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Research article

A study on the prescribing pattern of antibiotics in rural area of Bangladesh

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Abstract

Objectives: Antibiotic resistance occurs naturally over time through genetic changes. However, the misuse and overuse of antibiotics are accelerating this process. In many places, antibiotics are overused or misused and often given without professional jurisdiction. This study was designed to analyze prescription patterns of antibiotics in rural area of Bangladesh and find out the ways to initiate national action plans to combat antibiotic resistance. **Material and Methods:** This study was conducted at Satkhira district of Bangladesh from July to October 2016 to accumulate data from 560 respondents. The data were collected by taking prescription details from patients or their relatives by face to face interview with them who were willing to respond. Statistical analysis was performed using statistical software package SPSS, version 23. **Results**: In current study, we found average 3.6 drugs prescribed per encounter and 68% prescriptions contained antibiotic products. Approximately 80% antibiotics were prescribed by general physicians (GPs) and rural medical practitioners (RMPs). Azithromycin was found as top prescribed antibiotic that contributed 16.8% of antibiotic prescriptions. Only 53% antibiotics were prescribed based on proper diagnosis and average number of antibiotics per prescription was 1.4. About 48% antibiotics were prescribed for 3-7 days, 31% for 2 days, and 21% for single day. We found 25.4% antibiotic prescriptions were coming from RMPs. **Conclusion:** Our study suggests that antibiotics are being prescribed without proper justification in rural area of Bangladesh. As a national priority, measures should be taken for the prevention of overuse or misuse of antibiotics to combat bacterial resistance.

Introduction

Since their introduction into medicine in the 1940s, antibiotics are possibly the most vital advancement in the history of medicine and undoubtedly they are the most prevailing part of medication [1, 2]. Their role has extended from treating serious infections to avoiding infections in surgical patients, defending cancer patients, and patients with compromised immune systems. Antibiotics also used in promoting growth and preventing diseases in many food animals. In least developed countries, about 20% of antibiotics are used in hospitals and other healthcare facilities, and 80% are used in the community, either prescribed by primary healthcare providers or purchased directly from nearby pharmacies without any prescription [3]. Antibiotics are the most commonly prescribed group of drugs in general practices and in hospitals as prophylactically or to treat current infections [4]. Despite the improved trend of healthcare in Bangladesh, infectious diseases remain as priority in public health problem.

Antibiotic resistance is a worldwide problem. The selection and spread of resistant organisms in developing countries that can often be traced to complex socioeconomic and behavioral antecedents contribute to the escalating problem of antibiotic resistance. Factors such as unregulated manufacturing and dispensing of antibiotics, truncated antibiotic therapy, inadequate access to effective drugs and sometimes overall poverty and drugs of questionable quality are likely to be contributing to antibiotic resistance [5]. Most antibiotics are prescribed based on the prescriber's decision as the best-guess empiric therapy. A majority of the prescribers in Bangladesh diagnose infection by clinical assessment and suspect a microbial etiology [6]. The important factors associated with antibiotic resistance are poor hospital hygiene, overpopulation, lack of resources and knowledge in infectious disease controlling.

Now, however, once-treatable infections are becoming difficult to cure, raising costs to healthcare facilities for both individuals and society, and patient mortality is rising due to uncontrolled antibiotic use. Antibiotics are

available as over the counter drugs and any antibiotics can be prescribed by any healthcare providers which are big challenges to overcome resistance. Most of the medicines including antibiotics in Bangladesh are prescribed by non-qualified or relatively less qualified health workers [7]. Many pathogens are becoming resistant to more than one antibiotic, and new or higher generation of antibiotics are expensive and often out of reach for those who actually need them. Antibiotic resistance is a direct result of antibiotic misuse or overuse. The prescription procedure of antibiotics in Bangladesh is not complying with global standard as prior identification of the pathogens and its sensitivity to the drug is rarely completed before antibiotic prescription [8]. Currently, pharmaceutical companies are the only organizations in Bangladesh who provide information to prescriber about medicines and it is often inappropriate information for them [9]. The greater the volume of antibiotics used, the greater the chances to develop antibiotic-resistant strains of bacteria for survival of the fittest at the bacterial level. Two things are contributing to a global increase of antibiotic consumption. First, rising incomes that helps to get access to costly antibiotics. Second, the increased demand of animal protein which leads to increase the use of antibiotics in agriculture, again driving resistance. Sporadic uses of antibiotics increases the chances to develop resistance [2]. In this regards, many experts believed that inappropriate, and overuse of antibiotics must be reduced to decrease the prevalence of bacterial resistance [10].

