PATTERN OF SELF-MEDICATION WITH ANTIBIOTICS IN KHARTOUM STATE, SUDAN

Arwa H. A.Elhada*[1], Idris B. Eltayeb[2], Mahmoud M. E. Mudawi[3,4]

[1]Department of Clinical Pharmacy, Faculty of Pharmacy, Omdurman Islamic University, Sudan.
[2]Department of Pharmacology, Faculty of Pharmacy, University of Khartoum, Sudan.
[3]Department of Pharmacology and Toxicology, Faculty of Pharmacy, Northern Border University, KSA.
[4]Department of Pharmacology, Faculty of Pharmacy, Omdurman Islamic University, Sudan.

*Correspondence for Author

Arwa H. A.Elhada

Department of Clinical Pharmacy, Faculty of Pharmacy, Omdurman Islamic University, Sudan.

ABSTRACT

Aim: Self-medication is becoming a field of interest for research, but yet no much data are currently available about its major determinants. This study was aimed at determining the proportion of general population who practice self-medication with Antibiotics, the type of Antibiotic employed and the reasons for resorting to self-medication with Antibiotics.

Methods: This cross- sectional survey used a pre-tested questionnaire to collect data from a sample of 442 adult persons, selected from the seven provinces of Khartoum State, Sudan, using a multistage stratified clustered sampling.

Results: A total of 442 questionnaires were analyzed. The prevalence of self-medication with antibiotics during the 6 month prior to the study was 41%. Amoxicillin was the most popular (38%) antibiotic for self-medication besides erythromycin, tetracycline, and ciprofloxacin to treat the following symptoms: cough and sore throat, common-colds, skin infections, gastrointestinal infections and urinary tract infections with the length of use was mostly less than five days. Pharmacies were the most common source of antibiotics used for self-medication (72%). Previous experience was reported to be the main reason for using non-prescribed antibiotics (50%). There were no socio-demographic variables significantly associated with the actual practice of using non-prescribed antibiotics. However, health insurance, marital status, occupation and level of education were significantly associated with the intent to self-medicate with antibiotics (p < 0.05). Having no health insurance, being

single, is associated with the intent to self-medicate with antibiotics. It's surprising that despite being educated, most of those who self-medicated were university graduates and university students.

Conclusion: Given the findings, factors influencing people's intentions to self-medicate with antibiotics are required to be investigated to better understand such behavior. Impact of health insurance coverage on self-medication with antibiotics should also be further investigated.

KEY WORDS: Self-medication, antibiotics, Amoxicillin, cough.

INTRODUCTION

Self-medication is defined as the use of drugs to treat self-diagnosed disorders or symptoms or the intermittent or continued use of prescribed drugs for chronic or recurrent disease or symptoms [1].In developing countries most illness are treated by self-medication. Developing countries such as Sudan, Jordan, Trinidad and Tobago [2-6] as well as developed countries like Spain, Greece, Russia, Romania, USA, Italy and Malta [7-13] are experiencing self-medication and irrational use of Antibiotics in their communities. Self-medication with antibiotics may be a threat to the individual who practiced it as well as to the whole community [2]. Problems related to self-medication with antibiotics in the developing countries, are complex because they are related to other issues, such as poverty, lack of access to medicines and information regarding medicines, poor quality of health care facilities, and most importantly weak implementation of regulation related to medicines [14]. For example, many studies showed that limited purchasing power is a major determinant for self-medication with antibiotics among the population in India, Nigeria, the Philippines, Latino adults in the United States of America, and the non-Arab population in the United Arab Emirates [15-19]. Reasons for self-medication vary between societies, cultures, and types of health services [20]. Studies revealed that the increase in self-medication was due to numerous factors. These included socioeconomic factors, lifestyle, ready access to drugs, the increased potential to manage certain illnesses through self-care, and that medicinal products are greatly available [21]. Self-medication may be practiced as a consequence of ignorance, poverty and in availability of health facilities [1]. It has been pointed that the main reason for self-medication as reported by the participants was their previous experience on the efficacy of treatment [3]. People tend to diagnose and treat themselves and think that they are having the right drug for the right condition. Another study remarked that reasons cited by patients for practicing self-medication included expediency, convenience, efficacy of medicines,

dependability of supply, and cost reduction [22]. It is stated that cost of treatment may have a negative effect on health and that many individuals self-medicate to avoid the long waiting times in facilities and due to inaccessibility of health facilities, cost, and a feeling that the ailment is minor [23].

