Prescribing Practice of Antibiotics for Outpatients in Bangladesh: Rationality Analysis

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Abstract

Background: Antibiotic prescribing practice by physicians has abruptly increased globally due to increase in antibiotic usage and prevalence of drug resistances. Rational prescribing is mandatory to reduce drug resistance. Rationality analysis of prescribing drugs can help to point towards irrationality and can make a consensus among physicians for rational prescribing.

Objectives: The aim is to evaluate the pattern of antibiotic prescribing based on rationality, their usages in various disease conditions among different level of private practitioners in Dhaka city.

Methods: This observational study was carried out with a self-designed standard questionnaire by manual data collection over a 24 months period (01.01.2016 to 31.12.2017).The data were collected from the patient's prescription and directly interviewing the patients who were prescribed at least one antibiotic during the study period. WHO/INRUD prescribing indicators were used and descriptive statistics were applied to the collected data and analyzed using Microsoft Excel software.

Results: A total of 2,000 prescriptions were analyzed during the study period. Extreme aged patients were prescribed more antibiotics. Commonly prescribed antibiotic groups were cephalosporin (36.00%), macrolides (25.50%), quinolones (21.00%), penicillins (7.50%), and metronidazole (10.00%). 55.25% prescriptions had complete information on dosage form, 65% had complete direction for antibiotics use and 66.5% patients were completed full course of antibiotics. Although 81% prescriptions have no clinical test for using antibiotics, even though the percentages of patients disease recovery were 66% and incompliance were 34%.

Conclusion: The study pointed a need for national guidelines for the treatment of common diseases to maintain rationality in prescribing antimicrobial agents and a large surveillance on antimicrobial prescribing appropriateness is warranted.

Keywords: Antimicrobial prescribing; Rationality; Surveillance

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Introduction

Antibiotics are most extensively used drugs. Wide ranges of antibiotics are available to treat various types of infections. The choice of antibiotics is available to treat various types of infections [1]. Antibiotics have effectively prolonged the life expectancy and are currently the most commonly prescribed drugs in hospitals, worldwide [2]. But excessive and inappropriate use of antibiotics renders increased drug resistance [3-5]. The rational use of antibiotics is a major health need.

Almost half of all antibiotics prescribed were found to be inappropriate based upon clinical and financial criteria. Inappropriate use involves both over use and under use, which may be responsible in part for raising global incidence of microbial resistance to commonly prescribed antibiotics.

In a developing country like Bangladesh, the cost of health care is a key cause for concern. The practitioners should be made aware of the importance of combination therapy in the treatment of certain infections. So the chance of resistance development can be ameliorated to the most possible extent. Many studies have implicated that the antibiotics are among the major group of drugs, which cause Adverse Drug Reactions (ADRs) [6]. Many doctors in Bangladesh are prescribing antibiotics irrationally without taking consideration the clinical test in most cases. Subsequently the patients

are not completing the complete dosage regimen of antibiotics, if it is given in cold and general fever or even in other complicated infectious diseases.

The study of prescribing pattern of antibiotics infers to monitor, evaluate, and suggest modifications in the practitioner's prescription habits, so as to make patient care reasonable and effective [7]. The knowledge about antibiotic utilization patterns is necessary for a constructive approach to problems that arise from multiple antibiotic usages. It is extremely important that institutions and hospitals should have an antibiotic policy and ensure that the best choices are made by individual prescribers [8].

The aim of this study is to analyze and justify whether antibiotics are being prescribed rationally or irrationally for outpatients as well as to indicate the prevalence of most prescribed antibiotics in Bangladesh.

Materials and Methods

The observational study was carried out in the department of pharmacology, Uttara Adhunik Medical College (UAMC) during the period January 2016 to December 2017. Fifty medical students (4th year) of UAMC of the 2015 to 2016 academic year were divided into 5 groups. Each group was asked to collect 400 prescriptions of the registered physicians, specialists and quacks (village health personnel) from different area of Dhaka City. Total 2,000 prescriptions were collected during their academic year.

Written consent was taken from each patient during this study. Data were collected from the patients by random selecting the patients who came to buy the drugs from the medicine shops. The patients who were unconscious/mentally retarded, who were suffering with psychiatric diseases and who were admitted into hospitals were excluded from the study. Few questionnaires were excluded during the data analysis because of inadequate information.

