T.M. Chernova[1], V.N. Timchenko[1], O.A. Drobachenko[2], N.V. Murazova[3], A.N. Ryabova[3]
[1] St. Petersburg State Pediatric Medical Academy
[2] Government Health Institution of postgraduate education № 45, St. Petersburg
[3] Government Health Institution of postgraduate education № 41, St. Petersburg

CAPABILITIES OF TOPICAL THERAPY OF TONSILLOPHARYNGITIS IN CHILDREN IN THE PRACTICE OF DISTRICT PEDIATRICIANS

Contact Information:
Chernova Tatyana Maratovna, MD, PhD, Department of children's infectious diseases SPbSPMA
Address: 194100, St. Petersburg, 2 Litovskaya Street,
tel.: (812) 295-61-88 (812) 295-61-8,
E-mail: t-chernova@mail.ru

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Because of high risk of bacterial complications in children with tonsillopharyngitis in out-patient conditions, topical antiseptics which lengthen the recovery period of "healthy" biofilms in convalescents are often prescribed preventively. Our survey showed that the dynamics of the severity and duration of subjective symptoms of viral respiratory infections in children under the irrigation of the oropharyngeal mucosa by an elimination spray, prepared on the basis of natural hypertonic sea water with plant extracts, is comparable with the efficiency of a topical aerosol containing Gexetidine. However, a broader spectrum of activity contributed to the normalization of the pharyngoscopy on average 1.5 days earlier than the appointment of Gexetidine. The results obtained allow the spray made from natural hypertonic sea water with chamomile and aloe Vera to be recommended as a starter medicine for topical treatment of uncomplicated viral tonsillopharyngitis in outpatient children.

***Keywords**: tonsillopharyngitis, , treatment, sea water, children.*

Despite the advances of modern preventive medicine, acute respiratory tract infections (ARTI) remain the leading infectious pathology with the morbidity being 3 times higher in children than in adults. One of the most common local symptoms of ARTI in children is the affection of the pharynx.

Acute pharyngitis is usually caused by viruses (influenza, Para influenza, adenovirus, rhinovirus, enterovirus, reo virus). On average, the child has 3-4 episodes of acute respiratory tract viral infections (ARTI) annually. Less commonly, the cause can be bacteria, fungi, and various associations of pathogens.

In the system of "external barriers" mucosa of the upper respiratory tract is the first line of defense against various pathogenic environmental factors, such as bacterial, fungal, viral, industrial chemical irritants and pollution. The resistance of the mucosa to microbial contamination is the "first immune wave" and provides, in particular, the mechanism of colonization resistance, which prevents the consolidation of bacteria and other pathogens on the surface of the mucosa. Colonization resistance includes a set of specific factors of local

immunity, which include inhibitors of microbial adhesion, biocide products and biostatic secrets, the normal micro flora, and mechanical factors (ciliated epithelium) antibodies. One of the main components of cooperation of the immune defense system is a docking mechanism of colonization resistance of the mucosa with the factors stabilizing the internal environment. The weakening of anti-colonization resources opens the way for aggressive agents, triggering the following level of protection [1].

Colonies of microorganisms on the surface of the mucosa of the upper respiratory tract exist in so-called biofilms, which reduce the efficiency of the colonization resistance mechanisms. A biofilm is a well-organized self-regulating community of microorganisms, comprising representatives of various species of bacteria and fungi, which are immersed in a polymer matrix which they themselves are synthesizing [2]. The process of virus penetration into the epithelial cells of the upper respiratory tract is accompanied by a violation of the integrity of the biofilm and the release of large amounts of planctonic forms of latent persistent microbes. In the absence or deficiency of restraining factors in a child the acute viral infection is complicated by the superimposition of a bacterial process. Dysbiotic violations after acute respiratory disorders persist for 1-2 months.

