Compliance with antimicrobial therapy: Evaluating the related factors

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A R T I C L E   I N F O

A B S T R A C T

Background: Uncontrolled and irrational use of antibiotics increases the rate of antimicrobial resistance and treatment failure. Compliance with antibiotics is an important indicator to show how patients use their prescribed drugs and it can explain the relationship between drug administration and treatment outcome that needs to be monitored and promoted. We decided to evaluate compliance to antimicrobial drugs in this study.

Methods: In a cross-sectional study, 100 patients referring to 4 different specialists' offices were enrolled. The rate and type of non prescribed antibiotic administration were evaluated using predesigned questionnaires. The data were analyzed by SPSS 17.0 software using descriptive statistics and chi-square test for categorical data.

Results: Our results showed that 62.4% of the study population had poor compliance and 37.6 % had good compliance with their prescribed regimen. "Feeling better "and "getting worse" on prescribed regimen were major reasons for drug discontinuation. About 70% of our study population get non prescribed antibiotic from pharmacies at least once a year. Most of the requested antibiotics were not first line options. Level of education was the only factor significantly related to the rate of patient compliance.

Conclusion: This study shows the high rate of non prescribed antibiotic administration and low rate of compliance among the study population that emerge the need for particular patient education and putting restrictive rules to bound non-prescribed and unsupervised antibiotic marketing.

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Introduction

Compliance can be best described as the correspondence between the physician's instructions for the prescribed medication and the actual time history of the patient's dosing during the prescribed regimen. Poor-compliance has major impact on clinical outcome and can cause treatment failure (1). Many factors can affect the rate of patient compliance: factors related to health care professionals such as making a caring doctor- patient relationship, patient's related factors such as age, sex and level of education and socioeconomic class, and also medication's regimen factors like complexity of drug regimen and number of drugs one should take in a day (2). Compliance may be measured either directly or indirectly. In direct measurements we usually track a metabolite or a marker in body fluids. Indirect measurements that are more frequently used are based on information provided by patients through evaluating events or circumstances that are related to compliance such as self-report, interviews, pill counts and electronic monitoring (3).

Increasing antimicrobial resistance because of improper

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use of antibiotics is a major threat to public health and is classified as national security risks in some countries (4). Antibiotics are a group of drugs that need punctual dosing and administration instructions regarding both the quantity and timing, to get the desired outcome. Prolonged intervals between doses, missing a dose or not completing the treatment course are examples of poor compliance that decrease the antibiotic inhibitory effects and its efficacy and can lead to drug resistance (5).

Based on our experience rate of antibiotic administration, both prescribed and non prescribed as well as resistance to the first line options is really high in Zabol, and because there is no data available, about the antibiotic knowledge of Zabol residents and the way they follow their doctors instructions, we decided to study the rate of compliance and it's interacting factor; hoping our results could help the authorities to improve existing situation.

Patients and Methods

This is a cross-sectional study, performed in a 5 months period from October to February 2011 in Zabol.

Patients randomly selected, for interview. Questionnaires were used as data collection tools. The questionnaires filled by a solo interviewer in either pharmacies or doctors' offices. Gynecologist, Ear-Nose-Throat (ENT), infectious disease and internal medicine, specialties were chosen because they prescribed more antibiotics.

The Questionnaires consisted of 4 different parts. First section asked about demographic information of patients such as age, sex, level of education, marital status, and number of children, home address and job. In Second part level of patient knowledge about antibiotics and their adverse effects, frequency of prescribed and non prescribed antibiotic administration in a year, the causes of irregular drug administration and treatment discontinuation, their knowledge about missed dose instruction as well as level of understanding the written orders on drugs dispensed in pharmacies, were questioned. In Third part the patient doctor relationship and its input in patient compliance with their prescribed regimen were evaluated. The questions in the last part were designed to evaluate the pharmacist roles in drug administration and patient compliance.

Rate of patient's compliance was calculated by giving scores to 5 related questions, the range of compliance was determined between -5 to +5. We calculated compliance score for each questionnaire separately. Scorers between -5 to 0 were considered as poor compliance and 0 to +5 as good compliance.

The data were analyzed by SPSS 17.0 software using descriptive statistics and chi-square test for categorical data.

