

THE PREVALENCE OF PRESCRIBING ANTIBIOTICS BY PRIMARY HEALTH CARE PHYSICIANS IN TURKEY: A MULTI-CENTERED SURVEY

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ABSTRACT

Objective: Antibiotics are widely used in the treatment of infections and for empirical treatment purposes. Despite this common consumption of antibiotics, it is difficult to state that antibiotics are chosen and used consciously. This study was planned to determine the prevalence of prescribing antibiotics in Turkey.

Methodology: This cross-sectional study was conducted in November 2003. The study was carried out in a total of 46 primary care health centers of the following cities; Central Anatolian, Western Anatolian, Eastern Anatolian regions.

Results: Two hundred sixty seven physicians participated in the study, 38.9% (104) of which were women and 61.1% (163) were men. The proportion of antibiotic prescription was by 22.6%, and the most frequently chosen antibiotics were 15.6% (3301) Amoxicilline+Clavulanic acid (Amox/Clav), 15.1% (3184) Ampicilline+Sulbactam 12.84% (2711), respectively. When prescriptions with antibiotics were evaluated according to diagnosis, the most frequent diagnoses were found to be as follows: 53.3% (11430) Acute Upper Respiratory Infections, 16.4% (3516) Urinary Tract Infections.

Conclusions: The findings of the study suggest that primary healthcare physicians most often prescribe for acute respiratory tract infections, and prescribe Amoxicilline+Clavunic the most. It may be argued that more extensive studies are needed in this field.

KEY WORDS: Antibiotic, Primary Health Care, Physician, Prescription, Prevalence.

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INTRODUCTION

Antibiotics are commonly used in the treatment of infections and for empirical treatment purposes. As with all drugs, there are basic prin-

ciples in selecting the antibiotics to be used.¹⁻³ The leading international healthcare associations demand that the treatment criteria of antibiotics should be practical and should receive support from larger masses. Prescribing the correct antibiotics for infection treatment and prophylaxis, in effective doses with an appropriate length of time of use is significant in providing the correct treatment, reducing resistance to the drug, preventing complications, and lowering the cost of treatment.

This study was planned to determine the prevalence of prescribing antibiotics by primary health care physicians in Turkey, where patient

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visits to primary healthcare are very often, the reasons for prescribing antibiotics, and the variables that affect these reasons.

METHODOLOGY

This cross sectional study was conducted in November 2003. All cities were grouped according to their regions as eastern, western, northern, southern and central Anatolia. By taking into account the number of primary health care institutions and the region of the cities, 8 cities (Istanbul, Ankara, Izmir, Adana, Konya, Antalya, Samsun and Diyarbakir) ranking high in the densely populated cities list were selected for the study⁴. Physicians practicing in city centers were included in the study. With a 95% CI (confidence interval) and an error margin of $\alpha=0.03$, 598 physicians out of 4792 physicians practicing in primary health care institutions in the selected cities were chosen. However, data on 267 physicians with correct data, who accepted to participate in the study, were evaluated. A letter of approval was sent to the City Health Directorates.

The study was carried out in a total of 46 primary health care centers of the following cities which accepted to participate in the study: in the Central Anatolian region (9 primary care health centers in Ankara, 6 in Konya), in the Western Anatolian region (16 in Istanbul and surroundings, 8 in Izmir), in the Southern Anatolian region (three in Antalya, one in Adana), in the Eastern Anatolian region (three in Diyarbakir).

The city in the Northern Anatolian region was excluded from the study due to not being able to obtain appropriate health data. Prescriptions including antibiotics given over a month by physicians practicing in these primary care health centers were recorded on a computer-based system. The study abides by the encodings of ICD 10(WHO) while defining the diseases.⁵ A total sum of the prescriptions without antibiotics was taken. The questionnaire based interview conducted face to face consisted of four different variables; the date of the questionnaire, age and gender of the physicians, and variables affecting the physicians' and choice

of antibiotics. The data was analyzed using the SPSS and MINITAB programs. The chi-square (likelihood ratio) and two proportions z tests were utilized.

This study, though limited in climatic features and time, is of paramount importance in that it has been carried out in many locations, the number of the prescriptions included in the study is outstanding, and it reveals physicians' choices and antibiotics prescribing prevalence.

