

## Misuse of Antibiotics Therapy in General Population of Saudi Arabia

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### ABSTRACT

**Background:** The misuse of antibiotic treatment is an important cause of emerging bacterial resistance. Taking antibiotics without prescription through self-medication, friends or relative opinions, or pharmacist advice is a very common behavior in the developing countries.

**Methods:** The sample was selected from the most important and most populated area in Saudi Arabia (Riyadh region). The data were collected through self-administered questionnaires for educated participants and with interviewers for non-educated participants. The participants were selected randomly from outpatient attendants of hospital and health centers. The data were analyzed using SPSS software program, with descriptive and inferential statistics. **Results:** The response rate was 96% with mean age of  $32 \pm 12.79$  years, ranging from 14 – 80 years. Male subjects were a little more than females. Most of these subjects were university students. About 73% were not health staff and approximately 70% of subjects reported that they had health insurance. Most subjects (65.7%) took the antibiotics based on specialist prescription. For those who took their drugs without prescription, around 67.2% reported that was because they used it before. Following doctor's instructions about the time of taking the drug was reported by 80.3% of subjects. Following doctor's instructions regarding the appropriate dose was reported by 88% while, taking all the prescribed doses was only reported by 56% of the subjects. Significant association was found between health insurance and the way the subjects take their drug. Also, significant associations were found between education and income with following the doctor's instruction regarding taking all doses.

**Conclusion:** Misuse of antibiotic is still higher. There is extremely need for public educational programs in addition to application of the laws.

**Keywords:** Education, Antibiotics, Misuse, Community, Saudi Arabia

### INTRODUCTION

Antibiotics are the most commonly used drugs globally and especially in low income countries where infectious diseases are prevalent health problems. The misuse of antibiotic treatment is an important cause of emerging bacterial resistance<sup>(1)</sup>. Ecological studies have found bacterial resistance strongly related to the magnitude of antibiotics sale. The common practices of antibiotics misuse include incomplete regime of treatment, non-compliance with instructions of antibiotic use, and taking antibiotics without physician consultation<sup>(2)</sup>. Taking antibiotics without prescription through self-medication, friends or relative opinions, or pharmacist advice is a very common behavior in the developing countries<sup>(2)</sup>.

Self-medication is a prevalent practice in countries such as Sudan, Ethiopia, Pakistan, Yemen, Saudi Arabia, Jordan, and Brazil<sup>(3-8)</sup>. In addition, some developed countries in name Spain, United States, and Russia reported high rates of inappropriate antibiotic use. This worldwide occurrence of this problem requires large scale studies that investigate roots, causes and consequences of antibiotic misuse. One of the important causes of this problem is lack of health insurance which make patients try to avoid the physicians' bills and conduct self-medication<sup>(6)</sup>.

In UAE, about two thirds of antibiotics sale on over-the counter (OTC) basis, in Egypt it is even worse with 86.4% of antibiotics are sold OTC<sup>(9,10)</sup>. In Saudi Arabia, despite the continuous educational efforts, number of antibiotics dispensing OTC are elevated in the last years. Although, the Saudis authorities prohibited sale of antibiotics without prescription since 1972, this malpractice is increasing. This study aims to evaluate the misuse of antibiotics among general population in Saudi Arabia.

### METHODS

This is a cross-sectional study included 534 study participants, according to the sample size calculation at 95% confidence interval, 0.50 expected proportion, and 0.07 for standard error. The sample was selected from the capital city area in Saudi Arabia (Riyadh region). and then the sample was stratified according to the size of population in each area. The data were collected through self-administered questionnaires for educated participants and with interviewers for non-educated participants. The participants were selected randomly from outpatient attendants of hospital and health centers. The questionnaire had two sections, section A for demographic data and section B for data about malpractices in antibiotic use. Written consents were obtained from study

subjects before participation. The data were analyzed using SPSS software program, with descriptive and inferential statistics. Chi-square test was used for the association between demographic variables and malpractice questions. P value < 0.05 was considered significant. The study was done after approval of ethical board of Security Force Hospital.

**The study was done after approval of ethical board of King Abdulaziz university.**

## RESULTS

Out of 534 distributed questionnaires, 514 subjects agreed to participate and signed the consent forms while, 20 subjects refused. The response rate was 96% with mean age of  $32 \pm 12.79$  years, ranging from 14 – 80 years. Some responses were missing and were not included in the analysis. Details about the distribution of subjects according to the demographic variables and study questions are presented in Table 1. Male subjects were a little more than females (55.1% and 44.9%, respectively).

