clinical manifestations after nasopharyngeal irrigation with a probiotic solution, whether used in conjunction with standard medication or after surgical intervention. Oral commensals have a positive effect on recurrent tonsillitis, in particular *S. salivarius*, has previously been shown to be effective when combined with traditional conservative treatment and oral probiotics. In such cases, examined children exhibited faster positive dynamics in both objective local and general manifestations of the disease, as well as subjective complaints such as a foreign body sensation and throat pain. The mechanism of action of this bacterium is based on its ability to produce salivaricin A, a bacteriocin that inhibits the most significant pathogen of recurrent tonsillitis, *S. pyogenes* [8]. There is also evidence to support the effectiveness of probiotic agents for respiratory infections, which are more common in patients with chronic inflammatory conditions of the nasopharynx. For example, a study involving 70 children who took probiotics containing *Bifidobacterium* and *Lactobacillus acidophilus* for 2 weeks showed a reduction in recurrent episodes of infectious rhinitis, otitis media, and bronchiolitis [16]. Maya-Barrios A. et al. (2021) [17] demonstrated that the use of *Limosilactobacillus reuteri* strains is also effective in reducing the symptoms of pharyngitis or tonsillitis in children. A study conducted in Russia reported that the administration of a probiotic containing *Bifidobacterium bifidum* reduces the frequency of respiratory diseases and alleviates their course [18]. The use of oral probiotics for chronic tonsil and adenoid diseases is justified due to the fact that viral infections can trigger exacerbations of these conditions. Based on this information, it can be concluded that probiotic supplementation in conjunction with surgical intervention can significantly improve the quality of life for patients with chronic upper respiratory tract diseases, not only by alleviating clinical symptoms but also by reducing the severity of respiratory infections.

Limitations

The limitations of the study include the small number of patients and the short observation period (1 month) after surgical and therapeutic interventions.

CONCLUSION

Therefore, the results of the study suggest that the applied treatment methods have a beneficial effect on the dynamics of clinical symptoms, confirming their high effectiveness. Furthermore, a more significant positive impact on the alleviation of difficulty in nasal breathing and sleep disturbances was observed when the probiotic treatment was administered after adenotomy.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. Egorova KV, Zhamlikhanov NH, Mallin DA. Physical development of children with chronic inflammatory pathology of the pharynx: a review of the literature. *Lechaschi Vrach*. 2022; 10(25): 11-15. (In Russ.). [Егорова К.В., Жамлиханов Н.Х., Маллин Д.А. Физическое развитие детей с хронической воспалительной патологией глотки: обзор литературы. *Лечащий Врач*. 2022; 10(25): 11-15.]. doi: 10.51793/OS.2022.25.10.002
2. Samara P, Athanasopoulos M, Athanasopoulos I. Unveiling the Enigmatic Adenoids and Tonsils: Exploring Immunology, Physiology, Microbiome Dynamics, and the Transformative Power of Surgery. *Microorganisms*. 2023; 11(7): 1624. doi: 10.3390/microorganisms11071624
3. González-Díaz SN, Arias-Cruz A, Macouzet-Sánchez C, et al. Impact of air pollution in respiratory allergic diseases. *Med. Univ*. 2016; 18: 212–215. doi: 10.1016/j.rmu.2016.10.006
4. Sachkova LA, Balashov AL, Truhmanov MS. Frequently ill children. *University therapeutic journal*. 2021; 2(4): 75-85 (In Russ.). [Сачкова Л.А., Балашов А.Л., Трухманов М.С. Часто болеющие дети. *Унив. тер. вестн*. 2021; 2(4):75-85.].
5. Karpova EP, Gankovskaya LV, Vozgoment OB, et al. Hypertrophy of palatine tonsils — possible treatment approaches. *Russian Bulletin of Otorhinolaryngology*. 2020; 85(3): 57-63. (In Russ.). [Карпова Е.П., Ганковская Л.В., Возгомент О.В. и др. Гипертрофия небных миндалин — возможные подходы в лечении. *Вестн. оториноларингол*. 2020; 85(3): 57-63.]. doi: 10.17116/otorino20208503157
6. Marazzato M, Zicari AM, Aleandri M, et al. 16S Metagenomics reveals dysbiosis of nasal core microbiota in children with chronic nasal inflammation: role of adenoid hypertrophy and allergic rhinitis. *Front Cell Infect Microbiol*. 2020; 10: 458. doi: 10.3389/fcimb.2020.00458
7. Gurov AV, Yushkina MA, Muzhichkova AV. Microbiocenosis-regulating therapy of inflammatory pathology of the oropharynx. *Russian Bulletin of Otorhinolaryngology*. 2021; 86(6): 51-56. (In Russ.). [Гуров А.В., Юшкина М.А., Мужичкова А.В. Микробиоценоз-регулирующая терапия воспалительной патологии ротоглотки. *Вестн. оториноларингол*. 2021; 86(6): 51-56.]. doi: 10.17116/otorino20218606151
8. Ilchenko SI, Fialkovskaya AA, Ivanus SG. The effectiveness of the use of the respiratory probiotic *Streptococcus salivarius* K12 in children with recurrent tonsillitis. *Actual Infectology*. 2020; 8(2): 25-29. (In Russ.). [Ильченко С.И., Фиалковская А.А., Иванусь С.Г. Эффективность применения респираторного пробиотика *Streptococcus salivarius* K12 у детей с рекуррентными тонзиллитами. *Актуал. инфектол*. 2020; 8(2): 25–29.]. doi: 10.22141/2312-413x822020.199732
9. Kiselev AB, Chaukina VA, Andamova OV, Avtushko AS, Vertakova OV, Shugakova EV. Guidelines for Therapists and Otolaryngologists on Chronic Pharyngeal Infections and Associated Somatic Pathology, approved