Results

We included total number of 100 patients who had at least one antibiotic in their prescriptions. We analyzed 100 questionnaires and excluded 7 of them because of incomplete data. Demographic data are summarized in Table 1. The mean age of study population was 29.2 ± 8.05 years old and the median number of children for married patients was 3 children.

Frequency of antibiotic administration (prescribed or non-prescribed) in one year are shown in table 2. About 70% of our patients declared that they forgot to take their prescribed drug at least two or three times during their treatment course.

The percentage of good compliance with prescribed regimen was 37.6%. The correlation between different demographic factors and rate of compliance is showed in Table 3.

Figure 1 shows the causes of drug discontinuation. About 95 % of our study population preferred BID (two times a day) or TDS (three times a day) antibiotic regimen to other dosing regimen and 81.8% of the patients chose the oral over parenteral rout for drug administration.

Although all patients were asked to have follow up visit with their doctors, 72.7% of patients did not want to get back because of either high visiting cost (80%) or having trouble to get to the doctor office because of transportation issues (20%). Correlation between doctor's role and level of patient compliance are presented in Table 4.

Evaluation of answers about understanding of written orders in pharmacies showed that 47% did not know how to measure liquids in milliliter, 31% said they will use syringe or dropper and 23% said they will ask their doctors. As shown in figure 2, the physicians (82.8%) were the most important source of patient's medicinal information.

Metronidazol (50%), Ceftriaxone (22%), Cefexime (8.7%), Penicillines (8.3%), Azithromycin (5.5%) and Gentamycine (5.5 %) were the most requested non-prescribed antibiotics.

About 98% of our patients mentioned that no one in pharmacy had given them any instruction about drug administration and adverse effects.

Discussion

Our results showed that most of our study population had poor compliance with their prescribed antibiotic regimen.

Based on results of a literature review performed in 2002 noncompliance in short term antibiotic therapy is also common, and can lead to treatment failure, deterioration in patient condition, hospital admission and increase in direct and indirect management costs (6). Although numerous studies showed that, despite general expectation, patient compliance did not depend on patient age, gender, marital status, education, income or social class (7, 8), our results illustrated that level of education in our study population was significantly related to the level of compliance. This fact highlighted the role of

Table 1. Demographic data of study population.

Variable		Number (%)
Sex	Female	62 (66.7%)
	Male	31 (33.3%)
Marital Status	Single	21 (22.6%)
	Married	72 (77.4%)
Education	Illiterate	7 (7.6%)
	Elementary	16 (17.4%)
	Diploma	50 (54.3%)
	Bachelor	19 (20.7%)
Occupation	Self-employed	37 (40.7%)
	Government employee	27 (29.7%)
	Housekeeper	26 (28.6%)
	Unknown	2 (-)
Habitation	Urban	52 (55.9%)
	Rural	41 (44.1%)

Table 2. Rate of antibiotic administration in a year.

Antibiotic consumption in year		Number of patients (%)
Prescribed	None	11 (11.8%)
	One time	49 (52.7%)
	Twice	22 (23.7%)
	Three time or more	9 (9.7%)
Non prescribed	None	23 (24.7%)
	One time	32 (34.4%)
	Twice	29 (31.2%)
	Three time or more	7 (7.5%)

might not have correct understanding about clinical course of diseases and required length of treatment, and they judge, just based on the subjective symptoms, therefore incomplete treatment course is an important reason of high rate of treatment failure with first line antibiotics in this region, that should be considered .

Change in dosing regimen during treatment course is also common (11). The problem is that sometimes both patients and doctors are unaware about wrong administered dose. Based on our experience, patients may not have correct understanding of written orders on drug labels and hesitate to ask; this can lead to getting a wrong dose, and affect their compliance indirectly. It emphasizes the importance of in person patient education either in pharmacies or in doctors' offices.

Follow up doctor's visit can help monitoring drug administration and promoting patients compliance, but unfortunately patients usually do not agree to get back on predefined appointments, generally because of financial

public education in our study population as a potential way to increase rate of compliance.