An uncomplicated sore throat usually does not require the use of systemic antibiotics (except caused by group A streptococcus). Today in the treatment of acute inflammatory diseases of the pharynx in children at home the topical preventive tools with a wide spectrum of antimicrobial activity [3, 4] are being prescribed. This is caused by the limited possibilities of laboratory diagnosis which on one hand makes it hard for a physician to determine early signs of bacterial infection, and on the other - there is a high possibility of bacterial complications (otitis, rhinosinusitis, bacterial tonsillitis) in children with frequent and long-term RTI or in children with chronic upper respiratory tract pathology.

These drugs usually include one or more antiseptic agents (antibiotics or sulfonamides at least), essential oils, local anesthetics, deodorizing agents, natural antiseptics (plant extracts, bee products). Medicines are used in the form of rinses, tablets and lozenges for desorption, inhalations. In pediatric practice, the most convenient form is aerosol, since the drug is delivered directly to the site of inflammation. However, despite the wide range of tools for topical treatment of throat inflammatory diseases, their use in children is limited because of the numerous adverse effects (toxicity, allergenicity, irritancy). In this regard, the majority of district pediatricians prefer to appoint a Gexetidine spray because of its low toxicity, a broad spectrum of antibacterial and antifungal activity, and the presence of a weak anesthetic effect [4]. However, as with other topical antiseptics, the antibacterial effect of Gexetidine is directed not only against the pathogen, but also against the resident flora. That is why its use in the treatment of acute respiratory viral infections delays the recovery of the normal microbiota, which significantly increases the risk of a new episode of respiratory infection in the convalescent.2

As an alternative treatment of acute inflammatory diseases of the throat, home-made hypertonic saline solutions are often used. The high osmotic pressure on the mucosal surface created by them helps to drain the fluid from the tissues to relieve swelling, to relieve pain, to cleanse the mucosa and the tonsil lacunas of mucus, decay products of inflammatory mediators, and to mechanically remove and destroy the pathogens. Sea water also contains microelements (K, Mg, I, Se, Zn, Cu, Fe, etc.), allowing not only the recovery of the mucociliary clearance while irrigating the mucosa of the upper respiratory tract, but also enhancing the antiseptic effect, increasing the local immunity, activating the reparative processes in the epithelium and

normalizing the function of its glands. High efficiency of sea water in the treatment and prevention of seasonal URTI has been proved [5-7].

Recently, the Aqualor elimination throat spray with chamomile and aloe, made on the basis of sterile hypertonic seawater containing natural extracts of chamomile nobile and aloe Vera appeared on the Russian pharmaceutical market. Clinical trails have shown that the drug is highly effective as a monotherapy in the treatment of viral diseases of the throat, significantly reduces the degree of contamination of the mucosa with bacterial pathogens in bacterial processes and is compatible with other local drugs, and has a high safety profile [8, 9]. An important factor is the lack of preservatives and ethanol, so the spray is approved for use among children from the age of 6 months.

The aim of this study is to compare the efficiency of aerosol Gexetidine and Aqualor in the treatment of uncomplicated tonsillopharyngitis in children.

PATIENTS AND METHODS

In two children's clinics of St. Petersburg an open randomized prospective clinical survey in parallel groups was held. The study involved 60 children (30 boys and 30 girls) aged from 3 to 17 years old (mean 9,1 ± 3,99 years) diagnosed with " acute URTI, tonsillopharyngitis." The diagnosis was based on clinical manifestations: fever, symptoms of intoxication (headache, malaise, loss of appetite, sleep disturbance, etc.), catarrhal syndrome (dry/sore/aching throat, dry cough, hyperemia and graining of the pharynx, increased the tonsils and tonsillar lymph nodes).

The criteria of eligibility were: 1-2-nd day of the illness, mild or moderate form of the disease, the absence of topical therapy before the start of the observation, the ability of the patient / parent to adequately assess their condition and symptoms.

The exclusion criteria included: the presence of rhinitis, complications, intolerance to components of the drug, the patient or parent refusal of further participation in the monitoring, the need to use systemic antibiotic therapy.

