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Original Article EMERGENCY MEDICINE

Evaluation of the prescriptions written for upper respiratory tract infections

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ABSTRACT

OBJECTIVE: We aimed to determine frequency of antibiotic use and retrospectively evaluate prescriptions written for the patients with diagnosis of acute pharyngitis, acute nasopharyngitis and acute tonsillitis by our hospital emergency department physicians in January 2014.

METHODS: Records of the patients who were admitted to the education and research hospital between January 1st, 2014 to January 31st 2014 were analyzed in this study. Records of all the patients with the diagnosis of acute nasopharyngitis (J.00), acute pharyngitis (J.02) and acute tonsillitis (J.03) were analyzed, and patients with a second diagnosis or haven't any prescription were excluded from the study. Frequency of antibiotic and other symptomatic medications use were analyzed in prescriptions of 5261 patients.

RESULTS: Antibiotics were prescribed for 63.5% of the patients included in the study, and the most preferred antibiotics were penicilin and beta-lactamase combination (38.8%) and cephalosporins (26.2%). Combined preparations were the most preferred medications in symptomatic treatment (65.9%). Dexketoprofen was the most preferred among nonsteroidal anti-inflammatory drugs (63%). In each prescription, average number of 3.26 drugs were prescribed.

CONCLUSION: Excessive and improrer use of antibiotics in the treatment of respiratuary tract infection is a global problem. The use of excess agents in symptomatic medication leads to polypharmacy. Training of physicians and patients on principles of rational drug use will contribute to the solution of this problem.

Keywords: Antibiotic use; emergency medicine; symptomatic medications; upper respiratory tract infections.

Upper respiratory tract complaints are among the leading causes of admission into emergency service. Upper urinary tract infections are the most frequently seen cause of morbidity. They are the most frequently observed diseases which threaten community health, and result in labour loss. These infections can have viral or bacterial origins, and their incidence increases markedly during winter months [1]. Since these diseases spread by droplets, they are more frequently seen among crowded places. In the treatment of the patients analgesics, antipyretics, decongestants, antitussive drugs, and antibiotics have been used. As indicated in many guidelines, for these diseases with frequently viral

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etiology, prescription of antibiotics under certain indications has been recommended [2, 3]. As a known fact antibiotic use has been frequently abused by both the physicians, and the patients which results in increasingly prevalent antibiotic resistance.

Development of resistance against antibiotics is a global problem. Centers for Disease Control (CDC) reports that ın the United States of America every year 2 million people are infected with antibiotic-resistant bacteria, and at least 23,000 individuals die from these diseases [4]. World Health Organization has prepared a report based on data gathered from 114 countries in order to attract attention to this subject, and emphasized worldwide antibiotic resistance, inappropriate antibiotic use, and proposed some suggestions. In this report, individual responsibilities of the patients, health workers, administrations, and providers of health politics have been indicated, and especially the importance of prescribing the correct antibiotic for real indications has been underlined [5].

In this study, we aimed to retrospectively evaluate the contents of the prescriptions written by the emergency service physicians of our hospital during January 2014 for the patients with the diagnoses of acute nasopharyngitis, acute tonsillitis, and acute pharyngitis, and determine the frequency of prescribing antibiotics

MATERIALS AND METHODS

In our study, medical files of the patients who presented to a emergency medicine clinics of a tertiary health care training and research hospital between January 1st, and January 31st 2014 were investigated using hospital's automated registration system. Electronic files of all patients who were diagnosed as Acute Upper Respiratory System Diseases included in the 10. section of the ICD coding system lists (J00-J06) were screened. Among these, medical files of all patients with most frequently preferred three diagnoses namely acute nasopharyngitis (J.00), acute pharyngitis (J.02), and acute tonsillitis (J.03) were overviewed, and their prescriptions (if any) were evaluated. The patients who had been assigned the code of a second diagnosis apart from the determined ones were excluded from the study. Contents of the prescriptions of the patients were analyzed. Number of drugs, prescribed antibiotics (if any), the group, route of administration of the antibiotic, drugs to be preferred in the symptomatic treatment, and their prescription rates were evaluated. Antibiotics were grouped in the categories of penicilline derivatives, combination of penicilline derivatives, and beta lactamase inhibitors; cephalosporines, macrolides, quinolones, and others. Drugs to be preferred in the symptomatic treatment were grouped as combined preparations, paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs), antitussives, local oral disinfectants, decongestants, and antiemetics, NSAIDs were also grouped as naproxen, ibuprofen, etodolac, nimesulide, flurbiprofen, and dexketoprofen.