Although there is limited information about the pattern of antimicrobial resistance in this region, evidence from other parts of our country revealed high rate of resistance to standard treatments (9, 10). Different mistakes made by people in antimicrobial administration could be a potential cause. One of the most common mistakes in drug administration affecting rate of compliance in our subjects, was incomplete treatment course, either because of feeling better or getting worse after taking first few doses. This fact shows that this group of patients usually

Table 3. Relationship between demographic variables and rate of compliance.

| Variable		Good compliance	Poor compliance	P-value*
Sex	Woman	22	40	0.545
	Man	13	18	
Marital Status	Single	8	13	0.96
	Married	27	45	
Education	Illiterate	7	16	0.006**
	Elementary			
	Diploma	14	36	
	Bachelor	13	6	
Occupation	Self-employed	14	23	0.174
	Government employee	14	13	
	Housekeeper	7	19	
Habitation	Urban	22	30	0.295
	Rural	13	28	

* The result of chi-square test
** Significant p value

Table 4. Relationship between doctor's patient education and rate of compliance.

Doctor patient education	Good Compliance N (%)	Poor Compliance N(%)	P value*
yes	11 (37.9%)	10 (20.8%)	
no	4 (13.8%)	5 (10.4%)	
Somehow	14 (48.3%)	33 (68.8%)	0.187
Total number	29 (100%)	48 (100%)	

* The result of chi-square test
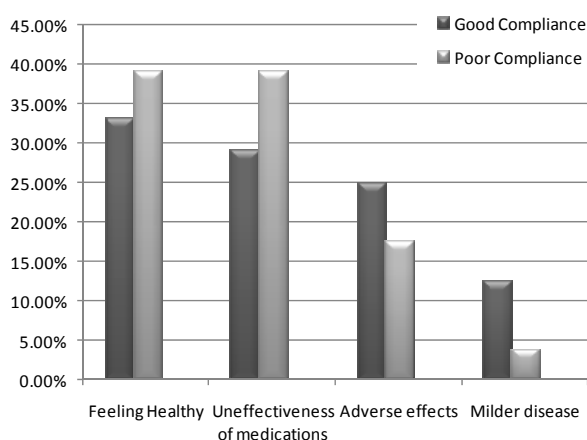
Figure 1. Causes of drug discontinuation.
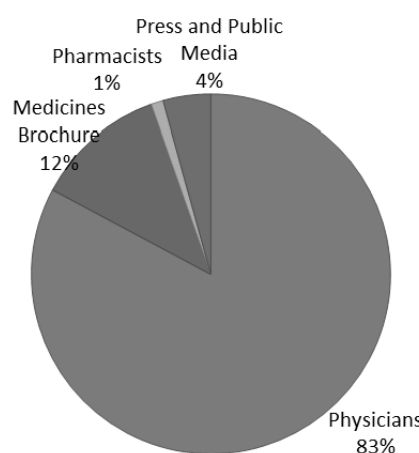
Figure 2. Source of patients medical information.

problems. Better coverage of medical services for low-income patients by insurance companies, could be a solution for this problem.

Annual reports of food and drug organization show that antibiotics are one of the most utilized drugs in our country. Our results showed high rate of non prescribed antibiotic administration. When we asked about antibiotics that are usually requested by people, we noticed that those should be saved for resistant pathogens such as third generation of cephalosporins are bought without prescriptions regularly. For example no one mentioned amoxicillin as his or her requested drug. It is another factor that increases antimicrobial resistance and reduces the number of effectinve treatment options. Unlimited selling of antibiotics in pharmacies because of financial advantage is a known provoking factor that emphasizes the need for putting restrictive rules on antibiotic marketing.

Role of pharmacist in patient education as a member of healthcare team was another factor evaluated in this study. Over the past 40 years, the pharmacist's role has changed from that of compounder and dispenser to one of "drug therapy manager" and nowadays they have proven role in patient care and promoting their compliance all over the world (12, 13) but our results showed that, most of our

study subjects were not familiar with pharmacist and the services they are supposed to provide, they were not even able to distinguish pharmacist in pharmacies from other staffs; people often recognize pharmacies as a place for selling drugs not a place for patient care.

Against what we predicted the majority of our study populations expressed that they prefer taking oral antibiotics, considering the risks of parenteral rout of drug administration, it is another point that need to be noticed by prescribers. Although there is strong casual relationship between compliance with doctor's instructions and treatment outcome (14), our opponent results showed that our doctors rarely use techniques that effectively improve compliance during antibiotic therapy. Finally, it should be declared that poor compliance with antibiotic regimen is more frequent than presumed in this region, considering its relation with emerging resistant organisms, researches aim at gaining better understanding of the determinants of the compliance should be considered as an essential topic.

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