All patients were prescribed warm alkaline drinks, and antipyretics (paracetamol, ibuprofen) if indicated. The use of antiviral or immune modulating agents was allowed, the choice of which was individual for each case.

The observed children were randomized into 2 groups. Patients in Group 1 (n = 30) in addition to primary therapy received 1 Gexetidine aerosol spray 2 times a day for 7 days; for patients in group 2 (n = 30) in addition to primary therapy the irrigation of tonsils and the posterior spray pharyngeal wall was carried out using the elimination throat spray with chamomile and aloe, 3-4 sprays 4-5 times a day for 7 days. Both groups were formed uniformly by age (mean age 9,4 ± 4,09 and 8,7 ± 3,93 years 1 and group 2, respectively), gender (15 boys and 15 girls in each group) and the initial clinical manifestations, which allowed to compare the observation results and determine their reliability. The sample size was sufficient to form conclusions.

Inspection was carried out daily until recovery, and included the collection and analysis of the anamnesis, the subjective assessment of symptom intensity (scratchy, sore throat, cough frequency) by the patient, an objective assessment of the presence and severity of symptoms pharyngoscopy, the size of tonsillar lymph nodes) by the doctor. The severity of symptoms was assessed on a 4-point scale, where 0 meatn no symptom, 1 - mild symptoms, 2 - moderate symptoms, 3 - severe symptoms. All results were recorded in an individual registration card (IGC).

The effectiveness of therapy was determined by time of disease symptoms reduction, the complete disappearance of clinical symptoms, and the presence and severity of acute URTI complications.

Throughout the monitoring adverse events were monitored, in the event of which the use of drugs could be discontinued.

Statistical analysis was performed on a personal computer using STATGRAPHICS Plus 3.0 and Microsoft Excel 2010. For parametric variables the mean value of the index patients (M) and the standard deviation (s) were determined. The difference between the mean values was considered significant at a significance level of p <0, 05, which corresponded to the reliable probability of ≥ 0, 95.

RESULTS AND DISCUSSION

The reason for treatment in a clinic for all patients was the fever to 37, 5-38, 9 ^{0}C, the presence of toxic symptoms (malaise, decreased appetite and headache), varying degrees of sore throat (88.3%), dry / aching throat (73.3%) and dry cough (51.7%). Pharyngoscopy in all patients revealed varying degrees of severity of typical tonsillopharyngitis symptoms: 100% had hyperemia of tonsils, tonsil arches and uvula, in 56.7% the mucosa of the oropharynx was loosened; tonsils were enlarged in 71.7% of cases, including 43.3% due to edema; granularity of the posterior pharyngeal wall was found in 23.3% of patients. 30% of the cases showed an enlargement in tonsillar lymph nodes.

Most of the patients went to the clinic on the 2nd day of the illness (73.3%). During the initial examination, the severity of pain in children of the 1 and 2 groups did not differ statistically and was on average 2, 2 ± 0, 59 and 2, 3 ± 0, 61 points respectively (Table 1). The patients' assessment of clinical dryness / sore throat at the time of treatment did not differ significantly in both groups and was on average 2,1 ± 0,64 and 2,2 ± 2,75 points respectively. Cough was recorded with equal frequency in both groups (23.3 and 26.7%, respectively). Pharyngoscopic symptoms showed similar results, which were: the severity of hyperemia 2,6 ± 0,49 and 2,5 ± 0,57, the enlargement of tonsils 1,88 ± 0,44 and 1,73 ± 0,55 points, respectively (p> 0 , 05). Thus, at the time of clinic visit the groups were compared based on demographic and clinical criteria.