People believed that physician visits for a diagnosis and prescription were unnecessary when the patient was familiar with the symptom and it had previously responded to antibiotic treatment [18]. Community members who practiced self-medication with prescription drugs got their medicines over-the-counter from community pharmacies and patent medicine stores [23]. Pharmacy staff behavior can be a factor that puts patients at risk for self-medication with antibiotics. Community pharmacies are failing their tasks in enhancing rational use of antibiotics. Such a practice may be a consequence of weak enforcement and control over the legislation and professional standards [24]. Antibiotics are frequently purchased without proper indication, in insufficient quantities, or when contraindicated. Approximately two-thirds of all oral antibiotics worldwide are obtained without a prescription and are irrationally used for diseases such as tuberculosis, malaria, and pneumonia and for mild childhood infections [10]. In Bavi, Vietnamese children were treated with antibiotics frequently by caregivers without physician consultation, which resulted in multi-drug-resistant strains (MDR) among respiratory pathogens [25]. Physician's unnecessary prescribing of Antibiotics tends to encourage self-medication. Moreover, the example of doctors' prescriptions seems to encourage the choice for expensive, often dangerous, symptomatic therapy in self-medication [17].A major shortfall of self-medication is that there is no clinical evaluation of the condition by a trained medical professional which could result in missed diagnosis and delay in appropriate treatment. (Grigoryan*et al*.,2007) highlighted that self-medication with antibiotics may lead to choosing non suitable antibiotics, using insufficient dosages or unnecessary therapy and that this inappropriate use increases the risk of selection of resistant bacteria and may contribute to antibiotic resistance [11].

The world Health Organization (WHO) [26] states that self-medication may result in certain potential risks for the individual consumer such as incorrect self-diagnosis, failure to seek appropriate medical advice promptly, failure to recognize special pharmacological risks, rare but severe adverse effects, failure to recognize or self-diagnose contraindications, interactions, warnings and precautions, failure to recognize that the same active substance is already being taken under a different name (different brands may have the same active

ingredient), failure to report current self-medication to the prescribing physician (risk of double medication or harmful interaction), failure to recognize or report adverse drug reactions, incorrect route or manner of administration, inadequate or excessive dosage, excessively prolonged drug use and incorrect choice of therapy. For example, viewing the likelihood of viral origin of respiratory complaints and the resistance of intestinal pathogens, most antibiotic use was probably unnecessary or ineffective [27]. The rates of antibiotic prescribing for upper respiratory tract infections (URTIs) remain extremely high although the majority of these illnesses are viral infections. This may imply that one of the triggers for using self-medication by people can be a past experience with prescribed use of antibiotics [11].

Treatment failures will lead to longer periods of infectivity, and hence increase the numbers of infected people moving in the community thus the general population will be exposed to the risk of contracting a resistant strain of bacteria [28]. A major problem of self-medication with antibiotics is the emergence of resistance of human pathogens [1]. The main reasons for the observed increase in resistance are the high frequencies of uncontrolled and excessive antibiotic use [10]. It is widely believed that human malpractices such as inadequate dosing, incomplete courses and indiscriminate drug use have contributed to the emergence and spread of antimicrobial resistance. The consequence of this is the loss of relatively cheap drugs that will require new drugs development which will be more expensive and will further disadvantage patients in developing countries [1]. Antibiotics use and consumption are determinants for the emergence of bacterial resistance to Antibiotics [19]. Developing countries are currently experiencing antimicrobial resistance as antibiotics are often available without prescription [2]. The rational use of drugs like antibiotics is thus of utmost importance to limit the increase in bacteria resistance. Prudent use of antibacterial drugs, using the appropriate drug at the appropriate dosage and for the appropriate duration—is one important means of reducing the selective pressure that helps resistant organisms emerge. The other vital aspect of controlling the spread of multidrug-resistant organisms is providing sufficient personnel and resources for infection control in all healthcare facilities [29]. Disregarding the problem of antibiotic resistance leads to unfavorable medical consequences substantial ecological and economic consequences [10]. The underlying motivation for this study is the prevailing health issues associated with inappropriate use of Antibiotics, which is increasingly becoming a challenge in Sudan. This study was designed to determine the