This survey based study was conducted to assess the prescription pattern of antibiotics in a rural area of Bangladesh for two main reasons. Firstly, whether a large number of lifesaving antibiotics are being used now-a-days with proper justification or not. Secondly, find out the way to overcome life-threatening antibiotic resistance due to irrational use.

Material and methods

This is a cross-sectional descriptive study conducted in six Upazila Health Complexes (UHCs) of Satkhira district in Bangladesh from July to October 2016. The sample size was 560 prescriptions during the study period. The data were taken by collection of prescription details from the patients or their relatives by face to face interview with them who were willing to respond for this study. The procedure also included a testing of 5% questionnaires of the total sample size in a place other than study area. Informed consent was required from the participants and confidentiality of the information was maintained. Statistical analysis was performed using the statistical software package SPSS, version 23.0 (SPSS Inc., Chicago, IL). Descriptive data has been given as frequencies and percentages.

Results

The socio-demographic characteristics of the respondents are shown in Table 1. Respondents had a mean age of 23.15 years (SD±12.57) and almost 50% of respondents were found within age of 18-44 years. Roughly 54% respondents were found below secondary level of education, whereas 19.5%, 12.5%, and 13.2% respondents had education equivalent to secondary, higher secondary and graduation or higher respectively. Among all respondents 59% were other than business or service holder. Approximately 81% respondents had family income below 25 KBDT and their mean income was 17.32 KBDT (SD±15.24).

The average number of drugs prescribed per prescription was 3.6. In 64.3% prescriptions, the range of drugs prescribed varied from 2 to 5. There was not a single prescription where no drug was prescribed. Antibiotics were prescribed in 68% prescriptions that constituted 21.3% of the total number of prescribed drugs. About 48% antibiotics were prescribed for 3 to 7 days therapy, 31% for 2 days, and 21% for one day. The recommended dosages of antibiotics were not mentioned in 15% prescriptions. General physician (GP) was found the most common prescriber of antibiotics and among all the available antibiotic prescriptions, 54.1% were from GPsfollowed by RMPs and their contribution was 25.4% (Figure 1). Azithromycin was found as the top prescribed antibiotic molecule followed by cefixime, cefuroxime and ciprofloxacin. Azithromycin was prescribed in 16.8% of all antibiotic prescriptions, whereas 13.9%, 12.9%,and 7.3% were for cefixime, cefuroxime, and ciprofloxacin (Figure 2). Among all prescriptions 34% antibiotics were found where proper diagnoses were not mentioned. Around 53% antibiotics were prescribed based on proper diagnosis and diagnosis was mismatched with prescribed antibiotics in 6% cases (Figure 3). The average number of antibiotics prescribed per prescription was 1.4. Among all antibiotic prescriptions we found that single antibiotic was prescribed in 49% prescription, two antibiotics were for 14%and three antibiotics were for remaining 5% prescription (Figure 4).

Discussion

The present study was conducted to explore the antibiotic prescribing pattern in rural area of Bangladesh. The main findings revealed that two third of all prescriptions contain two to five drugs and more than half of the prescriptions contain at least one antibiotic. The recommended dosage of antibiotic usage was not mentioned in about 15%of the prescriptions.