Most of these subjects were university students and the least were with primary (2.7%) or doctorate (2.3%) education. Regarding income, about one third of subjects had less than 2000 SR per month while the remaining subjects were approximately equal in percentages for the subscales of the income category. About 73% were not health staff and approximately 70% of subjects reported that they had health insurance while, 30% reported not. Regarding responses of the subjects to the malpractice of antibiotics, about half of subjects (48.7%) reported that they took antibiotics more than three months ago while, 27.7% took their antibiotics the last month. Most of subjects took the antibiotics for influenza, toothache, or sore throat. In general, most subjects (65.7%) took the antibiotics based on specialist prescription. For those who took their drugs without prescription, around 67.2% reported that was because they used it before, while 8.2% was

because of the low economic status and in 4.5% was because that they had not health insurance. Almost half of subjects (48.8%) took their drug for 4-7 days. Following doctor's instructions about the time of taking the drug was reported by 80.3% of subjects. Following doctor's instructions regarding the appropriate dose was reported by 88%, while taking all the prescribed doses was only reported by 56% of the subjects. More than half of subjects (58.4%). reported that the instructions of antibiotics use was received from specialists while, 25% from pharmacist. Source of antibiotics was the pharmacy as reported by 88.6%, from friends and relatives by 4.1%, available at home by 5%, and from other sources by 2.3% (Data not shown).

As shown in Table 2, the majority of subjects took their drug based on specialist, following by their own opinion, or pharmacist. The least were by friends or relatives, nurse, or others. Chi-squared test between demographic variables and the way the subjects taking their drug revealed no significant associations for all variables except for health staff ( $P < 0.005$ ). In this regard, 24.8% of the health staff took their antibiotics based on their own opinion while, none of them relied on nurses or friends' opinions. As presented in Table 3, no significant associations were found regarding following the doctor's instructions about the time of taking the drug. Similarly, no significant associations were found regarding following the doctor's instructions about doses of the drug. However, taking all the prescribed doses had significant association with education and income ( $P < 0.005$ , and  $P < 0.01$ , respectively).

Only 36.1% of subjects with postgraduate study did not complete all doses while, 40.5% of subjects with secondary education or less did not complete all doses. With regard to income, 66% of subjects who had > 10000 SR completed all doses, followed by subjects with income > 2000 and < 6000 SR (63.2%), and finally subjects with income < 2000 SR (47.5%).

Table (1) General characteristics of study participants			
<b>Gender (N= 514)</b>	Male	283	55.1
	Female	231	44.9
<b>Education (N= 512)</b>	Primary	14	2.7
	Intermediate	34	6.6
	Secondary	126	24.6
	University student	193	37.7
	Bachelor	113	22.1
	Master	20	3.9
	Doctorate	12	2.3
<b>Income (N= 481)</b>	< 2000	163	33.9
	2001-6000	120	24.9
	6001-10000	98	20.4
	> 10000	100	20.8
<b>Health staff (N= 507)</b>	Yes	137	27.0
	No	370	73.0
<b>Health insurance (N= 511)</b>	Yes	153	29.9
	No	358	70.1

**Table 2: Distribution of the responses of taking antibiotics according to the sample characteristics**

		You took the antibiotics based on						P
		Specialist	Nurse	Pharmacist	Friends or relatives	My opinion	Others	
<b>Gender (N= 514)</b>	Male	194	3	34	7	38	1	0.164
		70.0%	1.1%	12.3%	2.5%	13.7%	0.4%	
	Female	137	5	36	3	44	2	
		60.4%	2.2%	15.9%	1.3%	19.4%	0.9%	
Total	331	8	70	10	82	3		
	65.7%	1.6%	13.9%	2.0%	16.3%	0.6%		
<b>Education (N= 512)</b>	Secondary or less	119	5	25	5	15	1	0.051
		70.0%	2.9%	14.7%	2.9%	8.8%	0.6%	
	University student	114	2	28	5	38	1	
		60.6%	1.1%	14.9%	2.7%	20.2%	0.5%	
	Postgraduate	97	1	16	0	29	1	
67.4%		0.7%	11.1%	0.0%	20.1%	0.7%		
Total	330	8	69	10	82	3		
		65.7%	1.6%	13.7%	2.0%	16.3%	0.6%	
<b>Income (N= 481)</b>	< 2000	102	2	24	2	30	1	0.817
		63.4%	1.2%	14.9%	1.2%	18.6%	0.6%	
	2001-6000	82	2	12	2	19	0	
		70.1%	1.7%	10.3%	1.7%	16.2%	0.0%	
	6001-10000	67	3	10	3	10	1	
		71.3%	3.2%	10.6%	3.2%	10.6%	1.1%	
> 10000	64	1	13	2	19	0		
	64.6%	1.0%	13.1%	2.0%	19.2%	0.0%		
Total	315	8	59	9	78	2		
		66.9%	1.7%	12.5%	1.9%	16.6%	0.4%	
<b>Health staff (N= 507)</b>	Yes	83	0	16	0	33	1	0.004
		62.4%	0.0%	12.0%	0.0%	24.8%	0.8%	
	No	245	8	54	10	46	1	
		67.3%	2.2%	14.8%	2.7%	12.6%	0.3%	
Total	328	8	70	10	79	2		
	66.0%	1.6%	14.1%	2.0%	15.9%	0.4%		
<b>Health insurance (N= 511)</b>	Yes	99	2	15	4	31	2	0.206
		64.7%	1.3%	9.8%	2.6%	20.3%	1.3%	
	No	230	6	55	6	51	1	
		65.9%	1.7%	15.8%	1.7%	14.6%	0.3%	
	Total	329	8	70	10	82	3	
		65.5%	1.6%	13.9%	2.0%	16.3%	0.6%	

