

Knowledge and Practice about the Rational Use of Antibiotic among the Rural Adults in Rajshahi District, Bangladesh: A Community Clinic Based Study

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ABSTRACT

Decreasing antibiotic effectiveness due to inadequate knowledge and misconceptions on antibiotic usages has been a big threat all over the world including Bangladesh. The aim of the study was to determine the level of knowledge and practice about the rational use of antibiotics among adults in rural area of Rajshahi, Bangladesh. A Community Clinic (CC) based study was performed by involving 600 rural adults. Data were collected from different CC areas in the Rajshahi district, Bangladesh. Knowledge and practice were measured by using composite index. Multistage random sampling and binary logistic regression were used. The study revealed that only 17.2% rural adults had good knowledge about the rational use of antibiotics. The knowledge of proper usages of antibiotics was higher among the young adult compared to older age groups. Adults with primary, secondary and higher educational levels were more likely to have a good knowledge about the rational use of antibiotics compared to illiterate groups. In case of the rural adults, who were secondary and higher educated were more likely to have good practices about the rational use of antibiotics compared with their counterparts. However, majority of the participants (91.0%) had very poor practices in rational use of antibiotic. In this study we found that there was a vast gap of knowledge and practices about the rational use of antibiotics among rural adults in Bangladesh. Consequently, our findings can be considered to make awareness programme about rational use of antibiotic among rural adults in Bangladesh.

Keywords: Antibiotics; Composite index; Community clinic; Knowledge and practice; Binary logistic regression

INTRODUCTION

Antibiotics are antimicrobial drug, which are used in the treatment and prevention of bacterial infections, and they may either kill or inhibit the growth of bacteria. Hundreds of people had died every year due to many infectious diseases like cholera, small pox, plague, tuberculosis, etc. all over the world, when antibiotics were not available (Louie and Bell, 2002). After introduction of antibiotics as medicine in 1940s, it has been playing a vital role not only in treatment but also in prevention of many diseases caused by various microorganisms (WHO, 2014a). It also protects people with compromised immune system from being easy prey to microorganisms. Some diseases like small pox and poliomyelitis, could have been eradicated forever; and some other diseases like tetanus, diphtheria, tuberculosis, plague, etc. could have been contained to great extent. Thus antibiotics have become very essential medicine, but antibiotics have been growingly ineffective or less effective with increasing of its usages. This phenomenon is called “Antibiotic Resistance” which has become a big challenge all over the world. Misuse, use of insufficient strength and/or dose as well as duration of antibiotics course by common people is making microorganisms resistant to antibiotics. So incidence and prevalence of infectious diseases are growing in number and reflecting in high morbidity and even mortality. Negligence and

unconsciousness of medical professionals as well as ignorance of common people about proper use of antibiotics are contributing to Antibiotic Resistance. To address these problems, the World Health Organization has suggested to minimize unnecessary use of antibiotics, and completing full course of medicine (Awad and Aboud, 2015). It is also urged the member countries to take mass educational programme for patients and common people to ensure rational use of antibiotics, and thus hold antibiotic resistance. There are many studies and documentations about knowledge, attitudes and behavior of common people and medical professionals toward the use of antibiotics all over the world. The study conducted in Kuwait, Georgia, and Malaysia had revealed that respondents had poor knowledge about rational use of antibiotics (Awad and Aboud, 2015; Kandelaki1 *et al.*, 2015; Tan *et al.*, 2015; Agarwal *et al.*, 2015). Another study revealed that common people of Bangladesh extensively use antibiotics as well. However, such type of study is poorly documented in Bangladesh, though the problems of antibiotic resistance are supposedly grave in the country (Biswas *et al.*, 2014; Fahad *et al.*, 2010; Rahman and Rahman, 1998; Rahman *et al.*, 2011; Sayeed *et al.*, 2015; Mannan *et al.*, 2014).