at the meeting of the Coordination and Methodological Council for Postgraduate Education of the Novosibirsk State Medical University of the Ministry of Health of the Russian Federation on April 6, 2018, Minutes No. 98. (In Russ.). [Киселев А.Б., Чаукина В.А., Андамова О.В., Автушко А.С., Вертакова О.В., Шугакова Е.В. Методические рекомендации для терапевтов и оториноларингологов «Хронические очаги инфекции глотки и сопряженная соматическая патология», утвержденные на заседании координационно-методического совета по последипломному образованию ФГБОУ ВО НГМУ Минздрава России 06.04.2018, протокол № 98.].

10. Orlova YuE, Svistushkin VM, Nikiforova GN, et al. Treatment principles of children with pharyngeal tonsil pathology in the background of allergic rhinitis (literature review). *Consilium Medicum*. 2022; 24(3): 193–198. (In Russ.). [Орлова Ю.Е., Свистушкин В.М., Никифорова Г.Н. и др. Принципы лечения детей с патологией глоточной миндалины на фоне аллергического ринита (обзор литературы). *Consil Med*. 2022; 24(3): 193–198.]. doi: 10.26442/20751753.2022.3.201516

11. Zenaishvili RD, Malykhina DD. Optimization of chronic adenoiditis treatment with account of nasopharyngeal microbiota. *Rossiiskaia otorinolaringologiya*. 2018; 1: 54–58. (In Russ.). [Зенаишвили Р.Д., Малихина Д.Д. Оптимизация лечения хронического аденоидита с учётом микробиоты носоглотки. *Рос. оториноларингол*. 2018; 1: 54–58.]. doi: 10.18692/1810-4800-2018-1-54-58

12. Blackshaw H, Springford LR, Zhang LY, et al. Tonsillectomy versus tonsillotomy for obstructive sleep-disordered breathing in children. *Cochrane Database Syst Rev*. 2020; 4(4): CD011365. doi: 10.1002/14651858.CD011365.pub2

13. Kulmakova MA, Radtsig Elu, Polunin MM. Recurrent growth of pharyngeal lymphoid tissues in children: a literature review. *Pediatrics. Consilium Medicum*. 2022; 4: 336–339. (In Russ.). [Кульмакова М.А., Радциг Е.Ю., Полунин М.М. Проблема рецидивов роста лимфоидных структур глотки у детей (обзор литературы). *Педиатрия. Consil. Med*. 2022; 4: 336–339.]. doi: 10.26442/26586630.2022.4.201918

14. Clinical recommendations “Adenoid hypertrophy. Hypertrophy of the palatine tonsils.” Year of approval: 2024 National Medical Association of Otolaryngologists. Approved by the Scientific and Practical Council of the Ministry of Health of the Russian Federation. (In Russ.). [Клинические рекомендации «Гипертрофия аденоидов. Гипертрофия небных миндалин». Год утверждения: 2024 г. Национальная медицинская ассоциация оториноларингологов. Одобрено Научно-практическим Советом Минздрава РФ.]. URL: <https://base.garant.ru/410612248/> [date of access: March 14, 2025].

