Standard of care in the treatment of tonsilopharyngitis in children in Canton Sarajevo

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ABSTRACT

Objective: Inappropriate use of antibiotics is one of the major causes of resistance, and it is recognized as one of today’s most significant medical issue. Per standard of care antimicrobic treatment is not recommended for uncomplicated acute infections of the upper respiratory tract. However, despite this fact the most of antibiotics in ambulatory use are prescribed in these indications. The main objectives of this research was to evaluate the frequency of use of throat swabs in diagnostic purposes and subsequently prescribed antibiotic therapy in children with the diagnosis of bacterial tonsillitis or angina.

Methods: An observational, retrospective study was conducted in the pediatric departments in of the Public Health Center of Canton Sarajevo. Data were collected from the available medical records sourced with relevant info on diagnostic swabs for upper respiratory infections and the applied treatment.

Results: Data from 100 patients preschool and school age were collected. Results suggest that a significantly more frequent use of throat swabs is proven in preschool children compared to school age (p=0.008; $\chi^2$=7.100). In addition, results indicate that the prescription of beta-lactam antibiotics is preferred option of the treatment of tonsillitis and angina in whole sample. The preschoolers were more often prescribed cephalosporin antibiotics while school age children were the most frequently treated with the penicillin.

Conclusion: Streptococcus is detected in 35–50% of cases of clinically diagnosed streptococcal pharyngitis, which makes the bacteriological confirmation of the agent necessary. Penicillin is recommended as the medication of the first choice for streptococcal tonsillopharyngitis. Also, the research reveals common appearance of mixed infections as a reason for preferred prescription of macrolides and cephalosporins.

Keywords: tonsilopharyngitis, antibiotics, resistance

INTRODUCTION

Irrational consumption of antibiotics is one of the major causes for antibiotic resistance, and currently one of the leading medical problems worldwide (1). Antibiotic resistance is not only a problem in healthcare institutions, but also in the community. The confirmation of this is the increased spread of outpatient infections of methicillin-resistant Staphylococcus aureus (MRSA) (2,3) and the increased prevalence of the resistant Streptococcus pneumoniae in outpatient pneumonia (4).

Respiratory infections are the most wide spread and most common diseases in humans. Acute infections of the upper airways include acute inflammations of the nose and throat, otitis media, sinusitis and bronchitis (5). An antibiotic treatment is not recommended for uncomplicated acute infections of the upper airways, but most of the antibiotics in ambulatory use are prescribed in these indications.

Today, the diagnosis is usually made empirically on the basis of the clinical localization of inflammation, the other local symptoms and findings, epidemiological data and common symptoms of general infect (6-8). Diagnostic procedures such as serological methods or isolation of causers may facilitate etiologic diagnosis in acute respiratory infections.

The basic principles of the antimicrobial therapy are the justification, effectiveness and targeted focus on the presumed or proven cause. A large amount of antibiotics is prescribed for viral respiratory infections that typically require only symptomatic treatment. Gonzales and his colleagues found out that more than 50% of patients diagnosed with common cold or upper respiratory tract infections are treated with antibiotics among 28000 medical examinations (9).

The development of antibiotics resistance is a huge public health problem that has worsened in recent decades. In the United States about two million people per year...
get infections caused by resistant bacteria and about 23,000 people die from such infections. It is considered that the significant contribution to the development of resistance is the high prescription of antibiotics (5).

In most European countries, antibiotics aren’t available without a doctor’s prescription; however, in the south and east of Europe occasionally the antibiotics are reachable even without prescriptions. Also, it seems that the population of Western and Northern Europe is much more on top of this issue and harmful consequences of excessive use of antibiotics for the individual and the community (10).

The most of cases of acute tonsilopharyngitis does not require antibiotic treatment (up to 75% is considered to be viral pharyngitis) (11). Clinical presentation of viral and bacterial tonsilo-pharyngitis is similar, but it is expected that incidence of streptococcal tonsillitis would peak in early school age and remain more common in school children compared to preschoolers (12).

Considering widespread irrational use of antibiotics in the treatment of upper respiratory infections, we wanted to evaluate frequency of use throat swabs in diagnostic purposes while prescribing antibiotics to preschool and school children.

Materials and methods

This observational, retrospective study was approved by and conducted in the Canton Sarajevo Public Health Care Center, service for preschool and school children. The data were sourced from the archived medical records, for a period of six months (September 2014 to March 2015). Main focus of research was upper respiratory tract infections and the frequency of taking of throat swabs in therapeutic decision process while prescribing antibiotics.

We selected 50 preschool and 50 school children that were on the health check-up according to the health records and registered the frequency of upper respiratory infections within the last six months. Our focus was on patients diagnosed with tonsilopharyngitis, pharyngitis, tonsillitis or angina, in order to compare if physician’s approach in taking throat swabs differed.

Viral infections and other upper respiratory infections were registered and used to evaluate the average number of upper respiratory infections per child. Other diagnoses included, but were not limited to, laryngitis, otitis media and sinusitis.