In 1998, Bangladesh Government established Community Clinic (CC) in some areas of Bangladesh for providing health services especially for mothers and children such as antenatal care, postnatal care, under five children nutrition screening, family planning etc. Besides, they also provide general services as well as health education for awareness generation among people in these areas by the help of three health service providers as community health care provider, health assistant and family welfare assistant (DGHS, 2016). The Government is spending significant amount of fund for these aforesaid purposes. Rajshahi is a divisional district of Bangladesh and all rural peoples are getting service from CC. Moreover, there are many medical colleges, hospitals, clinics and educational institutes in Rajshahi city and having good communication from rural to urban, people can easily get the health services from these institutes. It is essential to assess the general health related knowledge such as rational use of antibiotics among rural adult peoples in Rajshahi district. It is also important to investigate the association between lack of knowledge and practices about the rational use of antibiotics among rural adults and socio-economic factors like age, gender, religion, education and income etc in order to make sure about remedial measures for effective health planning. Therefore, the aim of this study was to assess the knowledge and practice about the rational use of antibiotic by composite index among rural adults in the Rajshahi district in Bangladesh and also to understand the associated socio-economic factors.

MATERIALS AND METHODS

Design and study population

The cross-sectional community clinic based study sample was consisted of 600 adults (aged ≥ 18 years) peoples who lived in different catchment areas of community clinic (CC) within the Rajshahi district, Bangladesh. This district comprised of a total 232 CC and for the present study, 23 CC were randomly selected (DGHS, 2016). Total area of the Rajshahi district is 2,425.37sq.km with 17, 40,578 people (male 8, 72,467 and female 8, 68,111), about 67.07% adults are living in catchment area who have facilities to take primary health service from CC (BBS, 2011).

Sample size determination

An appropriate mathematical formula was used to determine sample size for this study. In this formula, we considered 80% power of study and 5% level of significance. All necessary information had been taken from the previous study for calculating sample size (Scaioli *et al.*, 2015; Bert *et al.*, 2017). The formula provided that 550 samples were sufficient for this study, but for getting more accurate results, we initially considered 630 adult peoples. One adult was selected from one household, unfortunately 30 (4.76%) selected adults did not agree to give their information. Finally, 600 adults were considered as the sample of the present study.

Sampling technique

Multistage random sampling was used for selecting sample in this study. In the first stage, 3 Upazilas (sub-district) were selected randomly from 9 Upazilas of Rajshahi district, which are belonged to catchment area of CC. In second stage, 30 catchment areas were selected randomly from each selected Upazila. In the third stage, 21 households (households were identified by holding number) were selected randomly from each selected area. A total of 630 households were selected, and from each household one adult was interviewed. The head or the senior person of the household either male or female present at the time of survey was considered as a sample of the present study.

Data were collected during December 2015. The socio-demographic and knowledge as well as practice about antibiotics were collected by using a pre-tested semi-structured questionnaire. The questionnaire was drafted in native language as *Bengali* during survey. The questionnaire was evaluated by five professional's evaluators, and a mini-assessment was conducted to validate it. We also modified the questionnaire based on the results of the pilot study to make it easier to understand and to answer. Nine qualified and skilled field

enumerators conducted this interview. Before data collection, they were trained by an expert. They were accompanied by a project team during original community visits to confirm exact administration of survey questionnaires. Nine questions were asked to selected subject for measuring their knowledge of antibiotics use.

Outcome Variables

The dependent variable in the study was knowledge about rational use of antibiotic, which was assessed knowledge and practices through 11 different questions, namely:

i) What is antibiotic? ii) When will you need antibiotics? iii) What do you do when you think that you need antibiotics? iv) How many days do you usually take antibiotics for? v) Pregnant woman must take antibiotics when they are sick, even without doctor's advice, to protect themselves and their children vi) What happen when you use too much antibiotics when not needed? vii) What happen when you do not complete your antibiotics course as prescribed? viii) What below medicines will you recognize as antibiotics? ix) When I have different bacterial infections, I may need to be treated?

