Self-medication with Antibiotics and Antimalarials in the community of Khartoum State, Sudan

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ABSTRACT. Purpose: To estimate the prevalence of self medication with antibiotics and antimalarials in Khartoum State, Sudan and evaluate factors associated with self medication. **Methods**: A pre-tested questionnaire was used to collect data from a sample of 600 households, (1750 adult persons), selected from three cities in Khartoum State, Sudan, using a multistage stratified clustered sampling. **Results**: One thousand two hundred and ninety three (73.9%) of the study population had used antibiotics or antimalarials without a prescription within one month prior to the study. Eight hundred and forty one (48.1%) of the respondents agreed that they have used antibiotics, 43.4% used antimalarials, while 17.5% used both. Self medication with either antibiotics/ antimalarials was found to be significantly associated with age, income, gender and level of education. Overall, self medication with any antibiotics or antimalarials was least common among the ≥ 60 years compared to youngest age group (OR: 0.07; 0.04 -0.11) and most common among the female gender (OR: 1.8; 1.4 -2.4), the middle income group (OR: 3.7; 2.6-5.3) and the university graduates. Self medication with antibiotic was found to be significantly higher among females (OR: 1.5; 1.16-1.87), middle aged respondents aged 40-59 (OR: 2.1; 1.5-3.0) compared to younger respondents. Lower income and higher level of education was also found to be significantly associated with the increase risk of self medicating with antibiotic. Increase risk for self medication with antimalarials were, however, found to be significantly associated with male gender and younger age group of <40 years and middle income earners and less educated respondents. The main reason that was indicated for the self-

medication was financial constraints. The main source of medicines was the private pharmacies, which were regarded as a cheaper alternative to other primary healthcare sources. **Conclusion:** The prevalence of self-medication with antibiotics/antimalarials in Khartoum State, Sudan is alarmingly high. Self medication behaviour varies significantly with a number of socio-economic characteristics. Given the growing global resistance for antibiotic and documented health issues related to inappropriate use of such drugs, our findings has major public health policy implications for countries like Sudan.

INTRODUCTION

Self-medication can be defined as the use of drugs to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent disease or symptoms.[1] It is usually selected by consumers for symptoms that they regard as troublesome to require drug therapy but not to justify the consultation of a prescriber. In developing countries, most illnesses are treated by self-medication.[2] A major shortfall of self-medication is the lack of clinical evaluation of the condition by a trained medical professional, which could result in missed diagnosis and delays in appropriate treatments.[3]

A major problem with self-medication with antimicrobials is the emergence of human pathogens resistance. Antimicrobials resistance is a current problem world-wide particularly in developing countries, where antibiotics are often available without a prescription.[4] Resistance to antimalarials drugs has also been reported in many third world countries.[5] Reasons for this resistance include the irrational use of antimalarials, including their indiscriminate non-prescription use.[6]

In Sudan there is suspicion that self medication is high. A reason for this is the fact that in Sudan most drugs can be obtained from pharmacies and drug stores without the requirement of a prescription. As a result, minor ailments are often treated with antimicrobials. In addition, self-treatment of malaria is common following self-diagnosis mainly based on presumptive symptoms of

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malaria. Self-medication with antimicrobials has the potential to harm society at large as well as the individual patient. Policy makers should be concerned if the spectrum of drugs available without a prescription includes antibiotics. The increase in antibiotics resistance in developing countries is of current public and professional concern as it results in multiple resistant organisms difficult to treat.[7]

Studies on the prevalence and factors associated with self-medication in Sudan are necessary to help with the planning of interventions to improve the use of medicines in the country. In this study we estimate the prevalence of self-medication with antibiotics and antimalarials in urban areas of Khartoum state, Sudan and evaluate socio-demographic factors that are associated with self medication with these medicines.

METHODS

A community based cross-sectional survey was conducted in Khartoum State, Sudan. Sudan is the largest country in Africa with a total area of: 2,505,810 square kilometres and an estimated population of 39 million people. Khartoum State covers an area of 28,000 square kilometres and has a total population of approximately six millions people. Health services in the Sudan are provided by both the private and public sectors. Prior to the 1990s health services provision was free at the point of delivery, with the government picking up the cost. Due to civil war in Sudan and current economic reforms in the country, the provision of health services is now based on fee for service at the point of delivery. The problem with this system is that the majority of the population cannot afford basic health services.