Results

From this study it was found that averagely 29% patients visited Bachelor of Medicine & Bachelor of Surgery (MBBS) doctors, 63% visited (Quack doctors) whereas only 8% visited Bachelor of Dental Service (BDS) doctors. The highest percentage of patients paid a visit to quack doctor and the lowest percentage of patients paid a visit to BDS doctors shown in Table 1.

Among the patients 61% were male and 39% were female. In this study, males were prescribed 22% more antibiotics than females shown in Table 2.

Children aged from '0' years to 15 years old took the highest percentage of antibiotics (55.25%) followed by people aged above 60 years (33.25%) whereas young people aged 16 to 60 years took the least percentage (11.50%) of antibiotics shown in Table 3.

The reasons for taking the antibiotics were due to suffering from upper respiratory tract infections (32%), cold and fever (28%), diarrhea (15%), STDs (4.50%), HTN (6.5%), UTIs (5%), Diabetes (3%), lower respiratory infections (2%) and others diseases (4%) (Table 4).

The average highest prescribed antibiotic groups were cephalosporin (36.00%) macrolides (25.50%) quinolones (21.00%) penicillins (10.00%) and metronidazole (9.80%) respectively (Table 5). This antibiotic was prescribed for the patients suffering mainly

Table 1: Prescriptions obtained from different health care professionals.

Variable	Frequency of prescriptions (%) n=2000
MBBS	580 (29%)
BDS	160 (8%)
Village healthcare personel (Quack)	1260 (63%)

Table 2: Gender variability of participants prescribed with antibiotics.

Gender distribution	Frequency (%) n=800
Male	488 (61%)
Female	312 (39%)

Table 3: Age distribution of respondents prescribed with antibiotics.

Age distribution (years)	Frequency (%) n=800
0-15	442 (55.25%)
16-60	90 (11.25%)
>60	268 (33.50%)

Table 4: Reasons for visiting doctors.

Name of diseases	Frequency (%) n= 800
Cold and fever	224 (28%)
Upper respiratory infection	256 (32%)
Diarrhea	120 (15%)
STDs	36 (4.5%)
HTN	52 (6.5%)
UTI	40 (5%)
Diabetes	24 (3%)
Lower respiratory infection	16 (2%)
Other diseases	32 (4%)

Table 5: Prescribed antibiotic groups.

Name of prescribing antibiotics	Frequency (%) n=800
Cephalosporin	288 (36.00%)
Macrolides	204 (25.50%)
Quinolones	168 (21.00%)
Metronidazole	80 (10.00%)
Penicillins	60 (7.50%)

from infections like Respiratory Tract Infections (RTI), Urinary Tract Infections (UTI), Diabetes, etc.

Single antibiotic was prescribed in 28.50% of prescription whereas two or more antibiotics were prescribed in 11.50% of prescriptions. A 55.25% prescriptions contained complete information regarding dosage form, 65.00% had complete direction for antibiotics use and 81.00% prescriptions had no laboratory clinical test for prescribing antibiotics. A 66.5% patients completed full course of antibiotics and the percentage of recovery from disease was 66% whereas significant percentage of patients (34%) complained side effects after taking the prescribed antibiotics (Table 6).

Discussion

Highest percentage of patients (63%) visited village health care personel because of the presence at root level in Bangladesh where patients found them easily, a lot of village doctor's practice there. Due to low facilities and life status, very few MBBS doctors are found away from Dhaka city that is reflected in the survey results. Quack doctors

Table 6: Prescription and usages pattern of antibiotics.

Variable	Response pattern	Frequency n=800	Percentage (%)
Pattern of antibiotics	Single antibiotic	570	71. 25%
	Multiple antibiotics	230	28. 75%
Prescription Information on dosage form	Complete	442	55.25%
	Incomplete	300	37.50%
	Not mentioned	58	7.25%
Information about the direction for antibiotic use	Complete direction	520	65%
	Incomplete direction	280	35%
Laboratory clinical test for prescribing antibiotics	With test	152	19
	Without test	648	81
Completion of full antibiotic course	Yes	532	66.50%
	No	268	33.50%
Patient's compliance	Recovery from diseases	528	66%
	Incompliance	272	34%

are abundant in village and patients have to pay minor fees for their visit, as a consequence highest percentage of patients visited Quack doctors.

Males were prescribed (61%) more antibiotics than females (39%). Higher prevalence of antibiotics in males also had been observed in previous studies conducted in Nepal and Bangladesh [7,9]. Antibiotics prescription rates in this study were found to be particularly high in the pediatric (55.25%) and geriatric populations (33.50%) perhaps because these populations are more prone to infections [10]. Furthermore, established guidelines suggest that antibiotics should not be the choice of treatment in most diarrhea cases and they should be used if infection with bacteria is observed [11,12].