Also, we were interested to look which antibiotics were prescribed to children treated for tonsilopharyngitis, pharyngitis, tonsillitis or angina. We wanted to evaluate which antibiotics groups are most frequently prescribed and see if prescribed treatments are aligned with the current treatment guidelines.

For statistical analysis of the data, the statistical software package SPSS (20.0) was used. To determine the statistical significance the chi-square test ($\chi^2$) and the Mann-Whitney U tests were used for testing the significance of difference between two independent samples, the level of statistical significance $p$ value of <0.05.

Results

The study included 100 preschool and school age children who were treated at the Health Center, 44 males and 56 females. The majority of subjects were the preschool children at the age of 6 (28%), and the school age children at the age of eleven (20%).

The upper respiratory infections were the most frequent diagnoses in pediatric outpatient population at the dispensary. Upper respiratory tract infections were more often observed in children of preschool age (92%) compared to the children of school age (86%). The highest average number of the occurrence of respiratory infections per child within six months follow-up was in children of preschool age, the age of two (2.8), and school age children, at the age of ten (3.2). A higher percentage of preschool children (42%) suffered from tonsillitis and angina in relation to school age children (36%) (Figure 1). No statistically significant difference was detected reporting tonsillitis and angina among children of pre-school and school age ($p=0.616$).

Figure 1: The frequency of tonsillitis and angina during five months

In the diagnosis of tonsillitis and angina in preschool children throat swabs were done in 79.41% of cases ($n=27$), while in children of school age swabs were done in 48.57% ($n=17$) of cases (Figure 2). A significant difference in the application of throat swabs in children of preschool and school age ($p=0.008; \chi^2=7.100$) was established.
According to literature children aged up to five years get over 6-9 acute respiratory infections on average per year, while 10% of children get up to 12 infections per year, which is in line with our research (13). Children in nurseries and kindergartens, and children who have brothers or sisters who visit closed children’s institutions (8,14) are particularly exposed. It is thought that viruses are responsible for 85% of all respiratory infections (8).

According to the available statistics in the Federation of Bosnia and Herzegovina (FBiH), the highest prevalence of respiratory diseases in 2005 were noted in children aged up to six years with a percentage share of 35.1%, and with a presence of 32.6% in people aged 7 – 19 years, whereas in 2013 it was 36.7% in children aged up to six years, and to 29.7% for people aged from 7 – 19 years (15).

Beta-lactam antibiotics (penicillin and cephalosporin) are the most commonly prescribed group of antibiotics for tonsillitis and angina to preschool and school children, with the preschoolers being prescribed cephalosporin more often compared to penicillin (Table 1).

In the treatment of tonsillitis and angina in preschool children the most commonly prescribed antibiotic was cefixime (20%), while in the children of school age the most frequently prescribed amoxicillin + clavulanic acid (46%).

The diagnoses of other infections (28%) are commonly present in medical records of children of preschool age, compared to children of school age (20%). Also, the percentage is larger in taking throat swabs in children of preschool age (71.43% (n=10) vs. 40% (n=4)).

Cephalosporins were the most frequently prescribed group of antibiotics in the case of other respiratory infections (Table 2). Preschoolers are commonly prescribed cefixime (43%), and children of school age cefuroxime and amoxicillin + clavulanic acid.

Viral infections were observed in 32% of children of school age, in which they are more frequent than in preschool children. There is no statistically significant difference of between the virus occurrence of preschool and school age (p=0.939). In the diagnosis of viral infections throat swab is not done.

In the treatment of viral infections analgesics were the most often prescribed (ibuprofen, dexketoprofen or paracetamol), antihistamines (loratadine) and corticosteroids (dexamethasone) in children of preschool age, and for the children of school age cough medicine (Table 3). Prescribed cough medication included antitussives (acetylcysteine or bromhexine) and herbal preparations with antitussive effects (extracts of ivy and primrose). In the treatment for viral infections ascorbic acid was often prescribed (18.7%), mainly in children of school age.

**Figure 2: Throat swabs for diagnosis of tonsillitis and angina in preschool and school children**

**Table 1: Antibiotics for tonsillitis and angina treatment in children of preschool and school age**

<table>
<thead>
<tr>
<th>Antibiotics in the treatment of angina and tonsillitis</th>
<th>Preschool age</th>
<th>School age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Penicillin + beta-lactamase inhibitor</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Cephalosporin</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Macrolide</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Sulfamethoxazole + trimethoprim</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

**Table 2: Antibiotics prescribed for other respiratory infections**

<table>
<thead>
<tr>
<th>Antibiotics in the treatment of other infections</th>
<th>Preschool age</th>
<th>School age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Penicillin + beta-lactamase inhibitor</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Cephalosporin</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Macrolide</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Sulfamethoxazole + trimethoprim</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

**Table 3: The medications prescribed for viral infections in children of preschool and school age**

<table>
<thead>
<tr>
<th>Viral infections therapy</th>
<th>Preschool age</th>
<th>School age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesic drugs</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Cough Medicine</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Antihistamines</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>3</td>
<td>-</td>
</tr>
</tbody>
</table>