Ethical clearance was obtained from the Ethical committee of Faculty of Pharmacy, University of Khartoum. The study population consisted of urban communities from three cities in Khartoum State; Khartoum, Omdurman and Khartoum North. A sample of 600 households (1750 adult persons) was selected from the cities using a multistage stratified clustered sampling. These involved randomly selecting residential areas within each city, from these, households were randomly selected. 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 by trained undergraduate medical and pharmacy students. The questionnaires were completed in the presence of the research students in case some participants required assistance. The response rate was 89.7%, there were no people at 28 households and 34 households declined to take part in the survey.

Questionnaire consisted of both closed- and open-ended questions. In addition to questions on demographic information, the questionnaire included questions on socio-economic variables such as monthly income, health seeking behaviour, previous self-use of antibiotics/antimalarials, conditions for which antibiotics/antimalarials were self-prescribed, sources of the antibiotics/antimalarials, names of antibiotics/antimalarials used, sources of information on antibiotics/antimalarials and reasons for self-prescribing of antibiotics/antimalarials. Self reported dosage and duration of therapy were compared to recommended dosages and duration for the particular drug according to national guidelines. Deviations from national guidelines were considered inappropriate. The questionnaire was pre-tested for content and design on 15 individuals. Slight modifications were done so that the questionnaire was simple to be answered and yet gave accurate data.

Data were entered into the Statistical Package for Social Sciences (SPSS, version 13) and descriptive analysis conducted. Prevalence of self-medication in the community with both antibiotics and antimalarials were reported as percentage and 95% confidence intervals.[8] The confidence intervals were computed using EpiCalc 2000 (CDC, USA). As the main outcome measures were binary variables describing the self medication status, logistic regression models were used to assess the predictors. Results were reported as odds ratio and 95% confidence interval and only the results of the multivariate logistic results are reported. Separate regression models were fitted for overall self medication status, self medication with antibiotic and self medication with antimalarials.[9]

RESULTS

One thousand seven hundred and fifty (1750) adults were surveyed, 996 (56.9%) of whom were aged between 20-39 years. Nine hundred and sixty (54.9%) were females. Five hundred and ninety seven (34.1%) had a monthly income of less than 10,000 Sudanese Dinar [SD] (US$ 38.5), while 735 (42%) had incomes in the range of 10,000 – 25,000

SD (US$38.5 - 96.2) and 418 (23.9%) had incomes greater than 25,000 SD (US$ 96.2). One hundred and fifty six (8.9%) were illiterate, 285 (16.3%) had completed primary education, 392 (22.4%) had gone through intermediate school, 474 (27.1%) had gone through secondary school while 443 (25.3%) were university graduates.

One thousand two hundred and ninety three (73.9%) of the study population had used antibiotics/ antimalarials without a prescription or medical advice within one-month of the study period. Eight hundred and forty one (48.1%) had used antibiotics, 760 (43.4%) had used antimalarials. Three hundred and seven (17.5%) of all the participants had reported to have used both during the month prior to the study without any prescription. Table 1 shows the prevalence and the confidence intervals for the self-prescribed antibiotics/antimalarials. Table 2 shows the conditions for which they were self-prescribed as reported by the respondents. Table 3 shows the descriptive association between socio-demographic status and self medication behaviour. Self medication with any of the antibiotics and/or antimalarials was shown to be significantly associated with age group (p< 0.001), gender (p = 0.008), monthly income (p < 0.001) and level of respondent's education (p < 0.001).

Table 4 provides the adjusted odds ratios and 95% confidence intervals that quantify the association between socio-demographic factors and the self medication, self medication with antibiotic and antimalarials. These estimates were obtained using multiple logistic regression models. The risk of self medication with antibiotic was higher among the middle aged group (40- 59 years) while that of antimalarials was in the youngest age group (20-39 years). The general pattern of self medication with any antibiotics or antimalarials was least common among age of ≥ 60 years compared to youngest age group (OR: 0.07; 0.04 -0.11). The risk of self-medication with antibiotics was higher among females compared to males; however, the pattern was reversed in case of self-medication with antimalarials. By and large, the female gender was found to have higher risk of self medication behaviour compared to males (OR: 1.8; 1.4 -2.4). Low income group was found to be the highest risk group for the self medication with antibiotics, while the middle income earners have shown to be associated with highest risk of self medication with antimalarials. Overall, self medication behaviour was most common among the middle income group (OR: 3.7; 2.6-5.3). The education levels were also

associated with the risk of self medication but varied pattern between the use of antibiotic and antimalarials were noted. The risk of self medication with antibiotic was clearly higher among the secondary and university educated graduates, while the risk of self medication with antimalarials was lowest among the intermediate and secondary educated respondents. Overall the self medication behaviour was highest among the university educated group.