proportion of general outpatients who self-medicate with Antibiotics, types of Antibiotics used and the reasons for resorting to self-medication.

Objectives

The aim of this study is to determine whether antibiotics are used for self-medication in Khartoum State, and to evaluate factors associated with self-medication.

MATERIALS AND METHODS

Study design

This study was a community based cross-sectional survey carried out with self-administered questionnaires. The study was based on the data collected from October 2011 to May 2012.

Study site

This study was conducted in Khartoum State, Sudan. Khartoum State covers an area of 28,000 square kilometres. Khartoum State consists of 7 provinces namely Khartoum province, Gabal Awlia province, Omdurman province, Ombadda province, Karrari province, Khartoum North province and Eastern Nile province. Each province includes several neighbourhoods. Each neighbourhood consists of several households

Study population

This study was carried among the general population of Khartoum State. Khartoum state has a total population of 6,925,989 according to census of 2008.

Sample size calculation

The minimum sample size for this study was determined using the formula:

$$n = z^2 pq / d^2$$

Where n = minimum sample size z = 1.96 at 95% confidence interval obtained from standard statistical table of normal distribution p = estimated prevalence of non-adherence in a given population (obtained from a pilot test of 40 participants which was found to be 45%)q = precision i.e. prevalence of adherence in a given population (1 − p) d = margin of error (0.05), minimum sample size was found to be 380.

Ethical consideration

This work was approved by the University of Khartoum Ethical Committee.

Data collection

Within each province, each neighbourhood was given a number and then a number representing the neighbourhood was chosen by the Random Number Generator. Each neighbourhood consists of several households. From each of the selected household, individuals were contacted and given explanation about the purposes of the research. Verbal consent to participate in the study was sought during this initial contact. Self-administered, structured pre-tested questionnaires were distributed to the individuals who agreed to take part in the study by well-trained data collectors. The questionnaire was pre-tested for content and design on 40 individuals. By the end, data from 442 participants was collected.

Data Analysis

Data was entered into the Statistical Package for Social Sciences (SPSS) and descriptive analysis was conducted. Microsoft Excel was also used to aid in data analysis. Prevalence of self-medication in the community with antibiotics was presented using frequency tables and figures.

RESULTS

Association between self-medication according to patient's characteristics

There were 442 respondents, aged above 18 years. There were 224(51%) males and 218 females (49%). 282 were married (41%) while 232 (51%) were single, 16 (3%) were divorced and 12(2%) were widowed 17 (3%) Of the respondents had post graduate education, 214 (49%) were university graduates, 91 (20%) had high school education, 68 (15%) had primary school education and 52 (11%) were illiterate. Of the 442 respondents 68 (15.4%) lived in Khartoum province, 61 (13.8%) in Omdurman province, 64 (14.5%) in GabalAwlia province, 62 (14%) in Ombadda province, 61 (13.8%) in Karrari province, 60 (14%) were from Eastern Nile and 64 (14.5%) lived in Khartoum North. 206 (46%) had health insurance while 236 (54%) had not. Of the respondents,57(13%) were employees,72 (16%) were self-employed, 9 (2%) were professionals, 2 (0.5%) were retired, 140 (33%) were students, 64 (15%) were unemployedand 90 (20.4%) were labourers. 98 (22%) of the respondents had a monthly income of less than 100 SDG (Sudanese Gunah), 126 (29%) had a monthly income of 100-250 SDG, 124 (28%) had a monthly income of 250-500 SDG, 67 (15%) had a monthly income of 500-1000 SDG and only 27 (6%) had a monthly income of greater than 1000 SDG as shown in table (1).