**DISCUSSION**

According to literature children aged up to five years get over 6-9 acute respiratory infections on average per year, while 10% of children get up to 12 infections per year, which is in line with our research (13). Children in nurseries and kindergartens, and children who have brothers or sisters who visit closed children’s institutions (8,14) are particularly exposed. It is thought that viruses are responsible for 85% of all respiratory infections (8). According to the available statistics in the Federation of Bosnia and Herzegovina (FBiH), the highest prevalence of respiratory diseases in 2005 were noted in children aged up to six years with a percentage share of 35.1%, and with a presence of 32.6% in people aged 7 – 19 years, whereas in 2013 it was 36.7% in children aged up to six years, and to 29.7% for people aged from 7 – 19 years (15).
In our study we observed a statistically significant difference in the prevalence of throat swabs in the diagnosis of tonsillitis and angina among children of preschool and school age. It seems that in patients with all clinical signs of streptococcal pharyngitis, streptococcus is only proven in 35-50% of cases, especially characteristic in children, suggesting that the bacteriological confirmation of the cause is necessary (16). Throat swabs are the golden standard to confirming the clinical diagnosis of acute sore throat caused by beta-hemolytic streptococcus A. The sensitivity of a properly collected and treated swab is 90-95%. The specificity of the rapid test for the detection of streptococcal antigen is high (>90%) and negative results in children and adolescents are necessary to confirm with cultivation (16,17). Beta-lactam antibiotics are the widely used antibiotics in the treatment of bacterial infections of the upper respiratory tract. Our results indicate a preference to prescribing cephalosporin in the treatment of the tonsillitis and angina. According to the recommendation of the Paul - Ehrlich Society expert commission for the rational use of antibiotics among children and youth, in determining the cause of angina streptococcus group A, the first choice for antibiotics is penicillin or penicillin V (18). Penicillin is recommended as the first-line treatment for tonsillopharyngitis caused by streptococcus group A by Cochrane Systematic review Van Driel ML et al. (19). Tonsillopharyngitis in school children is often caused by the atypical bacteria (Mycoplasma pneumoniae, Chlamydia pneumoniae). Esposito and his colleagues (2006) explored the influence of the use of macrolides in the treatment and they suggest that the M. Pneumoniae is the second (after virus) most frequent single cause of acute tonsillolaryngitis (20). There is no literature data about the frequency of isolation of certain pathogens as the cause tonsillopharyngitis or local patterns of prescribing antimicrobials for Canton Sarajevo.

To this date the resistance of the beta hemolytic streptococci of group A to penicillin has not been described, which does not mean that it does not exist. It was considered sufficient only to single out the findings of streptococci group A without an antibiogram, to prescribe penicillin. More frequent use of macrolides in the treatment of angina has led to the need for testing the isolates to their sensitivity to macrolides (21). In 2003, in Croatia there was an observed increase in the resistance in beta-hemolytic streptococci A to macrolides from 11% to 16% (22). There is no available data for Bosnia and Herzegovina in literature.

Prescribed treatment in the case of clinically diagnosed viral infections was in accordance with our expectations. No antibiotics were used while expectorants, ascorbic acid, antihistamines and corticosteroids were prescribed. Loratadine was the only prescribed antihistamine in our research, while no combinations with decongestants were noted. Schroeder et al. (2004) suggest that the combination of an antihistamine/decongestant has a modest effect in the treatment of cough in colds, but with a significant increase in side effects (23), while a new generation of non-sedating antihistamines doesn’t effectively reduce cough in colds and viral infections (24).

According to research Llor et al. (2013), around 50% of parents, even before visiting the doctor, expect a prescription for antibiotics for their children (25). However, there are significant differences in the expression of the requirements from patients for antibiotics, depending on the country in which they live, origin, traditions. Patients who have been adequately explained why the antibiotic is perhaps unnecessary, and patients who understand their disease, can be satisfied with the service, although they didn’t get an antibiotic (25).

**CONCLUSION**

Streptococcus is detected in 35–50% of cases of clinically diagnosed streptococcal pharyngitis, which makes the bacteriological confirmation of the agent necessary. Penicillin is recommended as the medication of the first choice for streptococcal tonsillolaryngitis.

Ultimately, it remains in doubt how to interpret a more frequent use of swabs in the diagnosis of tonsillopharyngitis and angina in the population of preschool children and whether it comes to greater confidence in the empirical diagnosis in the case of children of school age. The results of this study suggest the necessity of generating accurate data on resistance patterns that are present in the local community, while on the other hand the evidence is still needed for educational interventions in the field of rational prescribing of antibiotics. There are no exact data of the presence of resistant antimicrobials in Canton Sarajevo, and one of the possible reasons for the preference to prescribing macrolides and cephalosporins can be a frequent occurrence of mixed infections, which would make penicillin not effective in these tonsillitis or angina.

**DECLARATION OF INTEREST**

The authors declare no conflict of interest.
References