For statistical analyses NCSS (Number Cruncher Statistical System) 2007&PASS (Power Analysis and Sample Size) 2008 Statistical Software (Utah, USA) programs were used. When evaluating study data descriptive statistical methods (frequency, rate), and for the comparison of qualitative data Pearson chi-square test, Fisher Freeman Halton test, and Yates Continuity Correction test were employed. Statistical significance was evaluated at $p<0.01$, and $p<0.05$.

RESULTS

During the study period, medical files of a total of 23424 patients who had been applied to the clinic of emergency medicine of the training and research hospital, and had received diagnoses included under the 10. Section (Acute Upper Respiratory Tract Infections) based on ICD coding system (J00-J06) were screened. During the study period a total of 6254 patients who met all of the criteria were contacted. Among these medical files of the patients with the most frequently preferred three diagnoses namely, acute nasopharyngitis, acute pharyngitis, and acute tonsillitis were analyzed in the study. Among these patients 5703 (24.5%) cases had received diagnoses of acute nasopharyngitis (J.00; n=365; 6.4%), acute pharyngitis (J.02; n=4074; 71.4%) or acute tonsillitis (J.03; n=1264; 22.1%)

Among these 5703 patients, 442 patients with a second diagnosis were excluded from the study.

Medical files of 5261 patients who had received one of the diagnoses of acute nasopharyngitis, acute tonsillitis or acute pharyngitis were analyzed. Median age of the patients in all was 36.38 (min:1, and max 90 yrs) years. Median ages of the patients with acute nasopharyngitis (36.50; min:6, and max 88 yrs), acute tonsillitis (33.19; (min:1, and max 88 yrs), and acute pharyngitis (36.88; min:3, and max 90 yrs) were also estimated. Age distribution among groups did not demonstrate any statistically significant differences. The distribution of the patients with respect to their diagnoses were as follows: nasopharyngitis (n=321; 6.1%), acute tonsillitis (n=1214; 23%), and acute pharyngitis (n=3726; 70.8%). Four hundred and twenty (8%) patients had been discharged with recommendations, but without prescribing any drug, and this group most frequently received the diagnosis of acute pharyngitis (n=260; 61.9%). Similarly, 4841(92%) patients were prescribed drug therapy for mostly acute pharyngitis (n=3466; 78.7%). Patients had received diagnoses of acute nasopharyngitis (n=1098; 22.6%), and acute tonsillitis (n=277; 5.7%).

Average number of 3.26 (min, 1, and max. 6) drugs were prescribed for each one of 5261 patients included in the study. Prescriptions of the patients with the diagnosis of acute nasopharyngitis, acute tonsillitis, and acute pharyngitis contained an average of 3.13, 3.47, and 3.21 drugs, respectively.

Antibiotics had been prescribed for 63.5% of all cases. Antibiotics were mostly prescribed for the patients with acute tonsillitis (91.4%), followed by acute nasopharyngitis (59.9%), and acute pharyngitis (55%). Generally, antibiotic prescription rates were compared, and cases with tonsillitis were prescribed antibiotics significantly more frequently than those diagnosed as flu, and pharyngitis (p=0.001; p=0.001). However a statistically significant difference was not detected between cases diagnosed as nasopharyngitis, and pharyngitis as for drug prescription rates (p=0.110).

Mainly preferred antibiotics were seen to be combination of penicillin derivatives, and beta-lactamase inhibitor (38.8%), and cephalosporins (26.2%). In patients with the diagnosis of acute tonsillitis penicillin derivatives, and beta-lactamase combinations, and for acute nasopharyngitis cephalosporins had been preferred.When antibiotic prescription rates have been analyzed individually, penicillin derivatives, and beta-lactamase combinations differed statistically, and extremely significantly relative to other antibiotics (p=0.001, p=0.001). While comparisons between other prescribed antibiotics according to diagnoses did not reveal any significant differences (Table 1).