And the following questions were used to investigate practices about rational use of antibiotic:

i) What do you do when you feel better after taking antibiotics? ii) What do you do when you think that you need antibiotics?

Some other factors like age of the respondent [younger group (≤ 30 years), middle age group 31-50 years and an older age group (≥ 51 years)], gender (male and female), religion (Muslim and Non-Muslim), level of education (no education, primary education, secondary and higher education), and family income as Bangladeshi currency (BDT) (≤ 5000 BDT, 5001-10000 BDT and ≥ 10001 BDT) were considered to establish the association with lack of rational knowledge on antibiotic use. The participant's good knowledge and practice was scored using a system adopted from previous studies. Each correct response was awarded 1 point, while incorrect or 'don't know' answers received no marks (Haque *et al.*, 2016).

Statistical analysis

Descriptive analyses were conducted to determine the socio-economic and demographic factors regarding good knowledge and practice about rational use of antibiotics related characteristics of the respondents. Chi-square tests were used to find the association between two factors. Significance for all analyses was set at $p < 0.05$. Analyses were performed using statistical package for social sciences (SPSS version 22 IBM). The knowledge index was constructed using the sums of weighted input variables, where the maximum and minimum values were chosen for each underlying indicator. Binary logistic

regression model was used and which was accounted for independent variables simultaneously (Haque *et al.*, 2016). This study estimated the adjusted odds ratios (AORs) and 95 % CIs for significance testing. Only significant factors (on the basis of chi-square test) were considered in binary logistic model for further analysis.

Knowledge index = (Actual value-minimum value)/ (Maximum value-minimum value)

The performance of each indicator was expressed using a unit-free index between 0 and 1 (which allows the different indices to be added together) in accordance with the construction method of the Human Development Index (UNDP, 2005). As per the Knowledge Index in this study knowledge divided into three categories such as Poor, Moderate and Good and practices divided into two categories i.e. Poor and Good (Ling *et al.*, 2011).

Ethics approval and consent to participate

This study was organized by Development Association for Self-reliance Communication and Health (DASCOH Foundation). DASCOH Foundation got ethical approval from Community Based Health Care (CBHC) under the Ministry of Health and Family Welfare, Government of Bangladesh. Before data collection, we have discussed with about the objective of this study, and written consent was also taken from all participants. Ethics committee of Non-governmental Affairs Bureau (NGOAB) of Bangladesh has approved this project.

RESULTS

In the present study, the knowledge about the rational use of antibiotic was assessed from 600 Bangladeshi rural adults. It was noted that only 17.2% respondents had a good knowledge about the rational use of antibiotic. Within the study respondents, the persons in the age of ≤ 30 years had a good knowledge (23.8%) about the rational use of antibiotic compared to other age groups (15.3% in 31-50 years of age and 11.1% in ≥ 51 years of age) and the association between these factors was statistically significant ($p < 0.05$). Besides, it was observed that the secondary and higher educated people had a good knowledge (29.4%) about the rational use of antibiotic compared to their primary (23.02%) and illiterate (7.1%) adult counterparts and similarly the association between two factors were statistically significant ($p < 0.05$). Those with monthly family income of ≥ 10001 BDT had good knowledge about the rational use of antibiotic (26.7%) than lower income groups (22.2% in 5001-10000 and 12.1% in ≤ 5000 BDT income groups) and here also the association between these two factors was statistically significant ($p < 0.05$) (Table 1).

Table1: Association between knowledge of antibiotic and socio-economic and demographic factors among rural peoples in Rajshahi, Bangladesh