During reexamination after 1 day of therapy in patients of both groups a significant decrease in body temperature (an average of 37,2 ± 0,47 0 C in the 1st group and 37,0 ± 0,420 C - in the 2nd) was recorded; almost 2 times reduced dryness / pain in the oropharynx (up to 1,3 ± 0,61 points in the 1st group and 1,2 ± 0,81 - to 2-D); and the severity of pain (up to 1,2 ± 0 68 points in the 1st group and 1,3 ± 0,50 - in the 2nd). At the same time the 2nd group showed not only a much smaller number of patients with symptoms of intoxication and tonsils' swelling (50.0 and 13.3 vs. 83.3 and 46.7%, respectively, in group 1), but a lower expression of these symptoms (0,6 ± 0,57 and 0,3 ± 0,49 vs. 1,3 ± 0, 61 and 1,1 ± 0,36 points, respectively, in group 1). Despite the fact that oropharyngeal hyperemia persisted in all of the observed children, the severity of it was also less in group 2 (1,6 ± 0,67 vs. 2,2 ± 0,67 points in group 1).

Later the symptoms of intoxication, pain and discomfort in the throat had reduced in all of the patients, and a significant improvement of the pharyngoscopy (Figure 1-3) was seen. On the third day in both groups of children the symptoms of tonsillopharyngitis halved. It should be noted that in 5 patients (16.7%) in group 2 the pharyngoscopy had fully normalized (in the 1st group of such children were absent); and the others had a fully recovered tonsil relief (in group 1

1/3 Children tonsil swelling was still present). By the 4th day of observation there were no pharyngoscopic signs in 33.3% of patients from group 2 and only 10.0% from group 1. On the 5th day almost all patients stopped complaining. However, during an oropharynx examination it was revealed that 70.0% of children in Group 1 retained an ill-defined hyperemia of the mucosa of the palatine arches and the uvula (on the average score of 0,7 ± 0,47); whereas in the comparison group, this symptom was detected only in 16, 7% of cases.

The analysis of clinical manifestations' dynamics showed that the duration of fever, pain and discomfort in the throat, as well as the reaction of the lymphatic system were comparable in both groups ($p > 0.05$). However, the symptoms of intoxication and pharyngeal signs of inflammation in patients from group 2 were stopped on average 1.5 days faster than in patients from Group 1 (Table 2).

Regardless of the time when the clinical picture has normalized, in accordance to the standards of treating children with uncomplicated viral respiratory infections in outpatient settings, all patients were discharged with recovery on the 7th day of the observation.

While taking the therapy, none of the patients were found to have adverse events. During the observations seven children were excluded such as: three developed lacunar quinsy, 2 - infectious mononucleosis; in 2 cases the parents had changed the treatment by themselves. Thus, our clinical observation showed that the dynamics of severity and duration of symptoms of acute viral tonsillopharyngitis in children subjected to the irrigation of the oropharyngeal mucosa by an elimination spray, prepared on the basis of natural hypertonic sea water with plant extracts, had an efficiency comparable to the widely used Gexetidine-containing topical aerosol. However, when the throat Aqualor with chamomile and aloe, which has a broad spectrum of action (antiseptic, anti-inflammatory, moisturizing, immune stimulant) was used, normalization of the pharyngoscopy occurred on average 1.5 days earlier than after the appointment of Gexetidin which has provided only an antiseptic and anesthetic effect. It should be noted that while choosing the means for topical treatment of acute inflammatory throat diseases in children in outpatient conditions, preference should be given to medicines that have a broader effect range, contribute to a more rapid life quality recovery and cure the patient. The results obtained allow the recommendation of throat elimination sprays with chamomile and aloe Vera as a first-line medicine for topical treatment of uncomplicated viral tonsillopharyngitis in children in an outpatient setting.