In our research it was found that cephalosporins accounted 36.00% of total antibiotic prescriptions which is high as compared to the study conducted in Nepal and Turkey but low than India [7,8,13]. The highest uses of antibiotics were cefixime, cefuroxime and ceftriaxone for respiratory infections and other infections. This probably explains why ceftriaxone and cefixime have abnormally high resistances [14,15]. Acute respiratory tract infection was the condition associated most frequently with prescription of antibiotic, a result which substantiates findings from other Asian countries [8,16,17]. Results are also consistent with findings in China, where low-severity illness was a major reason for giving children antibiotics [16]. This is probably a result of aggressive marketing policies of Bangladeshi Pharmaceutical Companies on the physicians combined with inadequate knowledge of current treatment guidelines. The second highest prescribed antibiotics were macrolides. The third highest prescribed quinolones (21.00%) were levofloxacin, sparfloxacin and ciprofloxacin which is high compared to study conducted in India and Nepal [7,8].

In Bangladesh many doctors are not prescribing antibiotics following the prescription guidelines of antibiotics. As a result, sometimes antibiotics are being prescribed irrationally here to give quick relief of the patients without taking consideration of the patient's disease condition. This is because antibiotics are the most commonly used and misused drugs by patients and prescribers [18]. Physicians prescribe maximum antibiotics for outpatients in Bangladesh without clinical test (81%) and without giving complete

direction for antibiotic use (35%) but the percentage of patient's recovery from diseases were 66%. This is because of the physician's long service experiences as well as the broad spectrum nature of the prescribed antibiotics. This kind of antibiotic prescription habit of physicians may increase the misuse of antibiotics and resistance as well. Hospitals also account for antibiotic misuse worldwide due to non-evidence based practice [19-23]. Our survey based research also reveals that significant percentage of patients receiving antibiotics in Bangladesh which is relevant to the reports on antibiotic usages in other parts of Asia, Europe or America because antibiotics are considered as the second most prescribed drugs in the world, only next to the drugs indicated for cardiovascular diseases [9,10,24-26]. In a study in Vietnam in 1997, researchers discovered that more than 70% of patients were prescribed with inadequate amounts of antimicrobials for serious infections. In Turkey, 15% to 20% of all prescribed drugs were antibiotics. In China, researchers found that 63% of antimicrobials selected to treat proven bacterial infections were simply the wrong choice. The same is true even for the countries like Canada and the United States which developed their antibiotic usage control mechanisms. In these countries, it is estimated that physicians also over-prescribe antibiotics (50%) [13].

Conclusion

Because of irrational use of antibiotics leads to the spread of bacterial resistance to antibiotics and develops complicated health problems, our findings have important implications for public education and the enforcement of regulations regarding the prescription of antibiotics in Bangladesh. The study also urges the physician to be more professional and careful when antibiotic is prescribed for the outpatients. Effective strategies should be taken by the Government of Bangladesh to reduce the use of antibiotics which could include the development of policies to support the judicious use of antibiotics, strengthen the control of antibiotics selling and to implement educational campaigns for rational prescribing.

References

1. Rubin RP. A brief history of great discoveries in pharmacology: in celebration of the centennial anniversary of the founding of the American Society of Pharmacology and Experimental Therapeutics. Pharmacol Rev. 2007;59(4):289-359.

2. Park SH. Is Antibiotic resistance microorganism becoming a significant

problem in acute cholangitis in Korea? Clin Endosc. 2012;45(2):111-2.

3. Faryna A, Wergowske GL, Goldenberg K. Impact of therapeutic guidelines on antibiotic use by residents in primary care clinics. J Gen Intern Med. 1987;2(2):102-7.

4. Gonzales R, Bartlett JG, Besser RE, Hickner JM, Hoffman JR, Sande MA. Principles of appropriate antibiotic use for treatment of nonspecific upper respiratory tract infections in adults: background. Ann Intern Med. 2001;134(6):490-4.

5. Hiramatsu K, Hanaki H, Ino T, Yabuta K, Oguri T, Tenover FC. Methicillin-Resistance Staphylococus aureus clinical strain with reduced vancomycin susceptibility. J Antimicrob Chemother. 1997;40(1):135-6.

6. Padmaja U, Adhikari P, Pereira PA. Prospective Analysis of Adverse Drug reactions in a South Indian hospital. Online J Health Allied Sci. 2009;8(3):12.