Characteristics (n)	Knowledge about rational use of antibiotics			p-value
	Poor n = 294 (49.0%)	Moderate n = 203 (33.8%)	Good n = 103 (17.2%)	
Age in years				0.007
≤30 (189)	85(45.0)	59(31.2)	45(23.8)	
31-50(294)	156 (53.1)	93(31.6)	45(15.3)	
≥51(117)	53(45.3)	51(43.6)	13(11.1)	
Gender				0.250
Male (296)	135(45.6)	108(36.5)	53(17.9)	
Female (304)	159(52.3)	95(31.3)	50(16.4)	
Religion				0.786
Muslim (582)	285(49.0)	198(34.0)	99(17.0)	
Non-Muslim (18)	09(50.0)	05(27.8)	04(22.2)	
Educational Level				0.001
Illiterate (295)	163(55.3)	111(37.6)	21(7.1)	
Primary (125)	60(48.0)	36(28.8)	29(23.2)	
Secondary & Higher (180)	71(39.4)	56(31.2)	53(29.4)	
Monthly Family Income (BDT)				0.012
≤5000 (321)	165(51.5)	117(36.4)	39(12.1)	
5001-10000 (234)	109(46.6)	73(31.2)	52(22.2)	
≥10001(45)	20(44.4)	13(28.9)	12(26.7)	

BDT = *Bangladesh Taka*

This study revealed that only 9.0% respondents were properly follow health service provider advice about the rational use of antibiotic. Among them, the secondary and higher educated people had a good practices (44.4%) than primary educated (36.8%) and illiterate adults (18.3%) and distribution had showed statistically significant ($p < 0.01$) (Table 2).

Table 2: Association between Practices of antibiotic and socio-economic and demographic factors among rural peoples in Rajshahi, Bangladesh

Practice about rational use of antibiotics			
Characteristics	Good	Poor	p-value
(n)	n = 54 (9.0%)	n = 546 (91.0%)	
Age in years			0.389
≤30 (189)	20(10.6)	169(89.4)	
31-50(294)	27(09.2)	267(90.8)	
≥51(117)	54(09.0)	546(90.0)	
Gender			0.698
Male (296)	28(09.5)	268(90.5)	
Female (304)	26(08.6)	278(91.4)	
Religion			0.751
Muslim (582)	52(08.9)	530(91.1)	
Non-Muslim (18)	02(11.1)	16(88.9)	
Educational Level			0.017
Illiterate (295)	17(5.8)	278(94.2)	
Primary (125)	13(10.4)	112(89.6)	
Secondary & Higher (180)	24(13.3)	156(86.7)	
Monthly Family Income (BDT)			0.143
≤5000 (321)	22(6.9)	299(93.1)	
5001-10000 (234)	27(11.5)	207(88.5)	
≥10001(45)	05(11.1)	40(88.9)	

BDT = *Bangladesh Taka*

The table 3 depicts the binary logistic regression analysis in order to understand the effect of some socio-economic and demographic factors on the good knowledge about the rational use of antibiotics. Out of three variables, the level of education was shown a significant predictor for the good knowledge about the rational use of antibiotics. It was noted that respondents with primary level of education were 1.949 (95% confidence interval CI: 1.272-2.986) times more likely to have a good knowledge about the rational use of antibiotics

compared to illiterate counterparts and it's was statistically significant ($p < 0.05$). The similar trend was observed in case of adults with secondary and higher educational level.

Table 3: Effect of socioeconomic and demographic factors on knowledge about the rational use of antibiotics

Variables	AOR	95% C.I.		p-value
		Lower	Upper	
Age in years				
$\leq 30^R$				
31-50	1.378	0.828	2.291	0.217
≥ 51	1.527	0.982	2.377	0.060
Educational level				
Illiterate ^R				
Primary	1.949	1.272	2.986	0.008
Secondary & Higher	1.394	0.863	2.249	0.002
Monthly Family Income (BDT)				
$\leq 5000^R$				
5001-10000	1.045	0.546	1.999	0.895
≥ 10001	0.932	0.484	1.796	0.833

R = Reference group

Table 4 represents the binary logistic regression analysis of the factors associated with the good practices about the rational use of antibiotics. The respondents with secondary and higher level of education were 2.516 (95% confidence interval CI: 1.928- 4.916) times more likely to had a good practices about the rational use of antibiotic compared to their illiterate counterparts and it's was statistically significant ($p < 0.05$) (Table 4).

