

Antibiotics in Upper Respiratory Tract Infections: Appropriateness of the Practice in Jordan

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Abstract

Objectives: This study was conducted to assess how common is the use of antibiotics in the treatment of acute upper respiratory tract infections by primary health care providers in north of Jordan, and the appropriateness of that use. Furthermore, to assess antibiotic use in relation to patients and physician characteristics.

Methods: A cross-sectional survey was conducted among patients with acute upper respiratory tract infections attending primary health centers in Irbid governorate in north of Jordan. All patients with upper respiratory infections above the levels of the bronchioles were eligible for inclusion in this study. Accordingly, 234 patients were included. Each patient was first seen and treated by the health center general practitioner and re-examined and evaluated independently by a family medicine consultant during the same visit.

Results: The mean age of patients was 17.1 years (SD=16.4) and more than half of them (56%) were children < 15 years old. General practitioners prescribed antibiotics to 61% of the patients, and these prescriptions were inappropriate in 86% of the cases. Patients' characteristics such as age, sex and education showed no role on the antibiotic prescribing decision of their physicians.

Conclusion: Antibiotic use for upper respiratory tract infections in Jordan is common and largely inappropriate, and the characteristics of patients did not influence antibiotic prescribing by physicians. We recommend further investigations of this important issue, to find out the reasons of overusing antibiotics by physicians in these illnesses.

Keywords: Antibiotics, Upper Respiratory Tract Infections, Primary Health Care, Family Physicians, Jordan.

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Introduction

Approximately three fourths of all outpatient antibiotic prescriptions are given to treat acute

Upper Respiratory Tract Infections (URTIs).¹ The majority of visits to outpatient clinics and emergency rooms are for URTIs.^{2, 3} Given that these illnesses are mostly viral in origin, such use

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of antibiotics is considered largely inappropriate.⁴⁻⁶ Studies showed that antibiotics neither shorten the duration of illness nor prevent complications in URTIs.⁷⁻¹⁰ It has been reported that antibiotic consumption has an essential role in the development of beta- lactum- resistance pneumococcal,¹¹ and in the dissemination of Multidrug- Resistance Pneumococcal (MRP).¹² Antimicrobial resistance is a current problem globally especially in the developing countries where antibiotics are often available without a prescription,¹³ and have been described as a major threat to public health.¹⁴ Over- prescribing of antibiotics also lead to unnecessary expenditure, increase patients dependence on doctors, risks of side effects, besides development of bacterial resistance¹⁵ and this has been recognized as a global problem.¹⁶ Reports from the developing countries have also shown massive abuse of antibiotics in the treatment of URTI.^{17, 18} Because of the limited resources in these countries, the financial burden of overusing antibiotics is expected to be more severe. In Jordan, studies revealed that both antibiotics prescription^{19, 20} and self-medication^{21,22} are high.

The present study was conducted to assess the practice of antibiotics prescribing to treat URTIs in Jordan and its appropriateness. It also examines antibiotic prescribing by selected physician and patient characteristics.

Material and Methods

Study Design

This cross-sectional survey was conducted among patients with URTIs, who attended seventeen health centers in Irbid governorate in north of Jordan during a period of five months. These health centers were randomly selected using simple random sampling from the sixty centers of the district.

Study Participants

A total of 234 patients who had URTIs above the level of the bronchioles (any acute infection involving nose, paranasal sinus, pharynx, larynx,

trachea and bronchi) were included in the study and examined and evaluated by an independent family medicine consultant after being initially examined and treated by the general practitioner in the health center. This sample size was enough to detect a 60% prescription rate of antibiotics with a 95% assurance and a 6% accepted margin of error. It was also sufficient to uncover an 80% rate of inappropriate use of antibiotics with a 95% confidence and a margin of error of 5%.

Each patient was first seen and treated by the health center General Practitioner (GP), who was kindly requested to record the diagnosis, the likely cause of the illness (bacterial, viral,...etc), the case management for each individual and to fill the questionnaire that sought information about the physician and the patient. Then, each patient was re-examined independently by a family medicine consultant (First author) during the same visit who was unaware of the initial assessment. A special separate form was used to record the diagnosis, the likely cause of the illness, and whether or not the clinical condition needs antibiotic which were largely dependent on history, clinical examination and Step Score (SS) criteria (Absence of cough, fever more than 38c°, tonsilar exudates and tender anterior cervical lymphadenopathy). In the presence of the four clinical findings, the most likely diagnosis was considered bacterial and antibiotic was indicated. The presence of three clinical findings or less, the most likely diagnosis was considered viral and antibiotic was not indicated.

Ethical Concerns

The Ministry of Health in Jordan and Jordan University of Science and Technology approved the study protocol. A verbal consent for participation was obtained from the GPs and the patients. Patients and GPs were assured of the strict confidentiality of the data.