RESULTS

In a total number of 94.747 prescriptions, a total of 21.800 antibiotic drugs were found in 22.6% (21.454) of the total number of prescriptions. Of the physicians participating in the study, 38.9% (104) were women, and 61.1% (163) were men. The minimum age was 25, and the maximum age was 66. Antibiotic of choice was found that in 63.0% the choice was based on clinical experiences, and in 5.2% on information from pharmaceutical companies. Of the physicians in the 25-34 age group, 78.6% relied on information from pharmaceutical companies, and 57.7% in the 35-44 age group made use of their clinical experiences when prescribing antibiotics ($p<0.001$).

In a total number of 94.747 prescriptions given by the physicians, a total of 21.800 antibiotic drugs were found in 22.6% (21.454) of the total number of prescriptions. The most frequently chosen antibiotics in the prescriptions with one antibiotic drug combination were 15.6% (3301) Amoxicilline+Clavulanic acid (Amox/Clav), 15.1% (3184) Ampicilline+Sulbactam, 12.8% (2711) Amoxicilline (Amp+Sulb), 10.4% (2203) Trimethoprim+Sulfamethoxazol (Tmp/Smx), respectively (Table-I). The rate of Acute Upper Respiratory Infection was significantly higher compared to all other disease groups ($p<0.001$). While there was no significant difference between the rate of Eyelid, Conjunctiva, Sclera, Iris & Skin & Subcutaneous Tissue Local Infections, the rate of both infections was significantly lower than that of other diseases ($p<0.001$) (Table-II). While there was no significant difference between Acute Upper Respiratory Infection and the choice of antibiotics, there was

Table-I: Rates of diagnosis and including antibiotics (only in prescriptions with one antibiotic drug) in prescriptions.

<i>Diagnosis Groups</i>	<i>Ratio %</i>	<i>Antibiotics</i>	<i>Ratio%</i>
Acute Upper Respiratory Infections	53.3	Amox+ Clav	15.6
Urinary Tract Infections	16.4	Ampicillin+ Sulbactam	15.1
Auditory canal(externa, media, interna) and mastoid process infections	13.0	Amoxycilline	12.8
Skin and subcutaneous tissue local infections	4.3	Tmp+Smx	10.4
Eyelid, conjunctiva, sclera, iris infections	4.2	Clarithromycin	9.4
Other	8.8	Penicillin G	9.1
		Ampicillin	8.8
		Clindamycin	7.9
		Other	10.9

significant difference between the first and third choices in Sinus Infections ($p<0.05$), among all choices in Skin and Subcutaneous Tissue Local Infections ($p<0.001$), between the first and third choices in Eyelid, Conjunctiva, Sclera, Iris infections ($p<0.05$), & in the third choice in the Other group ($p<0.001$) (Table-II). When prescriptions with antibiotics were evaluated according to diagnosis, the first three most frequent diagnosis were found to be as follows: 33.6% (7201) Acute Upper Respiratory Infection 19.7% (4229) Sinus Infection, and 16.4% (3516) Urinary Tract Infections. With the exception of Amoxycilline, there was a significant statistical difference between the rate of use of Amox Clav and Ampicilline sulbactam ($p<0.001$) (Table-I). The distribution of age and gender according to the diagnosis in the prescriptions with information about the physician can be seen in Table-III.

DISCUSSION

This study carried out in primary health care centers in Turkey is significant in demonstrating physicians' choice of antibiotics. A number of retrospective and prospective studies conducted prior to this study provided information only about the antibiotic content of the prescriptions given to hospitalized patients. However, our study investigates the primary care physicians' choice of antibiotics, and factors that affect their choices in primary health care institutions which meet an important demand in health care services in Turkey.

In a study performed by Thamlikitkul et al. in Thailand, the rate of empirical prescription of antibiotics was found to be 41.1%. In the same study, it was stated that the rate of irrational antibiotic use was 52.3%.⁶ In a study conducted

Table-II: Physicians' diagnosis groups according to order of frequency, and physicians' first three choices of antibiotics

<i>Diagnosis Groups</i>	<i>Choices of antibiotics</i>						
	<i>N</i>	<i>First</i>	<i>%</i>	<i>Second</i>	<i>%</i>	<i>Third</i>	<i>%</i>
Acute Upper Respiratory Infections (without sinus infection)	7201	Amox+Clav	23.6	Amp+Sulb	22.2	Tmp+Smx	20.9
Sinus Infections	4229	Amoxycilline	29.1	Clindamycin	26.0	Clarithromycin	24.6
Urinary Tract Infections	3516	Amox+Clav	28.9	Ciprofloxacin	28.1	Amp+Sulb	27.9
Auditory Canal (externa, media, interna) and Mastoid Process infections	2791	Amox+Clav	18.5	Amp+Sulb	18.4	Amoxycilline	17.4
Skin and Subcutaneous Tissue Local Infections	927	Rifampicin	31.7	Erythromycin	21.8	Doxycycline	13.4
Eyelid, Conjunctiva, Sclera, Iris Infections	909	Gentamicin	34.1	Tobramycin	31.7	Rifampycine	29.8
Other	1881	Amoxycilline	26.9	Tmp+Smx	25.8	Penicillin G	19.9