When drugs written with the indication of

Table 1. Comparison of prescribed antibiotics according to diagnoses

	Nasopharyngitis (n=277)		Tonsillitis (n=1098)		Pharyngitis (n=3466)		Total		p
	n	%	n	%	n	%	n	%	
Penicillin derivatives	0	0.0	8	0.7	12	0.3	20	0.4	[a]0.194
Penicillin derivatives plus beta lactamase inhibitors	20	7.2	614	55.9	1001	28.9	1635	33.8	[b]0.001**
Cephalosporins	135	48.7	351	32.0	782	22.6	1268	26.2	[b]0.001**
Macrolides	8	2.9	26	2.4	96	2.8	130	2.7	[b]0.755
Quinolones	2	0.7	1	0.1	10	0.3	13	0.3	[a]0.173
Others	1	0.4	4	0.4	4	0.1	9	0.2	[a]0.122

[a]Fisher Freeman Halton; [b]Pearson chi-Square; **p<0.01.

symptomatic treatment were analyzed, local oral antiseptics (69%), anti-flu drug combinations (65%), paracetamol (36%), NSAIDs (26%), amtitussives (16%), decongestans (5%), and vitamin preparations (3%) had been prescibed with respective percentages. Comparisons of prescription rates of symptomatic drugs based on the indicated diagnoses revealed significant differences apart from metoclopropamide (Table 2).

Drugs written for symptomatic treatment were evaluated, and paracetamol prescription rates according to indicated diagnoses were significantly lower in cases with the diagnosis of nasopharyngitis when compared with those with established diagnosis of tonsillitis, and pharyngitis (p=0.001, p=0.001). Decongestant prescription rates in cases with nasopharyngitis were significantly higher relative to the cases diagnosed as tonsillitis, and pharyngitis (p=0.001; p=0.001). Antitussive prescription rates in cases diagnosed as tonsillitis were significantly lower than those written for the patients with diagnoses of nasopharyngitis, and pharyngitis (p=0.001; p=0.001). Anthistamine drug prescription rates in patients with diagnoses of nasopharyngitis were significantly lower when compared with cases diagnosed as tonsillitis, and pharyngitis (p=0.007; p=0.016). Other symptom-relieving drugs as antacids, proton pump inhibitors, vitamin preparations, and herbal preparations were more frequently prescribed relative to the cases with tonsillitis, and pharyngitis (p=0001; p=0.001).

NSAID prescriptions written for cases diagnosed as nasopharyngitis were significantly more numerous when compared with those written for cases diagnosed as tonsillitis or pharyngitis (p=0.001, p=0.001). NSAID prescription rates were significantly lower relative to cases with tonsillitis (p=0.001). Among NSAIDs, more frequently dexketoprofen (63%), etodolac (14%), nimesulide (11%), flurbiprofen (6%), and naproxen (4%) were preferred. Comparisions of NSAID prescription rates based on diagnoses are bsummarized in Table 3.

DISCUSSION

Number of antibiotic-resistant mikroorganisms are increasing day by day, and the rational drug use is gaining importance. Excessive, and erronous use of antibiotics play an important role in the development of resistant organisms. One of the reasons for prescription of antibiotics is nonspecific upper respiratory tract infections as tonsillitis or pharyngitis

In cases with pharyngitis, in the presence of symptoms, and signs as throat ache, fever, headache,

Table 2. Comparison of prescribed symptomatic drugs according to diagnoses

Drugs	Nasopharyngitis (n=277)		Tonsillitis (n=1098)		Pharyngitis (n=3466)		Total		p
	n	%	n	%	n	%	n	%	
Combined preparation	116	41.9	783	71.3	2293	66.2	3192	65.9	[a]0.001**
Local oral antiseptics	175	63.2	838	76.3	2333	67.3	3346	69.1	[a]0.001**
Paracetamol	56	20.2	403	36.7	1329	38.3	1788	36.9	[a]0.001**
NSAIDs	140	50.5	206	18.8	938	27.1	1284	26.5	[a]0.001**
Decongestant	59	21.3	55	5.0	153	4.4	267	5.5	[a]0.001**
Antitussive	45	16.2	60	5.5	681	19.6	786	16.2	[a]0.001**
Metachlopramide	2	0.7	10	0.9	33	1.0	45	0.9	[b]1.000
Anthistamines	4	1.4	1	0.	10	0.3	15	0.3	[b]0.008**
Other symptomatic drugs	50	18.1	22	2.0	121	3.5	193	4.0	[a]0.001**

[a]Pearson chi-Square; [b]Fisher Freeman Halton; **p<0.001.