Table 1: Age of those who self medicated

Respondent characteristic	self-medicated	non self-medicated	Total	P value
Age				**0.056**
< 25	69 (15.60%)	91 (20.63%)	160(36%)	
25-39	66 (14.96%)	117 (26.53%)	183(41%)	
40-59	39 (8.84%)	48 (10.88%)	87 (20%)	
> 60	6 (1.36%)	5 (1%)	11(2%)	
Total	**180 (40.8%)**	**261(59.2%)**	**441(100%)**	
Missed			**1**	

The prevalence of self-medication was found to be inversely proportional to age. It was highest among those aged between 18 to 24 years.

Table 2: Gender of those who self medicated

Respondent characteristic	self-medicated	non self-medicated	Total	P value
Gender				**0.470683**
Males	88 (20%)	136 (31%)	224(51%)	
Females	93 (21%)	125 (28%)	218(49%)	
Total	**181 (41%)**	**261 (59%)**	**442(100%)**	

Self-medication was slightly higher among females.

Table 3: Marital status of those who self-medicated

Respondent characteristic	self-medicated	non self-medicated	Total	P value
Marital Status				**0.009743**
Single	101 (23%)	131 (30%)	232(51%)	
Married	68 (15%)	114 (26%)	182(41%)	
Divorced	6 (1%)	10 (2%)	16(3%)	
Widowed	6 (1%)	6 (1%)	12(2%)	
Total	**181 (40%)**	**261 (60%)**	**442(100%)**	

The majority of those who self-medicated were single.

Table 4: Occupation of those who self medicated

Respondent characteristic	self-medicated	non self-medicated	Total	P value
Occupation				**0.0075**
Employee	23(5%)	34(8%)	57(13%)	
Self Employed	27(6%)	45(10%)	72(16%)	
Professional	7(2%)	2(0%)	9(2%)	
Retired	2(0%)	0(0%)	2(0.5%)	
Student	63(15%)	77(18%)	140(33%)	

Unemployed	26(6%)	38(9%)	64(15%)
Laborer	28(6%)	62(14%)	90(20.4%)
Total	**176 (41%)**	**258(59%)**	**434(100%)**
Missed			**8**

Self-medication was most frequently practiced by students.

Table 5: Monthly income of self medicators

Respondent characteristic	self-medicated	non self-medicated	Total	P value
Monthly income				**0.090917**
≤ 100 SDG	36(8%)	62(14%)	98(22%)	
100 – 250 SDG	51(12%)	75(17%)	126(29%)	
250 SDG – 500 SDG	46(10%)	78(18%)	124(28%)	
500-1000 SDG	31(7%)	36(8%)	67(15%)	
>1000 SD	17(4%)	10(2%)	27(6%)	
Total	**181(41%)**	**224(59%)**	**442(100%)**	

Self-medication with antibiotics was very high among those with low monthly income.

Table 6: Educational status of those who self medicated

Respondent characteristic	self-medicated	non self-medicated	Total	P value
Level of education				**0.007758**
Illiterate	11(2%)	41(9%)	52(11%)	
Primary School	31(7%)	37(8%)	68(15%)	
High School	33(7%)	58(13%)	91(20%)	
University	91(21%)	123(28%)	214(49%)	
Post Graduate studies	15(3%)	2(0%)	17(3%)	
Total	**181(41%)**	**261(59%)**	**442(100%)**	

Despite their higher level of education, themajority of those who practiced self medication

with antibiotics were university graduates.

Table 7: Health insurance status of those who practiced self medication with antibiotics.