Statistical Analysis

Data entry and initial analyses were performed using the Epi 6 software,²³ while logistic regression was carried out using Epi Info 2002 statistical package.²⁴ Simple frequencies of

selected socio-demographic and clinical characteristics of patients were obtained. We also obtained the percentage of antibiotic used in the study population, as well as the percent of inappropriate use as judged by the family medicine consultant who followed the principles of judicious use of antibiotics in URTIs.²⁵ Kappa statistic was used to assess the agreements between the GPs and the family medicine consultant regarding their diagnoses and suggested causes of the illnesses and their judgments on the patients' needs for antibiotics. Chi-square test and logistic regression analyses were used to examine the unadjusted and adjusted influences of patients' and physicians' characteristics on the likelihood of prescribing antibiotics. A P-value of less than 0.05 was considered statistically significant.

Results

The age of patients ranged from 2 to 47 years with a mean of 17.1 (SD=16.4) years. About 56% of them were children below 15 years old and 62% of patients were males. The majority of the GPs (77.3%) were males and 59.1% of them aged between 30 and 44 years old. Half of the physicians have already finished 15 years or more since their graduation from medical school.

Overall, the rate of prescribing antibiotics for URTIs in this study was 61% and it did not differ by any patients' characteristics. On the other hand, the number of years in current practice was significantly related to antibiotic prescribing. Physicians with less than 5 years of practice in their current specialty were less likely to prescribe antibiotics (51.7%) than other physicians (P=0.02). However, none of the studied physicians' characteristics appeared significantly related to antibiotic prescribing in logistic regression analysis.

Table (2) shows diagnoses of patients, causes of illnesses, and the need for antibiotics as judged by the GPs and the family medicine consultant. Common cold was the most likely diagnosis by both of them although the GP was more likely to give such a diagnosis. The consultant was also more likely to consider the illness of viral etiology (82.1%) than GPs (56.8%), but the widest discrepancy between the GP and the consultant was on the judgment about the patient's need for antibiotics (60.7% vs. 8.5%, respectively), indicating a very poor agreement (kappa=0.11). Considering judgments of the GP, about 86% of the antibiotic use can be considered inappropriate.

Table (1): Distribution of study subjects and antibiotic prescribing by selected patient and physician characteristics.

<i>Variable</i>	<i>Total^a N=234</i>	<i>Prescribed antibiotics (%)</i>	<i>P-value</i>
Patient Characteristics			
<i>Age (year)</i>			
			0.28
2 – 15	131	64.1	
> 15	103	56.3	
<i>Sex</i>			
			0.49
Male	145	62.8	
Female	89	57.3	
<i>Years of education</i>			
			0.93
< 9	20	65.0	
9-12	124	60.7	
> 12	90	61.1	
Physician Characteristics			
<i>Age (year)</i>			
			0.86
< 30	10	61.5	
30 – 44	26	59.4	
≥45	8	64.1	
<i>Sex</i>			
			0.92
Male	34	63.3	
Female	10	64.3	

Years since graduation			0.94
≤ 5	10	62.3	
6 – 14	12	59.2	
≥15	22	60.9	
Years of practice			0.02
≤ 5	21	51.7	
6 – 14	10	69.0	
≥15	13	70.7	

^a Variability in totals is due to missing values

Table (2): Agreements between the general practitioners and the family medicine consultant on diagnoses, likely causes, and patients' needs for antibiotics, using Kappa.

<u>Variable</u>	<u>General practitioner n (%)</u>	<u>Family medicine consultant n (%)</u>	<u>Kappa</u>	<u>P-value</u>
Diagnosis			0.45	<0.0005
Common cold/URTI	117 (50.5)	141 (60.5)		
Pharyngotonsillitis	91 (38.9)	67 (28.8)		
Bronchitis	4 (1.7)	0 (0.0)		
Laryngitis	5 (2.1)	2 (0.9)		
Allergic rhinitis	13 (5.6)	22 (9.4)		
Other	4 (1.8)	1 (0.4)		
Likely cause of the illness			0.28	<0.0005
Virus	133 (56.8)	192 (82.1)		
Bacteria	84 (35.9)	20 (8.5)		
Other	17 (7.3)	22 (9.4)		
Patients need for antibiotics			0.11	<0.0005
Need antibiotics	142 (60.7)	20 (8.5)		
Do not need antibiotics	92 (39.3)	214 (91.5)		

Discussion

Antibiotics are frequently prescribed for the treatment of URTIs in adults and children in primary care. About 80% of all antibiotics prescribing occurs in general practice, more than 50% of this for respiratory infection and the majority of these infections do not require treatment.²⁶ Antibiotics overuse and misuse is common in both developed and developing countries and many studies in different parts of the world tackled the problem of antibiotics abuse in the treatment of URTI. Many of these studies have provided figures of the prescription rates, the amount of inappropriate use, and the particular illnesses receiving the largest amount of that overuse.

