Prophylaxis of chronic adenoiditis in the children

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This study was undertaken with the purpose of improving the effectiveness of the preventive treatment of chronic adenoiditis in the children. The open randomized comparative study included 219 children aged from 6 to 7 years presenting with clinical and anamnestic signs of chronic adenoiditis. The study group was comprised of 113 patients given the Streptococcus salivarius K1 2-hased probiotic complex during 30 days in combination with the nasal-douche. The control group consisted of 106 patients treated with the nasal douche alone. The analysis of the results of the study has demonstrated that episodes of exacerbation of adenoiditis on day 30 after the onset of the treatment occurred in 56 (49.6%) children of the study group compared with 95 (88.7%) patients of the control group. Three months later, acute sinusitis was diagnosed in 4 (3.5%) children of the study group compared with 14 (13.2%) ones in the control group. Acute otitis media was documented in 2 (1.8%) and 5 (4.7 %.) children of the study and control groups respectively. It is concluded that the treatment with the use of the Streptococcus salivarius K12-based probiotic complex permits to decrease the frequency of exacerbations of chronic adenoiditis and its complications in the children and reduces the requirement for medication therapy.

Keywords: adenoiditis, Streptococcus salivarius, K-12-based probiotic complex, children.

The chronic inflammation of the pharyngeal tonsil is one of the most burning problems of modern pediatric otorhinolaryngology. In Russia, the proportion of children with chronic adenoiditis is up to 50-70% [1]. The main cause of the chronic inflammatory process of the pharyngeal tonsil is the load of viral and bacterial antigens [2]. An important issue for today is the role of the key bacterial pathogen in chronic adenoiditis in children. According to some researchers, the leading in the development of chronic inflammation in the nasopharynx are *Sir. Pneumoniae* (pneumococcus) and *H. influenzae* (haemophilus influenzae). Thus, in children with chronic adenoiditis the pneumococcus was detected in 50% of cases, the hemophilic rod - in 66.7% of cases [3]. According to I. Brook et al. [4], *H. influenzae* (64.4%), *M. Catarrhalis* (35.6%) and *S.aureus* (33.3%) were most often found on the surface of the pharyngeal tonsil. According to our data, the main bacterial pathogen in chronic adenoiditis is *S. aureus*, which is released in almost 50% [5] of cases.

On the surface of the skin and mucous membranes, a person always has various microorganisms, many of which are in a symbiotic relationship with the microorganism and do not cause pathological changes in the colonized structures. Their combination creates normal microbiocenosis or normal microbiota, a qualitative and/or quantitative change of which (dysbiosis or dysbiosis) can cause pathological conditions. In this case, representatives of normal microbiota competitively displace or prevent colonization of the mucous membrane by a pathogenic microflora, which is one of the most important mechanisms of nonspecific local immunity. Such a competitive interaction of non-pathogenic and pathogenic microflora has been termed bacterial interference. The representatives of the normal microflora of the surface of the pharyngeal tonsil are neisseria (with the exception of *N. gonorrhoeae* and *N. meningitidis)* and some types of alpha-hemolytic streptococci *(Str.salivarius, Str. Vestibularis, Str. Faecium, Str. Mitis*) [4].

The bacterial interference of representatives of normal bacterial microflora in nature is usually due to the production of protein antibiotics - bacteriocins, also called bacteriocin-like inhibitory substances (BLIS). In studies begun more than 30 years ago in New Zealand among school-age children, a microbiological analysis of saliva was carried out and it was found that on the oral mucosa of some children predominates the *Str. salivarius*, which has a broad spectrum of bacteriocin (BLIS) activity against *Str. pyogenes*. In such children the oropharyngeal diseases caused by pathogenic streptococci were practically not observed [6]. Bacteriocins produced by such probiotic strains are called salivaricins.

In some cases several salivarcins are produced, encoded in the megaplasmide. The prototype of the genus of bacteria *Str. Salivarius*, which produces salivaricin (salivaricin A and salivaricin B), is a strain of *Streptococcus salivarius* K12. The search for a safe and effective probiotic

antagonist of such a pathogen as *Str. Pyogenes* led to the discovery of the strain K12 *Str. Salivarius*. A large number of scientific studies confirm the safety of strain K12 [7,8]. In recent years in the literature there were data on the high efficiency of oral probiotics based on *Str. Salivarius* strain K12 in the prevention of recurrent tonsillitis and acute otitis media [9, 10].