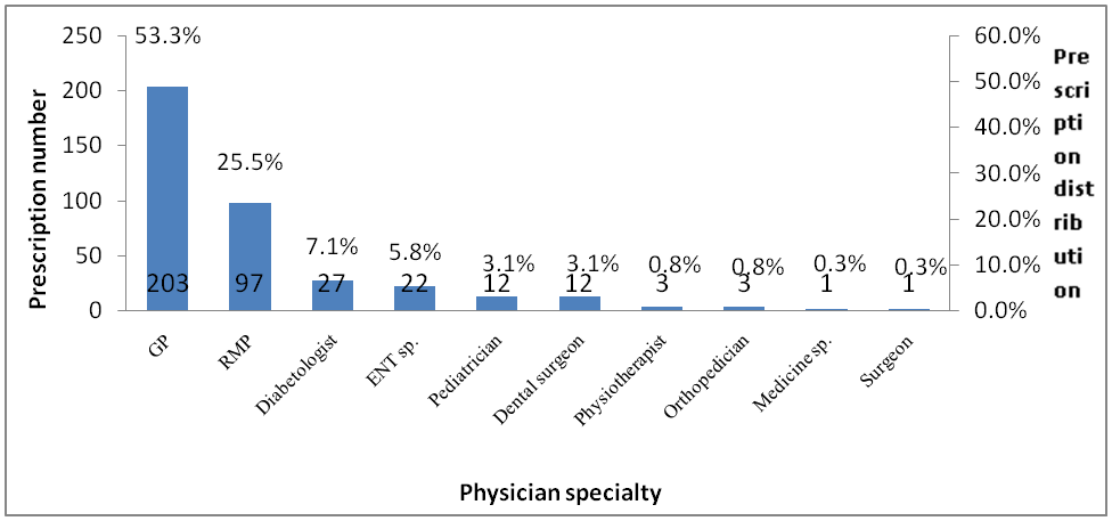

Figure 1: Antibiotic prescribers in rural area of Bangladesh

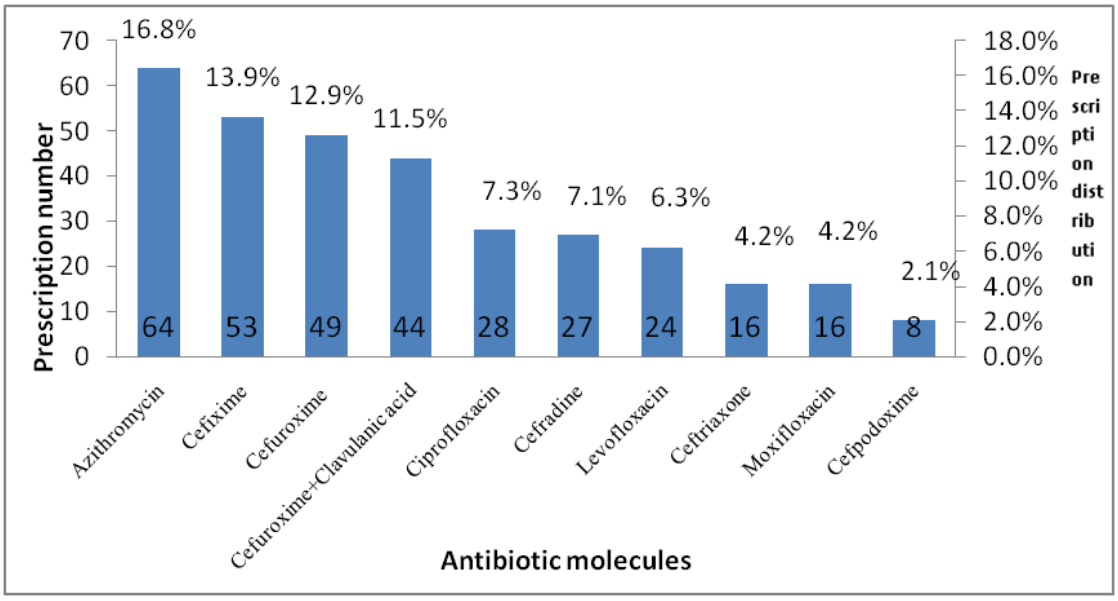

Figure 2. Ten most common antibiotics prescribed in rural area of Bangladesh

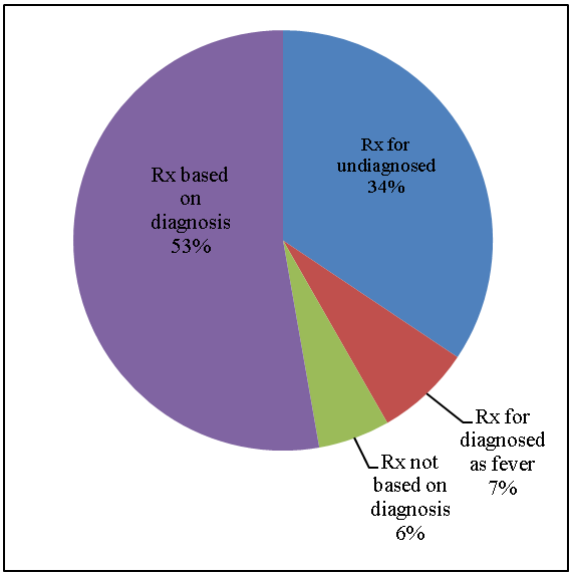

Figure 3. Antibiotic prescriptions based on diagnosis.

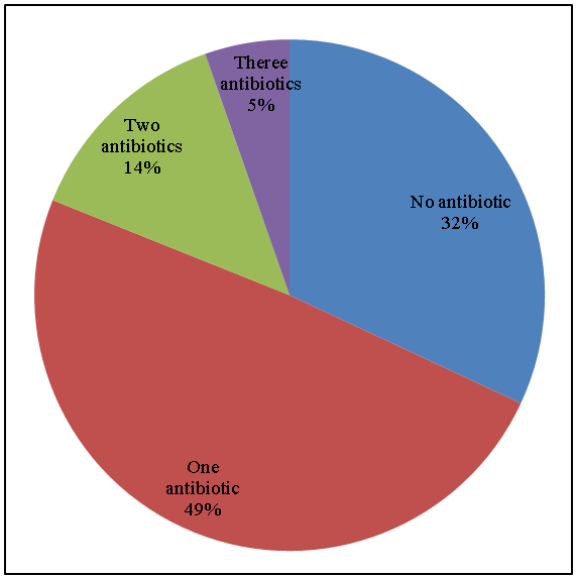

Figure 4. Distribution of antibiotic containing prescriptions

Table 1. Socio-demographic characteristics of the respondents

Parameters		Respondents (n=560)		
		n	%	Mean±SD
Age in years	Below 18	134	24	23.15±12.57
	18-24	108	19	
	25-34	90	16	
	35-44	84	15	
	45-60	68	12	
	Above 60	76	14	
Gender	Male	267	48	N.A
	Female	293	52	
Education	Illiterate	165	29	
	Can read only	142	25	
	Secondary	109	20	
	Higher secondary	70	12	
	Graduate and above	74	13	
Occupation	Service	95	17	N.A
	Business	134	24	
	Student	125	22	
	Others	130	23	
	Jobless	76	14	
Monthly income in KBDT	Below 10	216	39	17.32±15.24
	10-25	234	42	
	26-40	84	15	
	Above 40	26	5	