Table-III: Age, gender and characteristics of preferred antibiotics according to infections diagnosed by physicians

Diagnosis groups*	Age, Sex, and Choice of Antibiotics							
	25-34		35-44		45-54		55 ³	
	female	male	female	male	female	male	Female	male
1 n	Amp+Sulb 480	Amox+Clav 491	Amox+Clav 402	Amox+Clav 610	Tmp+Smx 144	Amp+Sulb 191	Amp+Sulb 48	Tmp+Smx 123
2 n	Clindamycin 435	Amoxycilline 322	Amoxycilline 386	Clarithromycin 451	Amoxycillin 120	Amoxycilline 207	Clindamycin 36	Amoxycilline 89
3 n	Amp+Sulb 284	Amox+Clav 216	Amox+Clav 270	Amox+Clav 278	Ciprofloxacin 85	Amp+Sulb 99	Amox+Clav 27	Ciprofloxacin 37
4 n	Amox+Clav 183	Amp+Sulb 226	Amp+Sulb 173	Amoxycilline 202	Amox+Clav 92	Amp+Sulb 91	Amoxycilline 28	Amox+Clav 88
5 n	Rifampicin 44	Erythromycin 85	Doxycycline 100	Rifampicin 64	Doxycycline 7	Erythromycin 31	Rifampicin 9	Rifampicin 16
6 n	Tobramycin 63	Gentamicin 117	Tobramycin 135	Rifampicin 151	Gentamicin 11	Gentamicin 10	Gentamicin 6	Gentamicin 6
7 n	Tmp+Smx 111	Amoxycilline 184	Penicillin G 139	Amoxycilline 183	Penicillin G 23	Tmp+Smx 43	Tmp+Smx 20	Penicillin G 19

1. Acute Upper Respiratory Infections (without sinus infections) * 2. Sinus Infections*
 3. Urinary Tract Infections* 4. Auditory Canal*(externa, media, interna) and Mastoid Process Infections*
 5. Skin and Subcutaneous Tissue Local Infections* 6. Eyelid, Conjunctiva, Sclera, Iris Infections* 7. Other

by Charles J et al., the most common condition diagnosed by general practitioners in children in the age group of 15 and under was determined to be contact/allergic dermatitis. Acute otitis media, asthma, tonsillitis, acute bronchitis and gastroenteritis were observed less frequently⁷. In another study carried out by Odenholt et al. in 2002, it was found that general practitioners in Scandinavian countries were of the opinion that they were limiting themselves by not giving antibiotic treatment to their patients diagnosed with respiratory tract infection, and that they preferred to provide antibiotic treatment only to patients with symptoms of acute upper respiratory tract infection. In the same study, it was observed that Penicillin V, and amoxycilline groups were most frequently preferred in the treatment of upper respiratory tract infections⁸. In our study, we found that primary care physicians in various cities in Turkey generally preferred to prescribe semi-synthetic penicillin's, and medication prepared from a combination of these penicillin's with beta-lactamase inhibitors. Considering that microorganisms resistant to beta-lactame antibiotics are common, it can be said that the physicians' choice is rather appropriate. In a study carried out by Vaccheri A et al. investigating general practitioners' choice of antibiotics in Italy and Denmark, without analyzing the di-

agnosis groups, it was found that physicians in Denmark preferred to prescribe narrow-spectrum penicillin's (phenoxymethyl penicillin) and macrolids in the first place, and wide-spectrum penicillin's, macrolids, fluoroquinolone and cephalosporines were frequently preferred by physicians in Italy.⁹ In a multi-centered study conducted by Edwards M et al. in England in 2003, it was reported that 50.0% of antibiotic prescriptions were given for the treatment of upper respiratory tract infections.¹⁰ In another multi-centered study performed by Tan TY et al. in England and Wales in 2003, general practitioners' choice of antibiotics in the treatment of urinary system infections was investigated. In the laboratory test results, they found that derivatives of cephalosporines and nitrofurantoin were the most frequently prescribed group of antibiotics.¹¹ In a study carried out by Otters HB et al. in Holland, they assessed the health state of patients in the age range of 0-17 (86577) examined by 103 general practitioners in 1987, and that of patients (76010) examined by 90 general practitioners in 2001. They also investigated the rate of antibiotic prescriptions within each year according to age, gender and diagnosis. It was observed that there was an increase in the rate of antibiotic prescriptions in 2001 compared to that of 1987, which particularly comprised wide-spectrum antibiotics.¹² In their study in-