Table 3. Comparison of prescribed NSAIDs according to diagnoses

NSAIDs	Coryza (n=140)		Tonsillitis (n=206)		Pharyngitis (n=938)		Total		p
	n	%	n	%	n	%	n	%	
Dexketoprofen	23	16.4	112	54.4	674	71.9	809	63.0	[a]0.001**
Etodolac	68	48.6	41	19.9	76	8.1	185	14.4	[a]0.001**
Nimesulide	36	25.7	25	12.1	82	8.7	143	11.1	[a]0.001**
Flurbiprofen	4	2.9	13	6.3	64	6.8	81	6.3	[a]0.198
Naproxen	6	4.3	12	5.8	41	4.4	59	4.6	[a]0.654
Ibuprofen	3	2.1	3	1.5	1	0.1	7	0.5	[b]0.002**

NSAIDs: Nonsteroidal anti-inflammatory drugs; [a]Pearson chi-Square; [b]Fisher Freeman Halton; **p<0.001.

nausea, vomiting, abdominal pain, tonsillopharyngeal erythema, excudate, petechia, enlarged anterior cervical, and palatal lymph nodes, beta-hemolytic streptococci should be thought as possible microbial agents. Throat culture or rapid antigen test should confirm the diagnosis. In cases with beta-hemolytic streptococci, priorly penicillin V, and penicillin G should be preferred. Symptomatic treatment is sufficient for symptoms as conjunctivitis, coughing, nasal discharge, and diarrhea [6].

In a study where prescriptions of practitioners were analyzed, most (78.3%) of the patients were prescribed antibiotics, and among them penicillin derivatives plus beta-lactamase combinations (43.4%), cephalosporins (17.9%), and macrolides (17.9%) were the mostly preferred antibiotics [7]. Still in a study where prescriptions of primary care physicians were evaluated, 34% of the patients were prescribed antibiotics, while most frequently penicillin derivatives plus beta-lactamase inhibitor combinations (35.6%), macrolides (28.2%), and cephalosporins (12.8%) were preferred [8]. Önlen et al. investigated antibiotic use by health care personnel, and their families, and found that 88.2% of the patients were prescribed antibiotics, followed by penicillin derivatives plus beta-lactamase combinations (43.9%), cephalosporins (17.6%), and macrolides (8.6%) [9].

In our study, we detected that 635% of the total number of cases were prescribed antibiotics. Most frequently antibiotics were prescribed (91.4%) for acute tonsillitis followed by acute nasopharyngitis (59.9%), and acute pharyngitis (55%). Mainly penicillin derivatives plus beta-lactamase inhibitor combinations (38.8%), and cephalosporins (26.2%) were preferred. In patients with acute tonsillitis penicillin derivatives plus beta-lactamase inhibitor combinations, and in patients with acute nasopharyngitis cephalosporins were preferred. Priority in the preference of these drugs is in compliance with alternatives of bacterial upper respiratory tract infections recommended in relevant guidelines.

Although very important differences did not exist when compared with previously reported studies, we think that antibiotic prescription rates were inappropriately higher.

Dosh et al. indicated that other reasons which lead the physicians to prescribe antibiotics for the treatment of upper respiratory tract infections are psychological pressure on physicians by patients who used antibiotherapy previously for similar symptoms, and believe that their complaints will not resolve without using antibiotics, and the authors also emphasized some special clinical findings as prolonged duration of symptoms, sinusal congestion, dark coloured nasal discharge, postnasal discharge,and rhonchi can be associated with prescribing antibiotics [10]. Similar indications are also valid for our emergency service physicians. However in addition to these indications, we think

that one of the most important reasons of recurrent prescription of antibiotics is that rapid antigen test was not studied in the laboratory of emergency medicine in our hospital. In guidelines, before starting antibiotherapy in patients who presented with complaints of upper respiratory tract complaints, throat culture, and rapid antigen test are recommended [6]. However during the study period, application of these tests in the emergency service was restricted, so none of the patients underwent these tests before initiation of treatment. The physicians were evaluated patients clinically or with other laboratory parameters. We think that physicians may prescribe higher number of antibiotics so as to protect themselves because of their restricted facilities, and also avoid risking their patients.