Respondent characteristic	self-medicated	non self-medicated	Total	P value
Health Insurance status				**0.000301**
Covered	103 (23%)	103 (23%)	206(46%)	
Not covered	78(18%)	158 (36%)	236(54%)	
Total	**181(41%)**	**261(59%)**	**442(100%)**	

Table 8: Sources of antibiotics used

	Source of Antibiotic used			
	From where did you obtain it			
	A community pharmacy	Family and friends	Left over Antibiotics from a previous prescription	Total
Frequency and percentage of those who practiced self medication with an Antibiotic in the previous 6 months	130 (72%)	31 (17%)	20.0 (11%)	181

Most antibiotics used for self-medication were directly obtained from community pharmacies.

Table 9: Reasons given for self medication

	Reasons given for self-medication				
	No waiting times involved with pharmacies	Pharmacies are low cost alternatives compared to other health care faciliti	I have previous experience with similar ailments	Others	Total
frequency and percentage of those who self medicated	43.0 (24%)	40.0 (22%)	90.0 (50%)	8.0 (4%)	181

The most common reason for which self-medication was practiced was that respondents had experience with similar ailments.

Table 10: Types of antibiotics used for self medication

	Type of Antibiotic used							
	Amoxicillin	Tetracycline	Ciprofloxacin	Doxycycline	Erythromycin	I don't remember the name	others	Total
Frequency and percentage of those who self medicated	68	19	6	3	9	45	29	179
	38.0%	10.6%	3.4%	1.7%	5.0%	25.1%	16.2%	100.0%

Amoxicillin was the antibiotic that was most frequently used for self-medication.

Table 11: conditions involve in self medication

	Conditions involved in self medication						
	Gastrointestinal tract infections	Common colds	Genitourinary infections	Cough and sore throat	Skin infections	Others	Total
Frequency and percentage of those who practiced self medication	13	49	7	74	20	16	179
	7.3%	27.4%	3.9%	41.3%	11.2%	8.9%	100.0%

41% of those who self-medicated used antibiotics to treat cough and common colds.

Table 12: Duration of antibiotic use

Days	**Frequency**	**Percentage**
Less than 5 days	84	49%
5-7 Days	71	42%
8-14 Days	13	8%
15 days and more	2	1%
Total	170	100%
Missed	11	
Total	181	

The majority of those who self-medicated used antibiotics for a short duration of less than 5 days.

DISCUSSION

In this study 41 % of the respondents practiced self-medication with antibiotics in the 6 months prior to the study. This rate is similar to the findings of other studies performed to survey self-medication with antibiotics. For example a study in Turkey with a 45.8 % rate of self-medication[30], a study in USA with a 43% rate of self-medication[12], a study in Lithuania with a 39.9% rate of self-medication[31], a study in Sudan with a 48.1% rate of self-medication[2], and a study in Jordon with a rate of 40.7 % rate of self-medication[4]. Higher rates were found in a study performed in China with a 59.7 % rate of self-medication[32], a study in Iran with a 53% rate of self-medication[33] and a study in Nigeria with 85% rate of self-medication[1]. Findings of this study are consistent with the findings of (Afolabi, 2008;Sapkota*et al*., 2010) where age was not significantly associated with antibiotic self-medication (p = 0.056) [34, 35]. Gender difference had no influence on the behavior of self-medication with antibiotics (p = 0.47). However, marital status was significantly associated with the intent to self-medicate (p < 0.001). Self-medication was higher in single