investigating respiratory tract infections in all age groups, Ferrara et al. determined that respiratory tract infections developed more frequently in the elderly compared to younger patients. They reported that a high rate of pneumonia resulting in mortality was observed in older patients particularly in intensive care units. In their study, they found that beta-lactamase agents, oral (amoxicilline, amoxicilline / clavulanic acid, cephuroxime axetil), and intravenous (sulbactam/ampicilline, ceftriaxone, cefotaxime) were preferred in the treatment of patients not staying in hospital and that of inpatients, respectively. They also reported that the use of macrolid or quinolone together with other agents was preferred depending on the course of illness and the presence of different risk factors in the treatment of patients with severe pneumonia, and patients with aspiration pneumonia. Lately, in the case of resistant strains, new agents such as ketolit, oxazolidinones and streptogramins are used for the treatment of gram positive microorganisms which demonstrate resistance to many drugs.¹³ Yoshikawa TT et al. determined that the most frequent causes of death in elderly patients were bacterial pneumonia, and bacterial urinary infection.¹⁴

Bjerrum L et al. investigated the antibiotic prescribing habits of general practitioners in respiratory tract infections in a total of 2833 patients in Denmark and Spain. The same study revealed that the most frequently prescribed antibiotic group in Denmark comprised narrow-spectrum penicillins with a rate of 58.0%, and wide-spectrum penicillin's and beta-lactamase inhibitor amoxicilline combinations were most frequently used in Spain.¹⁵ In a study carried out by Thamlikitkul V et al. in Thailand in 2004, it was reported that the rate of antibiotic use was generally low (44.1%), although antibiotics were frequently used in the treatment of patients diagnosed with common cold, pharyngitis and acute bronchitis (7.4%). In the same study, it was determined that the most frequently used antibiotic in the treatment of upper respiratory tract infections with total bacterial infection was penicillin V, and also amoxicilline roxithrom-

ycine, co-trimoxazole and doxycycline were used with a lower rate of frequency⁶.

Udomthavornsuk et al. examined the prescriptions given to a group of hospitalized patients in Switzerland.¹⁶ They observed that antibiotics were prescribed to 41.6% of 2112 inpatients in total. However, Ashworth M et al. determined that there has been an increase in the rate of prescribing antibiotics since the 1980s, and that the rate of prescribing antibiotics especially in the treatment of acute respiratory tract diseases decreased between 1995 and 2000.¹⁷ Rutschmann OT et al. determined that the rate of prescribing antibiotics in patients diagnosed with respiratory tract infections which was 52.1% in 1997 decreased to 41.5% in 1999. They were of the opinion that this decrease was due to the fact that the treatment of lower respiratory tract infections was carried out by field specialists. While the rate of prescribing antibiotics by field specialists in the treatment of upper respiratory tract infections was 36.2%, the rate of prescribing antibiotics by primary care physicians was found to be 42.9%.¹⁸ Balabanova Y et al. performed a study investigating the factors that affect physicians' choice of antibiotics, drawing attention to the relation between resistance and side effects. As a result, they pointed out that physicians' choice of antibiotics was 80.0% influenced by the presentations given by pharmaceutical companies.¹⁹ It is a positive outcome that this rate was found to be considerably low in our study (5.2%). In their study on the principles of prescribing antibiotics, Borrego et al. emphasized the necessity of taking into account such variables as renal functions, drug interactions and history of allergies, weight and age of the patient when prescribing antibiotics²⁰. The contribution of laboratory facilities cannot be denied in enabling physicians to make healthy decisions. Laboratory facilities in primary care health services have only recently started to improve in our country.

This study plays a critical role in manifesting the prescription of antibiotics in primary healthcare stage (22,6%, and Amox-Caly being the most frequently prescribed one) and their reasons. We strongly believe that the results of

this study are an essential resource for references, in the field of healthcare services and their financing, for the countries with similar healthcare organization. Besides, the results of this study should be strengthened with more research studies. The implications of this study for public healthcare should also be taken into consideration.

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