In addition to antibiotherapy, symptomatic treatment of upper respiratory tract infections has a great importance as for patient's comfort. In this disease group of mostly viral origin, effective symptomatic treatment has been shown to shorten duration of disease In this disease group which causes considerable labor loss, the importance of symptomatic treatment has been emphasized in various studies [1, 11, 12, 13]. Appropriate symptomatic treatment increases patient's comfort, and also prevents recurrent patient referrals. In symptomatic treatment, NSAIDs, decongestants, antitussives, antihistaminics, and combined preparations can be used [13, 14, 15].

In the treatment of coughing, studies performed with various antitussive agents, beneficial effects of antitussive agents over placebo have been demonstrated [15]. Antihistamine-decongestant combinations have been found to be beneficial in the treatment of nasal obstruction, and discharge., while usefulness of antihistamines could not be demonstrated [11, 16]. The benefits of single dose oral or topical decongestant therapy has been demonstrated, however effectiveness of recurrent oral decongestant therapy could not be revealed [12, 16]. Controversial reports have been published in the literature about effectiveness of paracetamol in the treatment of nasal obstruction [17, 18, 19]. Vitamin C preparations have been prescribed for symptomatic treatment, their use after onset of symptoms have not alleviated severity of symptoms [20]. The effectiveness of paracetamol has been demonstrated in the treatment of throat ache, and headache caused by upper respiratory tract infections [21]. Still NSAIDs were found to be effective in the treatment of headache, and painful conditions of muscles, and joints caused by upper respiratory tract infections [22].

In our study, we have observed that the physicians prescribed local oral antiseptics (69%), combined anti-flu preparations (65%), paracetamol (36%), NSAIDs (26%), antitussives (16%), decongestants (5%), vitamin preparations (3%), and anthistaminics (1%) as a symptomatic treatment. In comparisons between our outcomes, and those of the similar studies some differences have striked our attention. For instance in the study by Akıcı, and Tosun, preference rate of combined anti-flu preparations was 35–45%, while in our study, this rate was found to be 65 percent. Still, in a study by Akıncı et al. only 1% of the patients had used local mouth sprays, however in our study it was used by 69% of the patients. Vitamin prescription rate was found to be 38% in the study by Akıcı et al., however in our study it was 3% in compliance with the literature findings. Similarly diverse results have been obtained in various studies concerning frequency of analgesic, and other symptomatic treatment preparations [7, 8, 9, 23].

Although the reason for variations in symptomatic treatment alternatives has not been completely understood, we think that variations in additional symptoms of the patients, and physicians' habits of prescribing drugs have been effective. Similarly, a significant distribution between mutual comparisons of symptomatic treatments prescribed based on diagnoses has not been detected. This condition can be explained with the probable similarities between all clinical diagnoses, and nonspecificity of symptoms. However one can say that we are clinically successful in the prescription of these drugs recommended for the treatment of upper respiratory tract infections which carry importance for the improvement of life comfort of the patients. However the fact that this approach will induce polypharmacy, and related increase in the incidence of

side effects should not be overlooked.

In our study where prescriptions were reviewed as for polypharmacy, we found that each prescription contained an average of 3.26 drugs. Our outcomes resemble those of the literature. In various studies average number of 3.10–3.58 drugs have been written in each prescription. In various studies average number of drugs in each prescription have changed [7, 8, 23]. When prescription rate of combined preparations was taken into consideration, a tendency towards polypharmacy can be expressed.

Conclusion

Excessive, and inapropriate antibiotic use in the treatment of respiratory tract infections is a global issue, and facilitates development of bacterial resistance. The most current report of the World Health Organization on rational drug use, emphasized physicians as the primarily responsible health care professionals, and they should take care to prescribe medicine for appropriate indications. However do not forget that this approach will not suffice per se. Units, and authorities formulating, and implementing health policies should assume critical responsibilities about raising awareness in the community, and prevention of procuring antibiotics without prescriptions.

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