Given the relevance of the issue, we conducted an open randomized comparative study with the purpose of improving the effectiveness of the preventive treatment of chronic adenoiditis in children.

The study included 250 children attending organized children's groups, aged 6 to 7 years, who had clinical and anamnestic signs of chronic adenoiditis. The children were divided into two groups using simple randomization. The 1st group (study group, 128 patients) in addition to daily irrigation/elimination therapy (nasal irrigation of 0.9% NaCl solution) received a probiotic complex on the basis of *Str. Salivarius* strain K12 (one-per-day tablet at night for 30 days) as a prophylaxis for exacerbation of chronic adenoiditis. The 2nd group (control group, 122 patients) was treated only with irrigation/elimination therapy on a daily basis.

The criteria for exclusion from the study were individual intolerance of flavor additives that make up the probiotic complex and presence of concomitant diseases that change the natural course of the disease, affect the result of therapy and/or disrupt the possibility of subjective assessment of the symptoms of the disease (psychoneurological pathology, diabetes, blood diseases, cancer, immunodeficiency, gastrointestinal diseases, etc.).

The effectiveness was assessed based on the analysis of the medical records of the children during the observation period. At the same time, the frequency of the diagnosed alenoiditis and the need for topical anti-inflammatory therapy were taken into account as well as the frequency of complications of adenoiditis (acute otitis media and acute rhinosinusitis) and the need for systemic antibacterial drugs. Also, the incidence of undesirable side effects in patients by ongoing prophylaxis was taken into account. The control examinations and analysis of medical records were conducted on the 30th day ± 3 days (visit 1) and on the 90th day ± 5 days (visit 2) from the beginning of the observation.

Results and discussion

Because of nonappearance at follow-up control medical examination, 12 patients from group 1 and 19 patients from group 2 were excluded from the study. In three (2.3%) patients of the 1st group, the parents of the children noted the development of a cutaneous allergic reaction. When examined by a pediatrician in all cases was made a diagnosis of "acute allergic urticaria reaction" with an easy course of the disease, not requiring in-patient treatment. The etiology of this reaction could not be discovered, since all 3 children had episodes of food allergy in the life history, and the parents of 2 out of 3 patients admitted the possibility of the error of the child's diet during the treatment. After reversing this reaction with a single dose of oral forms of antihistamines, these patients were transferred to the control group. Thus, the results of the study were evaluated on the basis of observation of 113 patients of the study group and 106 patients of the control group.

It was revealed that by the 30th day, the exacerbation of chronic adenoiditis, manifested by increased coughing and nasal congestion, was noted in 56 (49.6%) children of the study group and 94 (88.7%) children of the control group. By the 90th day from the beginning of treatment, the symptoms of exacerbation of chronic adenoiditis were recorded in all children of the control group and only in 81 (71.7%) patients in the study group. During the observation 3 or more episodes of exacerbation of chronic adenoiditis were recorded in 23 (20.4%) children of the study group and in 66 (62.2%) children of the control group. According to the given data and taking into account the intensification of the symptoms of adenoiditis the intranasal glucocorticosteroid

preparations were prescribed to 99 (93.4%) patients of the control group and to 53 (46.9%) children of the study group.

The analysis of the complications of adenoiditis showed that at the time of the child's second health screening (visit 2) based on the history and clinical examination, including a rhinoendoscopic study, acute rhinosinusitis was diagnosed in 4 (3.5%) children in the study group and in 14 (13.2 %) children in the control group, acute otitis media - in 2 (1.8%) children in the study group and in 5 (4.7%) children in the control group. Taking into account the generally accepted indications for systemic antibiotic therapy in the treatment of acute rhinosinusitis and acute otitis media, the use of systemic antibiotics was required by 7 (6.2%) children in the control group and by 1 (0.8%) child in the study group.

Conclusion

Consequently, to improve the effectiveness of preventing of the exacerbation of chronic adenoiditis in children, the probiotic complex based on *Str. Salivarius* strain K.12 is recommended. This will decrease the number of exacerbations of chronic adenoiditis and the load of chemotherapeutic drugs that are used to relieve the symptoms of the disease, as well as reduce the incidence rate of acute rhinosinusitis and acute otitis media.