15. Radtsig EYu, Davydova OV, Kizeva AG, et al. The effectiveness comparison of various conservative treatment options of nasopharyngeal inflammation in children. *Russian Bulletin of Otorhinolaryngology*. 2022; 87(4): 38–44. (In Russ.). [Радциг Е.Ю., Давыдова О.В., Кизева А.Г. и др. Сравнение эффективности различных вариантов консервативного лечения воспаления глоточной миндалины у детей. *Вестн. оториноларингол*. 2022; 87(4): 3844.]. doi: 10.17116/otorino20228704138

16. Khan Laghari I, Nawaz T, Mustafa S, et al. Role of multi-strain probiotics in preventing severity and frequency of recurrent respiratory tract infections in children. *BMC Pediatr*. 2023; 23(1): 505. doi: 10.1186/s12887-023-04338-x

17. Maya-Barrios A, Lira-Hernandez K, Jiménez-Escobar I, et al. *Limosilactobacillus reuteri* ATCC PTA 5289 and DSM 17938 as adjuvants to improve evolution of pharyngitis/tonsillitis in children: randomised controlled trial. *Benef Microbes*. 2021; 12(2): 137–145. doi: 10.3920/BM2020.0171

18. Feklisova LV. Prospects for the use of the immobilized monocomponent probiotics in children with recurrent respiratory diseases. *Infectious Diseases: News, Opinions, Training*. 2021; 10(2): 60–68. (In Russ.). [Феклисова Л.В. Перспективы применения сорбированного монокомпонентного препарата-пробиотика у детей с рекуррентными респираторными заболеваниями. *Инфекц. болезни: новости, мнения, обуч.* 2021; 10(2): 60–68.]. doi: 10.33029/2305-3496-2021-10-2-60-68

Information about the authors

Aleksandr O. Izumov – Cand. Sc. (Med.), Associate Professor, Head of the Department of Pediatric Dentistry, Novosibirsk State Medical University of the Russian Ministry of Health; e-mail: izumovao@yandex.ru, <https://orcid.org/0000-0002-1223-1995>

Anastasiya E. Karavozova – 2nd-year resident in Pediatrics, Department of Propaedeutics of Childhood Diseases, Novosibirsk State Medical University of the Russian Ministry of Health; e-mail: nastya_vae100@mail.ru, <https://orcid.org/0009-0006-4496-0435>

Valeria E. Menshchikova – 2nd-year postgraduate student in Pediatrics, Department of Propaedeutics of Childhood Diseases, Novosibirsk State Medical University of the Ministry of Health of the Russian Federation; e-mail: vaidurova_valerya@mail.ru, <https://orcid.org/0009-0007-1119-7258>

Tatyana I. Ryabichenko – Dr. Sc. (Med.), Professor of the Department of Propaedeutics of Childhood Diseases, Novosibirsk State Medical University of the Ministry of Health of the Russian Federation; Leading Researcher, Laboratory of Immunology, Research Institute of Experimental and Clinical Medicine, Federal Research Center for Fundamental and Translational Medicine, Ministry of Education and Science of the Russian Federation; e-mail: 2925871@mail.ru, <https://orcid.org/0000-0002-0990-0078>

Tatyana V. Kartseva – Dr. Sc. (Med.), Associate Professor, Head of the Department of Propaedeutics of Childhood Diseases, Novosibirsk State Medical University of the Ministry of Health of the Russian Federation; e-mail: kartseva-t@mail.ru, <https://orcid.org/0000-0001-7007-1996>

Olga O. Obukhova – Dr. Sc. (Med.), Head of the Laboratory of Immunology, Research Institute of Experimental and Clinical Medicine, Federal Research Center for Fundamental and Translational Medicine, Ministry of Education and Science of the Russian Federation; e-mail: trio188@yandex.ru, <https://orcid.org/0000-0002-9834-1799>

Vera G. Selyatitskaya – Dr. Sc. (Biol.), Professor, Director of the Research Institute of Experimental and Clinical Medicine, Federal Research Center for Fundamental and Translational Medicine, Ministry of Education and Science of the Russian Federation; e-mail: vgselyatitskaya@frcftm.ru, <https://orcid.org/0000-0003-4534-7289>