The current study showed that 61% of patients attending health centers in Irbid, northern Jordan, with infections of the respiratory tract above the level of the bronchioles, such as the common cold, pharyngitis, and bronchitis were treated

with antibiotics and 86% of such antibiotic use was unnecessary. This figure is consistent with previous studies in Jordan which revealed high antibiotic prescribing rate.^{19, 20} Antibacterial usage in 16 European countries have been reviewed by Ronnig et al.⁵ and revealed that antibiotic use was more than necessary mostly irrational and generally empirical. Other studies in China¹⁷ and Uzbekistan¹⁸ showed that antibiotic use rate for upper respiratory tract infections were very high. Scott et al.²⁷ also reported close figures on rates of antibiotic prescription and inappropriate use among patients with these illnesses.

Having only 8.5% of the patients were in need for antibiotics by the family medicine consultant, compared to 61% by GP could simply reflect differences in knowledge. However, the GPs have suggested a bacterial etiology in only 36% of the cases. Such a wide difference between the percent of patients who were prescribed to take antibiotics and the percent considered of bacterial

etiology could point to some beliefs physicians hold on a prophylactic role for antibiotics, or to other factors that influence physicians' decisions to prescribe antibiotics, such as the pressure they are having from the patients and their families.

Although, like in other studies,^{28, 29} the number of years spent in practice was found to be significantly associated with antibiotic prescribing in the bivariate analysis, this relation disappeared when logistic regression was performed. This could be due to the small number of physicians included in the study, and therefore, there was an insufficient study power to show the significance of such a relation.

The study has also shown patients' characteristics having no influence on their doctors' decisions to prescribe antibiotics. But these findings were in support of other studies. Like other reports,^{28, 30, 31} antibiotics prescription did not differ according to sex. Although children were prescribed antibiotics more often than adults (64% vs. 56%), the difference did not reach statistical significance (P=0.28). However, previous studies were also inconsistent with respect to the influence of patients' age on the decision to prescribe antibiotics.^{1, 31, 32}

In the interpretation of the study findings, one should consider that only one family medicine consultant assessed the practice of antibiotics prescription by the GPs. At least two family medicine consultants would be preferred to assure the quality and the consistency of their decisions.

In conclusion, antibiotics use for URTIs in Jordan is common and largely inappropriate. Patients' characteristics had no influence on antibiotic prescribing by physicians. We recommend further research on primary health care providers to understand the factors and reasons of overusing antibiotics in these illnesses.

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استخدام المضادات الحيوية في التهابات الجهاز التنفسي العلوي: مدى ملاءمة هذه الممارسة في الأردن

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الملخص

الهدف: أجريت هذه الدراسة لتقييم مدى شيوع استخدام المضادات الحيوية في علاج التهابات الجهاز التنفسي العلوي الحاد من قبل اطباء مقدمي الرعاية الصحية الأولية في عدة مراكز للرعاية الصحية الأولية في شمال الأردن، ومدى ملاءمة ذلك الاستخدام. وعلاوة على ذلك، لتقييم مدى تأثير خصائص الاطباء والمرضى في قرار وصف المضادات الحيوية.

طريقة الدراسة: أجريت هذه الدراسة الميدانية بين المرضى الذين يراجعون مراكز الرعاية الصحية الأولية في محافظة اربد في شمال الأردن. وكان جميع المرضى الذين يعانون من التهابات الجهاز التنفسي العلوي فوق مستوى القصبيات مؤهلين لإدراجهم في هذه الدراسة. وفقا لذلك، تم ادراج 234 مريضاً. جميع المرضى تم معاينتهم وعلاجهم للمرة الاولى من قبل الطبيب الممارس العام في المركز الصحي ومن ثم إعادة النظر وتقييمهم كل على حدة من قبل استشاري طب الأسرة وخلال الزيارة نفسها.

النتائج: كان متوسط عمر المرضى 17.1 سنة وأكثر من نصفهم (56 %) هم من الأطفال أقل من عمر 15 سنة. 61 % من المرضى المدرجين في الدراسة تم معالجتهم بالمضادات الحيوية، وكانت غير مناسبة من حيث التشخيص في 86 % من الحالات. وأظهرت الدراسة ان خصائص المرضى مثل الجنس والعمر والتحصيل العلمي ليس لها أي دور في قرار وصف المضادات الحيوية من قبل أطبائهم.

الخلاصة: استخدام المضادات الحيوية لالتهابات الجهاز التنفسي العلوي في الأردن أمر شائع وغير ملائم إلى حد كبير من حيث التشخيص، وتدلل النتائج على انه ينبغي الشروع بالمزيد من الدراسات والبرامج التعليمية، لمعرفة أسباب الإفراط في استخدام المضادات الحيوية من قبل الأطباء في هذه الأمراض والتي تشفى تلقائياً.

الكلمات الدالة: المضادات الحيوية، التهابات الجهاز التنفسي العلوي، الرعاية الصحية الأولية، طبيب الأسرة، الأردن.