Table 4: Effect of educational level on practice about the rational use of antibiotics

Variables	AOR	95% C.I.		p-value
		Lower	Upper	
Educational level				
Illiterate ^R				
Primary	1.898	0.892	4.037	0.096
Secondary & Higher	2.516	1.928	4.916	0.006

R = Reference group

DISCUSSION

The present study demonstrates the knowledge and practices about the rational use of antibiotics among rural adult peoples in Rajshahi district of Bangladesh. There was hardly any study on this issue in rural Rajshahi areas. However, in order to provide good health and family planning services, awareness generation of health and rational use of antibiotics in rural areas, the Bangladesh government had formulated the Community Clinic (CC) in 1998. In a CC, there were three health service providers such as Community Health Care Provider (CHCP), Health Assistant (HA) and Family Welfare Assistant (FWA) and four management committees namely one community group (CG) and three community support group (CSG). The major roles of these management committees were to involve in community clinic management, security, service quality improvement, awareness rising regarding health and rational use of antibiotics. It was expected that the rural adults living in the catchment area of community clinic were more knowledgeable and practicable about the rational use of antibiotics by the activities of CC but in reality, the present study was shown the opposite trends i.e. poor knowledge and practice about the rational use of antibiotics among the rural study population. One of the important roles of the CGs and HSPs of community clinic was to arrange health education session for increasing good knowledge and practices on health and awareness regarding the rational use of antibiotics rural adult's people. Unfortunately they didn't provide such kind of regular interventions till now.

Apart from the responsibilities of CC, the present study also focused on the socio-economic and socio-demographic associates of the knowledge and practice about the rational use of antibiotics. It was noted that the younger generation had a good knowledge about the rational use of antibiotics compared to older age groups and the similar results were found in Jordan and Malaysian population (Shehadeh *et al.*, 2012; Hassali *et al.*, 2017). The younger people may have the urge and/or easy access to mix with health provider and physician than their older people, who may have limited access. The respondents with higher level of education had a good knowledge and practices about the rational use of antibiotics and the similar result was noted in Swedish population (Vallin *et al.*, 2016). In fact, the educated people had an easy access to smart phone, browse internet, watch and read different types of print and mass media in compared to their illiterate counterpart. Apart from educational attainment of the studied adults, the monthly family income may have also played a significant role on the level of knowledge and practice of using antibiotics. It was observed that economically rich family had a good knowledge of using antibiotics compared to poor

rural adults. It may be due to the fact that the rich adults were involved in the managing committees of CC and they may influence the health service providers to get more benefits.

The present study was a cross-sectional community clinic based study, which did not permit us to create any complete progressive associations for identifying knowledge and practice about the rational use of antibiotics and several socioeconomic and demographic factors. This study suggested for more longitudinal research to realize this complex relationship and understand the fundamental tools. The policy maker, ministry of health and family welfare government of Bangladesh would take proper initiative to consider big sample this type of study. Electronic and print media can able to increase the knowledge and practice about the rational use of antibiotics. However, this study may be the first one to analyze the knowledge and practice of the rational use of antibiotics among rural people of Rajshahi district in Bangladesh. This study can be generalized to other rural parts of Bangladesh and can be treated as an important issue. It may be due to the fact that the multi drug resistance patients are increasing in Bangladesh (WHO, 2014b).

CONCLUSION

Therefore, it may be concluded from the present findings that only 9.0% people were properly aware and practice about the rational use of antibiotics and follow the advice of health service providers from community clinics. The education level may have played a vital role to increase the knowledge and practice towards antibiotics among the rural adults in Rajshahi district of Bangladesh. If antibiotics will not be used judiciously, society and future generations will indeed suffer. On the basis of the present study, we would suggest to introduce regular educational campaign about the rational use of antibiotics all over the country for generating more awareness. Involvement of mass media might be very effective in doing these campaigns. Health service providers should also be made conscious for avoiding unnecessary prescription of antibiotics and educating patients and their relatives about the rational use of antibiotics.

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