REFERENCES:

1. Ryazantsev S.V., Khmelnytskaya, N.M., Turnova E.V. The role of mucosal protection in the upper respiratory tract from potentially pathogenic antigen factors. Journal of otorhinolaryngology. 2001,5.
2. Romanova, Y.M., Ginzburg A.L. Bacterial biofilms as a natural form of bacterial existence in the environment and in the host organism. Journal of Microbiology Epidemiology and Immunobiology. 2011, 3: 99-109.
3. Egorova O.A. The expediency of the use of local antimicrobial agents in the treatment of upper respiratory tract infections. Farmateka. 2006, 5: 107-109.
4. Lopatin A.S. Treatment of acute and chronic pharyngitis. RMZH. 2001, 9 (16-17): 694 - 698.
5. Ryabova M.A. Out of season SARS - treatment and prevention. The attending physician. 2011, 8.
6. Tano L., Tano K. A daily nasal spray with saline prevents symptoms of rhinitis. Acta Otolaryngol. 2004, 124 (9): 1059-62.

7. Slapak I., Skoupa J., Strnad P. et al. Efficacy of isotonic nasal wash (seawater) in the treatment and prevention of rhinitis in children.Arch Otolaryngol. 2008, 134 (1):67-74.
8. Bogomilskiy M.R., Radtsig E. Y., Kotova E.N. Local therapy of inflamatory diseases of the hypo pharynx in children. Journal of otorhinolaryngology. 2010, 2: 63-65.
9. Soldatskiy Y.L., Onufreeva E.K., E.K. Isayeva and others. Comparative effectiveness of different methods of elimination therapy in treatment of tonsil pharyngitis in children. Effective pharmacotherapy. Pulmonology and otolaryngology. 2011, 2: 66-69.

Table 1 Frequency (%) and severity (score, M ± s) of the initial clinical manifestations in the studied groups

Symptoms	**1group**	**2 group**
Body temperature	100	100
	38,4±0,41	38,3±0,45
Intoxication symptoms	90,0	93,3
	1,9 ± 0,53	1,8 ± 0,49
Dry/sore throat	76,7	70,0
	2,1± 0,64	2,2 ± 0,75
Sore throat	90,0	86,7
	2,2 ± 0,59	2,3 ± 0,61
Hyperemia of the oropharyngeal mucosa	100,0	100,0
	2,6 ± 0,49	2,5 ± 0,57
“Looseness” of the mucosa	53,3	56,7
“Grit” of the posterior pharyngeal wall	26,7	20,0
Enlarged tonsils	70,0	73,3
Swollen tonsils	46,7	40,0
	1,3 ± 0,47	1,3 ± 0,49

Notice: During the comparison of each indicator in the survey groups p> 0.05.