7. Shankar RP, Partha P, Shenoy NK, Easow JM, Brahmadathan KN. Prescribing patterns of antibiotics and sensitivity patterns of common microorganisms in the Internal Medicine ward of a teaching hospital in Western Nepal: A prospective study. Ann Clin Microbiol Antimicrob. 2003;2:7.

8. Remesh A, Salim S, Gayathri AM, Nair U, Retnavally KG. Antibiotics prescribing pattern in the in-patient departments of a tertiary care hospital. Pharma Pract. 2013;4(2):71-6.

9. Vaccheri A, Bjerrum L, Resi D, Bergman U, Montanaro N. Antibiotic prescribing in general practice: Striking differences between Italy (Ravenna) and Denmark (Funen). J Antimicrob Chemother. 2002;50(6):989-97.

10. Chang SC, Chang HJ, Lai MS. Antibiotic usage in primary care units in Taiwan. Int J Antimicrob Agents. 1999;11(1):23-30.

11. Diagnosis and Treatment of Respiratory illness in children and adults. ICSI. 2008.

12. Guidelines for New Diarrhea Treatment Protocols for Community Based Healthcare Workers-A generic guide to be translated into country specific, indigenous languages using appropriate local terminology-Center for Population. Health and Nutrition of the Bureau for Global Programs, Field support and Research of the U.S. Agency for International Development (USAID).

13. Karabay O, Özdemir D, Güçlü E, Yıldırım M, İnce N, Küçükbayrak A, et al. Attitudes and behaviors of Family Physicians regarding use of antibiotics. J Microbiol Infect Dis. 2011;1(2):53-7.

14. Rashid A, Chowdhury A, Sufi HZR, Shahin AB, Muazzam N. Infections by Pseudomonas aeruginosa and Antibiotic Resistance pattern of the isolates from Dhaka Medical College Hospital. Bangladesh J Med Microbiol. 2007;1(2):48-51.

15. Taslima TL, Sabita RR, Donald JG. Multiple antibiotic resistance mediated by plasmids and integrons in uropathogenic Escherichia coli and Klebsiella pneumoniae. Bangladesh J Microbiol. 2007; 24(1):19-23.

16. Bi P, Tong S, Parton KA. Family self-medication and antibiotics abuse for children and juveniles in a Chinese city. Soc Sci Med. 2000;50(10):1445-50.

17. Okumura J, Wakai S, Umenai T. Drug utilization and self-medication in rural communities in Vietnam. Soc Sci Med. 2002;54(12):1875-86.

18. Chambers HF. General Principles of antimicrobial therapy. In Goodman and Gillman's The pharmacological basis of therapeutics. 11th ed. Edited by: Brunton LL, Lazo JS, Parker KL. New York: McGraw-Hill, USA. 2006;1095-111.

19. Stein CM, Todd WT, Parirenyatwa D, Chakonda J, Dizwani AG. A survey of antibiotic use in Harare primary care clinic. J Antimicrob Chemother. 1984;14(2):149-56.

20. Aswapokee N, Vaithayapichet S, Heller RF. Pattern of antibiotic use in medical wards of university hospital, Bangkok, Thailand. Rev Infect Dis. 1990;12(1):136-41.

21. Kunin CM, Johansen KS, Worning AM, Daschner FD. Report of a symposium on use and abuse of antibiotics worldwide. Rev Infect Dis. 1990;12(1):12-9.

22. Zara C, Alerany C, Verger G. Use of restricted antibiotics in primary care. DICP. 1991;25(6):662-7.

23. Yang YH, Fu SG, Peng H, Shen AD, Yue SJ, Go YF, et al. Abuse of antibiotics in China and its potential interference in determining the etiology of pediatric bacterial diseases. Pediatr Infect Dis J. 1993;12(12):986-8.

24. Elaine L, Lin SX, Cabilia GD. Antibiotic Use in Hispanic Households, New York City. Emerg Infect Dis. 2003;9(9):1096-102.

25. Dimiņa E, Kūla M, Caune U, Vīgante D, Liepiņš M, Zeidaka L, et al. Repeated prevalence studies on antibiotic use in Latvia, 2003-2007. Euro Surveill. 2009;14(33).

26. Tünger O, Dinç G, Ozbakkaloglu B, Atman UC, Algün U. Evaluation of rational antibiotic use. Int J Antimicrob Agents. 2000;15(2):131-5.