**Table 3:** Distribution of the responses following the doctor's instructions about time, dose, and taking all doses of antibiotics according to the characteristics of the sample

		Time of antibiotic		Sig.	Dose of antibiotic?		Sig.	Take all doses		Sig.
		Yes	No		Yes	No		Yes	No	
<b>Gender (N= 514)</b>	Male	218	57	0.572	242	30	0.476	150	129	0.252
		79.3%	20.7%		89.0%	11.0%		53.8%	46.2%	
	Female	181	41		192	29		133	93	
		81.5%	18.5%		86.9%	13.1%		58.8%	41.2%	
	Total	399	98		434	59		283	222	
		80.3%	19.7%		88.0%	12.0%		56.0%	44.0%	
<b>Education (N= 512)</b>	Secondary or less	134	34	0.215	142	22	0.119	103	70	0.004
		79.8%	20.2%		86.6%	13.4%		59.5%	40.5%	
	University student	144	42		160	26		87	99	
		77.4%	22.6%		86.0%	14.0%		46.8%	53.2%	
	Postgraduate	120	21		131	10		92	52	
		85.1%	14.9%		92.9%	7.1%		63.9%	36.1%	
	Total	398	97		433	58		282	221	
		80.4%	19.6%		88.2%	11.8%		56.1%	43.9%	
<b>Income (N= 481)</b>	< 2000	131	28	0.459	139	20	0.075	76	84	0.010
		82.4%	17.6%		87.4%	12.6%		47.5%	52.5%	
	2001-6000	90	25		102	11		74	43	
		78.3%	21.7%		90.3%	9.7%		63.2%	36.8%	
	6001-10000	74	20		77	15		51	44	
		78.7%	21.3%		83.7%	16.3%		53.7%	46.3%	
	> 10000	85	14		95	5		66	34	
		85.9%	14.1%		95.0%	5.0%		66.0%	34.0%	
	Total	380	87		413	51		267	205	
		81.4%	18.6%		89.0%	11.0%		56.6%	43.4%	
<b>Health staff (N= 507)</b>	Yes	105	25	0.809	116	13	0.414	72	60	0.753
		80.8%	19.2%		89.9%	10.1%		54.5%	45.5%	
	No	288	73		313	46		206	161	
		79.8%	20.2%		87.2%	12.8%		56.1%	43.9%	
	Total	393	98		429	59		278	221	
		80.0%	20.0%		87.9%	12.1%		55.7%	44.3%	
<b>Health insurance (N= 511)</b>	Yes	122	28	0.731	129	19	0.644	79	71	0.317
		81.3%	18.7%		87.2%	12.8%		52.7%	47.3%	
	No	276	69		304	39		203	150	
		80.0%	20.0%		88.6%	11.4%		57.5%	42.5%	
	Total	398	97		433	58		282	221	
		80.4%	19.6%		88.2%	11.8%		56.1%	43.9%	

## DISCUSSION

The aim of this study was set to evaluate the misuse of antibiotics among representative sample of Saudi population. Riyadh city is the capital of Saudi Arabia; it contains a lot of people from approximately all regions of the country. In this country as in many other developing countries, pharmacies and supermarkets are dispensing drugs without prescription<sup>(11)</sup>. It has been reported that self-prescribed drugs or self-medication is more prevalent in developing countries<sup>(11-13)</sup>. The reasons for that might related to the availability of most kinds of drugs as over-the-counter (OTC) in pharmacies and supermarkets. Another reason might be the economic status of individuals as prescription of drugs by specialist will definitely