Eight hundred and ninety (68.8%) of the respondents who had self-medicated obtained the drugs directly from private pharmacies. Other sources of medicines included relatives and friends, 248 (19.2%) and left over drugs from a previous treatment, 155 (12%). Five hundred and ninety five (46%) of the respondents who had self medicated indicated that they obtained the information on drugs from pharmacists. Other sources of information included relatives and friends 409 (31.6 %).

Five hundred and five (39%) of those who self-prescribed with antibiotics/antimalarials reported incorrect doses and/or inappropriate duration of use of the medication. Reasons given for self-medication behaviour included the perception that pharmacies were low cost alternatives compared to other health care facilities, which charged consultation and laboratory fees. In addition there were no waiting times involved with pharmacies. Some respondents relied on the fact that they had previous experience with similar ailments therefore giving them the confidence to self-medicate.

DISCUSSION

The prevalence of self-medication with antibiotics/antimalarials in Khartoum state, Sudan is high. Similar findings have been reported in studies from countries in Latin American.[10, 11] Patient education, socio-economic status, gender and age appear the major factors associated with self-prescription of these medicines.

A major problem with self-medication with antibiotics/ antimalarials is the emergence of drug resistance. Antimicrobial resistance is a current problem world-wide; particularly in developing countries.[4] 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.[7] The consequence of this is the loss

Table 1: Prevalence and (95% Confidence Interval) of self medication with antibiotics/antimalarials in Khartoum State, Sudan (n= 1750)

Characteristics	Frequency	Prevalence % (95% CI)
Self medication with antibiotics and or antimalarials	1293	73.9 (71.8 – 75.9)
Self-medication with antibiotics		
Amoxicillin	405	23.1 (21.2 – 25.2)
Tetracycline	153	8.7 (7.4 -.10.1)
Ciprofloxacin	120	6.9 (5.8 – 8.2)
Doxycycline	106	6.1 (5.1 – 7.4)
Erythromycin	57	3.3 (2.5 – 4.3)
Self-medication with antimalarials		
Chloroquine	277	15.8 (14.1 – 17.6)
Pyrimethamine + Sulfadoxine	184	10.5 (9.1 – 12.1.)
Artemether injections	104	5.9 (4.9 – 7.1)
Chloroquine + Pyrimethamine + Sulfadoxine	98	5.6 (4.6 – 6.8)
Pyrimethamine+ Sulfadoxine + Doxycycline	54	3.1 (2.4 – 4.1)
Chloroquine +Tetracycline	43	2.5 (1.8 – 3.4)

of relatively cheap drugs that will require new drugs development, which will be more expensive and will further disadvantage patients in developing countries such as Sudan. The rational use of antibiotics is thus of utmost importance to limit the increase in bacterial resistance.

Table 2: Conditions for which antibiotics were self-medicated

Conditions	Number Who self-medicated (%)
Coughs	243 (13.9)
Common colds	208 (11.9)
Genitourinary infections	184 (10.5)
Cough and sore throat	109 (6.2)
Malaria	97 (5.5)

Consumers require access to accurate and understandable information with regard to the potential benefits and risks associated with the use of drugs including self-medication. Ways to reduce self-medication and encourage clinical and laboratory consultation includes public education. This could involve highlighting problems that may arise from inappropriate medication use such as bacterial resistance discussed above.

The main source of antibiotics/antimalarials was private pharmacies. Though regulations that categorise most of these drugs as prescription only exist, regulatory authorities often lack resources to enforce them. Even if enforcement was possible, having and enforcing a strict prescription policy without providing adequate and affordable access to medical consultation and treatment, might exclude the poorest from accessing drugs, leading to increased morbidity from otherwise treatable infectious diseases. In addition, in some areas in Sudan, access to health care services is often limited. In such instances self-medication, particularly with antimalarials might do the community more good than harm. It is important, however, that such self-medication be accompanied by appropriate training on how to use medicines appropriately and effectively.

Implementation of pharmaceutical care in community pharmacies could help alleviate this problem. Community pharmacists can play an active role in the provision of primary health care by attending to minor ailments and refer patients to physicians where patients require further investigation.[13] Sudanese pharmacists must improve their clinical knowledge and skills; and demonstrate their willingness to be responsible for the patient's drug therapy and must develop close working relationship with other health care professionals. Practitioners, administrators and faculties of pharmacy in Sudan need to coordinate these activities to encourage participation by practising pharmacists.