Fig. A. Dynamics of the pain syndrome in both groups

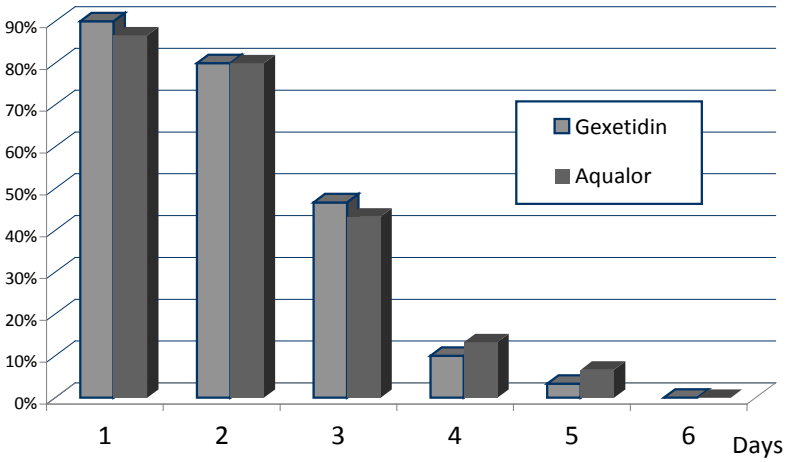

Fig. 2 Dynamics of complaints on dry / sore throat in both groups

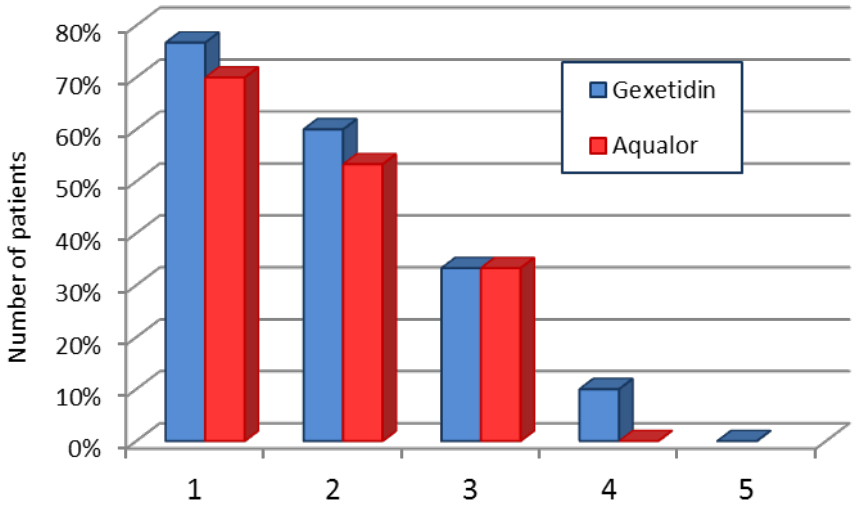

Fig. 3 Dynamics of oropharyngeal hyperemia in both groups

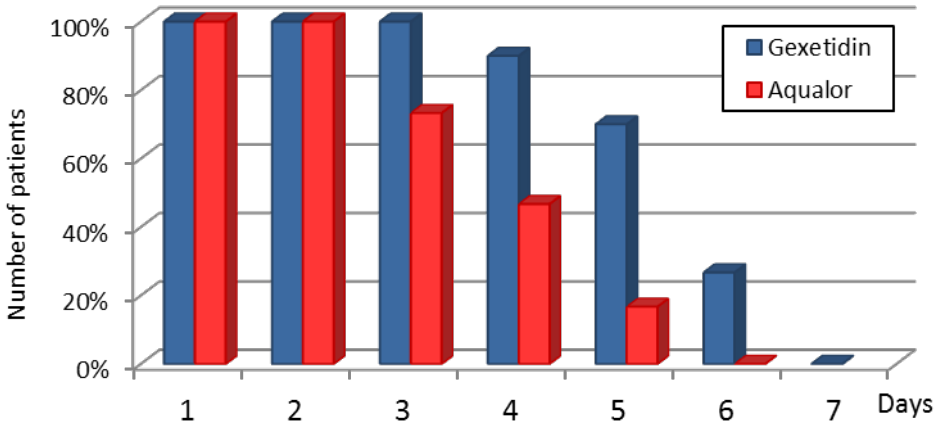

Table 2 Duration (days, M ± s) of clinical symptoms in both groups

Symptoms	**1 group**	**2 group**
Fever	1,6 ± 0,85	1,5 ± 0,57
Symptoms of intoxication	2,4 ± 0,84	1,7 ± 0,76
Dryness/sore	2,3 ± 0,99	2,2± 0,83
Cough	4,7 ± 0,79	3,4 ± 0,86
Sore throat	2,6 ± 0,84	2,6 ± 1,01
Hyperemia of the oropharynx	4,8 ± 0,99	3,3 ± 1,03
Loosening of the oropharyngeal mucosa	3,8 ± 0,83	2,9 ± 0,83
Granularity of the posterior pharyngeal wall	4,4 ± 0,52	4,2 ± 0,41
Tonsils enlargement	4,7 ± 0,86	3,9 ± 1,32
Tonsil swelling	3,1 ± 0,83	1,3 ± 0,49
Enlargement of tonsil lymph nodes	4,9 ± 1,08	4,5 ± 0,53

Notice: During the comparison of each indicator in the treatment groups' p> 0.05.