Diagnoses were not properly written in half of the prescriptions which suggest most of the prescriptions were not following rational prescribing protocols and absence of diagnosis in prescriptions is a serious challenge for evaluation of rational prescribing and establishing better strategies for decreasing antibiotic resistance. This finding is similar to some other findings. One study reported that proper diagnoses were missing in 69% prescriptions [11]. Our finding is also supported by another two studies where they published that diagnoses were not present in 75.9% [12] and 69.58% [13] prescriptions respectively. Absence of hospital antibiotic use protocol, proper sensitivity data and unfitting usage as prophylaxis are the main reasons for wrong antibiotic therapy [14]. A significant portion of prescriptions was prescribed by non-qualified doctors, which is another great challenge for us to implement any strategy to prevent increasing antibiotic resistance. Pediatric patients are commonly affected by inappropriate prescribing of antibiotics. In a study it was shown that 26% of procured drugs were antibiotics for children aged within four years and 48% of these antibiotics were procured in quantities less than daily dose [15]. We found average 3.6 drugs per prescription; however, a previous study from Bangladesh has reported a figure of1.4 drugs per encounter [16]. Another study reported average 3.5 drugs per prescription in Pakistan [11]. But average 3.6 drugs per encounter in the present study which is higher than there commended limit of 2.0 suggested by WHO [17]. In present study more than half of antibiotic prescriptions are coming from general physicians. This is similar to another study finding in India and they reported that 67.1% antibiotics are prescribed by general physicians [11]. Our current study revealed that among all antibiotic prescriptions 16.8% is azithromycin which is mainly prescribed by GPs and RMPs without considering proper rationality. That's why, in Bangladesh, azithromycin was found 100% ineffective in wound and urine infections and 95% cases Escherichia coli was resistant to azithromycin due to over use or misuse of this antibiotic [18]. We found single antibiotic was prescribed in 49% prescriptions, two antibiotics in 14% prescriptions and three antibiotics were prescribed in the remaining 5% prescriptions. Similar data reported in another study that in Bangladesh one antibiotic was prescribed in 43% prescriptions, double antibiotic was prescribed in 15% prescriptions and 3% for three antibiotics [19].

Irrational use of antibiotic remains the key factor in the development and spread of resistant organisms. Appropriate use of antibiotics is necessary to prevent emergence of drug resistant bacteria. Our figure of 68% prescriptions having an antibiotic which is much higher than some other study results conducted in Bangladesh [16], India [20], Lebanon [23], Nepal [24], and Tanzania [25] (17.5 % to 39.6%). In the present study, limited information was provided in the prescription regarding the duration of antibiotics and clinical diagnoses; one of the reasons may be the inclusion of 25.5% of antibiotic prescriptions from non-qualified practitioners. A study in USA revealed that 21% of all prescriptions contained at least one prescription writing error [26]. The limited

information on clinical diagnoses, course of antibiotics and others advices do not help to promote rational use antibiotics to combat emerging microbial resistance. Moreover, incomplete information hinders patients' antibiotic taking compliance [27]. Antibiotic resistance mechanisms are emerging and spreading globally that threatening our capability to treat common infectious diseases, causing in lengthy illness, disability, and mortality. Without effective antibiotics for the prophylaxis and treatment of infections, medical processes such as organ transplantation, diabetes management, cancer chemotherapy, and major surgery become very risky.

Prescribing three or more drugs increases the risk of drug interactions, dispensing errors, and proper comprehension of the correct dosage and moreover, development of antibiotic resistance [20]. Such irrationalities in prescribing medicines and limited advice given to patients indicate that traditional teaching in medical schools and continuing professional development do not equip students and physicians for rational medication [16]. This is probably because their pharmacology training has more emphasis on theory than on practical aspects of prescribing [21, 22].

Conclusion

The present study identified potential problems in prescription pattern of antibiotics, overuse or misuse of this medicine and their consequences on human health in rural area of Bangladesh. The findings of our current study demand a large-scale investigation on the pattern of antibiotic prescriptions in the similar parts of Bangladesh to support these findings. Antimicrobial stewardship program can be initiated to motivate and train medical students, practitioners and allied healthcare professionals regarding safe and effective prescribing to combat antibiotic resistance. Strengthening the capacity of government institutions and regulatory bodies (e.g. DGDA and DGHS) to oversee the justification of antibiotic prescription and implementation of national action plans on antibiotic use to control inappropriate use of it. In the long run, this will help to reduce antibiotic resistance as well as economic loss of the country as antibiotic resistance increases the cost of healthcare with lengthier stays in hospitals.

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