We acknowledge that this type of study, using a self-administered questionnaire, depends very much upon information given by respondents.

Table 3: Association between self-medication according to patient's characteristics

Respondents' characteristics	Self medicated (n = 1293)	Not self-medicated (n = 457)	P - Value
Age			< 0.001
20-39	889 (68.8%)	107 (23.4%)	
40-59	345 (26.7%)	244 (53.4%)	
≥60	59 (4.6%)	106 (23.2%)	
Gender			0.008
Males	608 (47.0%)	182 (39.8%)	
Females	685 (53.0%)	275 (60.2%)	
Monthly income			< 0.001
≤ 10,000 SD (US $ 38.5)	462 (35.7%)	135 (29.5%)	
10,000 – 25,000 SD (US $38.5 -96.2)	610 (47.2%)	125 (27.4%)	
> 25,000 SD (US $ 96.2).	221(17.1%)	197 (43.1%)	
Level of education			< 0.001
Illiterate	63 (4.9%)	93 (20.4%)	
Primary School	155 (12.0%)	130 (28.4%)	
Intermediate school	262 (20.3%)	130 (28.4%)	
Secondary School	413 (31.9%)	61 (13.3%)	
University Graduates	400 (30.9%)	43 (9.4%)	

Table 4: Adjusted Odds Ratios and 95% CI Association between self-medication and various variables (n = 1750)

Respondent characteristic	Self medication with antibiotics and antimalarials OR (95% CI)	p	Self-medication with antibiotics OR (95% CI)	p-	Self-medication with antimalarials OR (95% CI)	p
Age						
20-39	Reference		Reference		Reference	
40-59	0.15 (0.10 - 0.22)	< 0.001	2.1 (1.5 – 3.0)	< 0.001	0.26 (0.18 – 0.36)	< 0.001
≥60	0.07 (0.04 – 0.11)	< 0.001	0.40 (0.21 – 0.77)	0.006	0.18 (0.12 – 0.29)	< 0.001
Gender						
Males	Reference		Reference		Reference	
Females	1.8 (1.4 – 2.4)	< 0.001	1.5 (1.16 – 1.87)	0.001	0.67 (0.53 – 0.85)	0.001
Monthly income						
≤ 10,000 SD (US $ 38.5)	Reference		Reference		Reference	
10,000 – 25,000 SD (US $38.5 -96.2)	3.7 (2.6 – 5.3)	< 0.001	0.78 (0.59 – 1.0)	0.061	4.1 (3.0 – 5.5)	< 0.001
> 25,000 SD (US $ 96.2).	1.4 (0.9 – 2.1)	0. 100	0.61 (0.42 – 0.87)	0. 007	0.70 (0.5 – 1.1)	0.096
Level of education						
Illiterate	0.25 (0.14 – 0.46)	< 0.001	0.0 (0.0)	0.994	2.3 (1.3 – 4.0)	0.004
Primary School	0.28 (0.17 – 0.44)	< 0.001	0.16 (0.11 – 0.25)	< 0.001	1.2 (0.8 – 1.7)	0.477
Intermediate school	0.41 (0.27 – 0.62)	< 0.001	0.15 (0.11 – 0.21)	< 0.001	0.46 (0.33 – 0.63)	< 0.001
Secondary School	0.41 (0.26 – 0.67)	< 0.001	1.1 (0.8 – 1.5)	0.463	0.07 (0.05 – 0.11)	< 0.001
University Graduates	Reference		Reference		Reference	

However, given the large number of respondents and the random nature of the sample, we believe the results are a close estimate of the situation in Khartoum state.

CONCLUSION

The prevalence of self-medication with antibiotics/antimalarials in the community in Khartoum State, Sudan is alarmingly high. This could reflect the trends in the whole of the Sudan. Self medication tended to be higher in people with a higher education, those on intermediate incomes, females and those below the age of 40. Given the growing global resistance for antibiotic and documented health issues related to inappropriate use of such drugs, our findings has major public health policy implications for countries like Sudan.

ACKNOWLEDGEMENTS

DECLARATIONS

This work was approved by the University of Khartoum Ethical Committee. Authors have no conflicts of interest with regard to the data produced. The data collection was conducted in Khartoum state - Sudan. Data analysis and manuscript writing were undertaken in Faculty of pharmacy, Kuwait University.

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