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Mini Review

The Role of Phage Therapy in Recurrent Pharyngotonsillitis of Children with Frequent Morbidity

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Abstract

Improper and irrational use of antibiotics has led to antimicrobial resistance, which is a major and growing public health problem in the world. Georgia is one of the leading countries among those that consume a large number of antibiotics and often inappropriately. It is also undeniable that due to the urgency of the issue of frequent morbidity of children with pharyngotonsillitis, the antibiotic therapy in most cases has no alternative for practicing doctors and parents. Antibiotic resistance is a particularly acute problem in children; One area of use of bacteriophages is antibacterial therapy, which is an alternative to taking antibiotics. Antibiotics and bacteriophages act directly on microbes. However, antibiotics destroy not only pathogenic but also normal microflora. Bacteriophages act only on pathogenic microorganisms. Such selective action is due to the nature of phages.

Keywords: *Phage Therapy; Pharyngotonsillitis; Morbidity; Bacteriophages*

In view of the above, we aim to determine the clinical efficacy and significance of phage therapy as an alternative to antibiotic therapy among children frequently diagnosed of pharyngotonsillitis. Based on the above, we set out research tactics to achieve the goal of conducting bacteriological examination of children with recurrent pharyngotonsillitis and analysis of antibiotics and phagograms, searching for effective alternative treatments.

The study reaffirms the need for bacteriological examination of the throat smear in patients with recurrent pharyngotonsillitis. Therefore, treatment should be prescribed only on the basis of antibiotic susceptibility analysis taking into account the analysis of antibiotic-ogram data.

In patients with recurrent pharyngotonsillitis, pharyngeal smear phagogram analysis is necessary and, consequently, the importance of phagotherapy alternatives is considered in the effectiveness of treatment of patients with recurrent pharyngotonsillitis.

Improper and irrational use of antibiotics has led to antimicrobial resistance, which is a major and growing public health problem in the world. Georgia is one of the leading countries among those that consume a large number of antibiotics and often inappropriately [5,9]. It is also undeniable that due to the urgency of the issue of frequent morbidity of children with pharyngotonsillitis, the antibiotic therapy in most cases has no alternative for practicing doctors and parents. Improper intake of antibiotics poses a serious threat to human health, especially children. Antibiotic resistance is a particularly acute problem in children; One area of use of bacteriophages is antibacterial therapy, which is an alternative to taking antibiotics. Phagotherapy, respectively, belongs to alternative medicine [2-4,6,13].

Various studies suggest that the combined use of phages and antibiotics may be much more effective and less prone to the development of resistance than therapy with antibiotics alone, or with phages alone. Numerous studies revealed a great potential for the combined use of phages and antibiotics in the treatment of bacterial infections [17].

Antibiotics and bacteriophages act directly on microbes. However, antibiotics destroy not only pathogenic but also normal microflora. Bacteriophages act only on pathogenic microorganisms. Such selective action is due to the nature of phages [1,9,10,11].

In view of the above, we aim to determine the clinical efficacy and significance of phage therapy as an alternative to antibiotic therapy among children frequently diagnosed of pharyngotonsillitis.

Based on the above, we set out research tactics to achieve the goal of conducting bacteriological examination of children with recurrent pharyngotonsillitis and analysis of antibiotics and phagograms, searching for effective alternative treatments. In particular, in order to achieve the set goal, 86 children (33 boys, 43 girls) aged 4 to 14 years, who are registered in Kutaisi Children's Polyclinic N3, participated in the study. At the base of anamnesis of frequent acute recurrent pharyngotonsillitis, resistant to treatment, in particular antibiotic therapy (mainly protected by representatives of the penicillin group and/or macrolides). We set up a diagnostic program. We sent a smear taken from the nose for analysis at the Bacteriophage Analytical Diagnostic Center in Tbilisi.

Analysis of the obtained results

Analysis of the results obtained Bacteriological examination of the throat smear from 86 children in the study revealed the dominance of the following strains.

Staphylococus aureus was observed with abundant growth in 31 (36%), small growth in 13 (15%) and moderate 26 (30%) cases. Streptococus pyogenes with abundant growth 38 (44%). Str. Durans with abundant growth 31 (36%). Candida with moderate growth 31 (36%). There were frequent cases when the simultaneous existence of several strains was noted. Other causative pathogens have also rarely been identified.

The primary results of susceptibility of patients examined to antibiotics and antibacterial preparations are given in table 1-3.