individuals, an explanation of this is that most of these people cannot afford to pay for a doctor's visit as they are still students or not yet employed. Self-medication with antibiotics was not found to be more or less frequently practiced in different residential areas within Khartoum state (p = 0.999). Self-medication with antibiotics was found to be inversely proportional to participant's monthly income. Self-medication increased as the monthly income decreased and the highest prevalence was among the group which had a monthly income between 100 to 250 SDG (Sudanese Gunah). However, this difference was not statistically significant (p = 0.09). On the other hand, occupation was highly associated with the intent to self-medicate (p = 0.0075). Self-medication was more frequent among those who were laborers, students, self-employed or unemployed. These workers have lower monthly incomes so they are not able to afford the expenses of doctor's visits and investigations so they tend to self-medicate. Self-medication rates were appreciably lower among professionals, employees and retired participants. Professionals have better incomes and thus can afford to pay for health expenses. Employees may have lower self-medication rates as they might have health insurance. Retired individuals might already be on poly pharmacy which makes self-medication unfavorable for them. Moreover they usually have chronic diseases and visit doctors regularly. It's surprising that despite the high education level of the participants (more than 50% where university graduates), an appreciable percentage still practiced self-medication with antibiotics (p = 0.007758). This may be attributed to the high rates of inertia in Sudan. Graduates have no jobs and cannot afford health expenses. Health insurance was not shown to limit the behavior of self-medication in this study; in contrast among those who self-medicated, 57% had health insurance. This phenomenon reflects the limitations of health insurance systems in Sudan. Health insurance services are only provided in limited centers in Khartoum State. Furthermore, patients may have to pay for some types of antibiotics as they are not included in the insurance plan. The main reason mentioned for not seeing a doctor was that the patient claims that he/she has had a similar condition before and thinks that it's mild and he/she can use the similar medicine or repeat a previous prescription. Other reasons included that pharmacies are low cost alternatives compared to other health care facilities and that there are no waiting times involved with pharmacies. These findings are consistent with the findings of (López*et al*., 2009) [36]. The major source of the antibiotics used was community pharmacies. Strengthening pharmacy regulations and educating both the public and pharmacists may prevent self-medication directly from the pharmacy. Other patients used left over medications from previous prescriptions. According to (Grigoryan*et al*., 2007) preventing leftovers may have a substantial role in preventing self-

medication [11]. This can be accomplished by ensuring that the amount dispensed exactly equals the amount prescribed, by educating patients and by making doctors aware that prescribing for minor ailments may increase the risk of self-medication for such ailments. Amoxicillin was the antibiotic that was most commonly use as 38 % of the participants used amoxicillin.

Argument of its frequent use was supported by its low-cost across the globe and its wide-spread prescription by health care providers which makes it well-known to public. This is consistent with the findings of(SarhoodiandArzi, 2009;Sawair*et al*., 2009) [33, 4]. About 41% of those who self-medicated used antibiotics to treat cough and sore throat infections and 27% used them to treat common colds.Sore throat or pharyngitis is typically a viral infection. Current care guidelines states that patients should be informed that pharyngitis is usually a mild, self-healing disease. If the patient has two of the following symptoms; fever over 38 degrees C, swollen submandibular lymph nodes, tonsillar exudate and no cough, throat swab is recommended. In case of children 15 years old or less, any of these symptoms should be tested. If antibiotic is indicated, penicillin is the preferred choice. Antibiotics can be started for patients with high fever before culture results are available Patients need to be educated that antibiotics do not treat common colds as common colds are caused by viruses, and so antibiotics will not do any good. Other conditions for which antibiotics were used are skin infections, Gastrointestinal tract infections and Genitourinary tract infections. These findings are consistent with the findings of (Awad *et al*., 2005) [2]. Approximately half of those who self-medicated used the Antibiotic for a period of less than 5 days. Of them only 15 % used Azithromycin. All the others used Amoxicillin, Erythromycin, Tetracycline or Doxycycline. Patients tend to stop the antibiotic when their symptoms subside or if they think it is not working well. Such behavior will result in the development of resistant strains of bacteria.

CONCLUSION

The results of this study confirm that self-medication with antibiotics is a frequent problem in Sudan and thus interventions at different levels are required in order to reduce the frequency of antibiotics misuse. Adequate health education to stop this unsavory practice needs to be mounted while efforts should be made to make qualitative health care readily available. Health care providers should educate patients on the dangers of self-medication. Such

messages should be extended to the community at large periodically by government health ministries.

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