cost the patients more to pay. In addition, the lack of rules and punishment and periodic investigation and monitoring may lead to such illegal sale of the drugs. In the current study, the sample comprised different individuals with different characteristics which sufficiently reflects the characteristics of the target people in real. Health insurance in this country does not cover all people, it is limited to employees or those who pay annually for insurance companies<sup>(12)</sup>. This might also be one of the reasons that lead patients to seek for drugs directly from pharmacies without prescription. Taking the antibiotics by subjects was based mostly on specialist (65.7%) while, 34.3% of the drugs were self-prescribed either by pharmacist, friends or relatives, own opinion, or others. This

result is more than that observed by **Mossa *et al.***<sup>(14)</sup> in Ethiopia, in which the authors found 14.8% of self-medicated drugs with 6.7% related to antibiotics. It is also more than that observed by **Widayati *et al.***<sup>(15)</sup> who found 7.3% self-medication among the surveyed Indonesian population. However, this result is less than that observed by **Awad *et al.***<sup>(3)</sup> in Sudan, **Abasaheed *et al.***<sup>(16)</sup> and **Dameh *et al.***<sup>(17)</sup> in United Arab Emirates, **Sabry *et al.***<sup>(18)</sup> and **El-Nimr *et al.***<sup>(10)</sup> in Egypt, and some other previous studies conducted in Saudi Arabia in different areas<sup>(19-23)</sup>. The result is close to that found in Jordan by **Al-Azzam *et al.***<sup>(7)</sup>. These large variations between studies might be related to the different areas and the different characteristics of the included samples. No significant association was found between self-medication of drug and gender, education, income, and health insurance. However, a significant association was found between self-medication and occupation where the subject was asked if he/she is a member of health staff. The result related to gender is similar to that found by **Abasaheed *et al.***<sup>(16)</sup>, while it is no consistent with that observed by some previous studies<sup>(3, 10, 17)</sup>. Occupation was found significant with self-medication in the study of **El-Nimr *et al.***<sup>(10)</sup> among Egyptian population which is similar to the result of this study. Health insurance, in contrast with this study, was found significant with self-medication among Indonesian subjects in the study conducted by **Widayati *et al.***<sup>(15)</sup>.

Influenza, toothache, and sore throat were the most reported diseases led participants to seek for self-medication. This is similar to some previous studies<sup>(24, 25)</sup> where these and some other diseases were reported with some difference in ranking. About two thirds of the respondents reported that the reason for self-prescription of the antibiotic was a previous experience of using the same drug. This is consistent with the study of **Wadayati *et al.***<sup>(15)</sup>, in which 54% of subjects who used self-medications reported that the reason was previous experience. This is a critical indicator of antibiotic malpractice because it might increase the possibility of bacterial resistance to drugs<sup>(26)</sup>. Duration of using the antibiotics was 4-7 days (48.8%), followed by 1-3 days (39.2%). Incomplete using of the drug is another malpractice of using drugs and may lead to recurrence of the case which in turn will lead the patient to change for another type of antibiotic. More than half of the respondents in the current study reported that they purchased their self-medications from pharmacies. Indeed, this is another health problem of drug malpractice. **Al-**

**Mohamadi *et al.***<sup>(20)</sup> in 2013 in Saudi Arabia conducted a survey among pharmacists to evaluate their responses to self-medication. It was found that 97.9% dispensed the requested drugs immediately. The reason for that as it was reported was if they (pharmacists) did not dispense the drug the others would do. Another study conducted in Saudi Arabia in Makka by **Al-Qasimi and Mohamed**<sup>(27)</sup> revealed that 100% of the surveyed pharmacies dispensed antibiotics without prescription. The first source of self-prescribed antibiotics was pharmacy (88.6%). This is an additional evidence of malpractice of pharmacies which alarming the need of applying the laws in this regard. Most of the self-prescribed antibiotics were Augmentin, Amoxicillin, and Cephalosporin. This result comes in the same line with some other studies<sup>(3, 16, 28, 29)</sup>. The significant association between education and income with the question related to taking all doses reflect the effect of education in following the doctor's instructions. The economic level, on the other hand, reflect the ability of individual to taking all doses as having all doses means to get more drugs and this will cost more. A systematic review for the published articles from 2002 to 2015 regarding malpractice of antibiotic among Saudi population revealed high prevalence of misuse ranging from 41%-92% particularly among children<sup>(30)</sup>. This is a complex multifactorial issue including culture and behavioral characteristics of individuals, socioeconomic factors, and education level.

## CONCLUSION

The prevalence of antibiotic misuse is still alarmingly high. Activation of laws is highly recommended to prevent pharmacies to dispense antibiotics without prescription and to prevent supermarket to dispense antibiotics as OTC drugs. In addition, the application of public educational programs using all social medias are highly needed to present and explain the dangers of drug malpractice and self-medication.

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## CONFLICT of interests

The authors declared no conflict of interests.

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