Antibiotics and Antibacterial Preparations	+1		+2		+3		+4		R	
	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%
Amoxacillin	12	14	4	5	4	5	4	5	62	71
Ampicillin	4	5	12	14			4	5	68	76
Ampicid	8	9	8	9			4	5	68	76
Ampiox	12	14	8	9	4	5	4	5	56	67
Zinat	4	5	12	14	12	14	12	14	46	53
Claforan	4	5	12	14	16	18	32	37	22	26
Triaxone	4	5	8	9	8	9	20	23	46	60
Fortum	12	14	4	5	8	9	4	5	58	67
Gentamicin	12	14	12	14	8	9			44	63
Ambibak	28	33	20	23	8	9	4	5	26	30
Erythromycin	4	5							82	95
Sumamed	8	9							76	91
Doxocycline	12	14	4	5	8	9	16	18	46	52
Ciprofloxacin	8	9	8	9	8	9	32	37	30	36
Phloxane										
Avelox			20	24	16	18	40	46	8	11
Meflocid	8	9	16	19			32	37	30	36
Rifampicin					4	5	72	85	8	10
Dalacin					12	14	60	69	14	17
Biseptol					12	14	8	9	66	67

Table 1: *Susceptibility to antibiotics and antibacterial drugs (N = 86).*

Bacteriophage	+1		+2		+3		+4		R	
	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%
Pio bacteriophage			20	24					66	76
Intest bacteriophage	16	19	12	14	4	5			54	62
Fergusian phage	12	14	12	14	8	9			54	62
Sess Phage	24	28	12	14	4	5			46	53
Enko Phage	12	14	8	9	8	9			58	68
Carrot phage										

Table 2: *Sensitivity to bacteriophages is given in table 2.*

Antifungal drug abs	+1		+2		+3		+4		R	
	%	abs	%	abs	%	abs	%	abs	%	
Nystatin	8	9	12	14	4	5			62	72
Nizoral					12	14	16	19	58	67
FCN -150				8	9	20	24	58	67	

Table 3: *Sensitivity to antifungal drugs (N = 86).*

The antibioticogram revealed that only 21 of the patients examined showed sensitivity to penicillin group antibiotics. Resistance to macrolides was observed in most cases, with only 8 cases showing weak sensitivity. This explains the ineffectiveness of the treatment, which was massively observed in patients participating in the study prior to performing a bacteriogram. It is noteworthy that high sensitivity to antibiotics was observed on Rifampicin (for almost 90%) and in 72 patients (85%) the sensitivity was 4+. Which is explained by the peculiarity of this group of antibiotics and the sharp limitation of their adminstration in children over the years. The analysis of the bacteriogram enabled us to show the tactics of further treatment in the children of this contingent. Two groups of patients were selected to achieve the set goal.

Group I included 45 patients, which were treated with antibiotic susceptibility detected on a bacteriogram (mostly Cephalosporins) and Group II consisted of 41 patients who were prescribed phage therapy; also considering the sensitivity of the phages to the phagogram.

Treatment was carried out according to the course of treatment, the antibiotic selected by the antibioticogram was prescribed at a course of 7 - 10 days, taking into account the severity and clinical picture, while in the second group patients were given only phages according to the phagogram at a 3-month course. Patients were monitored for 6 months.

Clinical analysis of patients after treatment revealed that the outcome was significant in group I patients who were re-treated with regard to antibiotic susceptibility. The incidence of relapses in these patients was slightly reduced. And in the second group of patients, after a full course of phage treatment, the clinical effect was dramatically improved and remission was significantly prolonged. However, research and observation in this direction is still ongoing. The results obtained further increased our interest in phages, which determined the need for analysis of literary data. We have clarified the pathogenetic significance of bacteriophages: Bacteriophages are viruses of bacteria. When a phage enters a microbial cell, it penetrates it, switching the mechanism of action to produce similar phages that break down the cell membrane and attack other microbes in decuple numbers. Lysis takes on a spontaneous character. Release from unwanted microbes takes place within a few hours. Phagolysis - the destruction of bacteria by phages - a natural process that takes place in a body damaged by bacteria during self-healing. If self-healing did not happen for any reason, then the body needs help, by inserting the appropriate bacteriophage, which is obtained artificially.

Generally, phage bears the name of the microbe on which it acts. Phages, these natural sanitizers can be used not only for treatment but also for the prevention of infectious diseases. They are non-toxic, have no contraindications and can be combined with other medications. Bacteriophages can be prescribed for pregnant women, lactating women and children of any age. The main condition for their successful use is a separate culture test for susceptibility.

However, there is a consistent pattern - the susceptibility of clinical strains of microorganisms is stable and has a tendency to increase [1,7,8,15,16,18,19]. This reaffirms the important role of phage therapy in clinical medicine.

Thus, based on research and literature review, it has been determined that phage therapy may be considered as an alternative to antibiotic therapy. This study confirms the clinical efficacy of this alternative. Based on research and literature reviews it was established that phage therapy might be considered as an alternative to antibiotic therapy. This study confirms the clinical efficacy of this alternative.

Outcomes/Conclusion

The study reaffirms the need for bacteriological examination of the throat smear in patients with recurrent pharyngotonsillitis. Therefore, treatment should be prescribed only on the basis of antibiotic susceptibility analysis taking into account the analysis of antibiotic-ogram data.

In patients with recurrent pharyngotonsillitis, pharyngeal smear phagogram analysis is necessary and, consequently, the importance of phagotherapy alternatives is considered in the effectiveness of treatment of patients with recurrent pharyngotonsillitis.

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