

Patterns of antibiotic use among appendectomy patients in the community: a prescription-based survey in a Bangladeshi urban hospital

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Abstract: A survey of 141 appendectomy patients, 71 male and 70 female, in Dhaka City was carried out to assess the frequency of inappropriate antimicrobial therapy which was used to prevent post surgical bacterial infection. Among 141 patients 83.7% (118) was in the age range 26-55 years; and female patients were higher (55%) than male (45%). Hospitalized patients prescriptions were analyzed to obtain information of the use of antibiotics. It was found that eight different types of antibiotics were used; and they were Ceftriaxone, Metronidazole, Amikacin, Cefixim, Gentamicin, Clindamycin, Flucloxin and Ceftazidime. Among the used antibiotics Cefixim and Ceftriaxone were prescribed for all patients. Different antibiotic combinations such as 2 antibiotics, 3 antibiotics, 4 antibiotics and 5 antibiotics were used for the test subjects to treat post operative infections; no single antibiotic was found to prescribe for any case. Among these various combinations 2 antibiotic combination was used for 64.5% patients then followed 3 (22.7%), 5(7.8%) and 4 (5.0%) antibiotic combination. Finally our study demonstrated that inappropriate antibiotic use was found higher (77.8%) than standard use (32.2%). Inappropriate use consisted overuse (22.9%) and underuse (44.9%) of antibiotics for post operative treatment of appendectomy patients. Underuse was found higher than overuse (44.9%>22.9%). Inappropriate use of antibiotics plays major role in the development of drug resistance. These findings support future community-oriented educational interventions aimed at improving physician prescribing practices behaviour in order to achieve a more rational use of antibiotics.

Key Words: Antibiotic, Appendectomy, Misuse, Overuse, Underuse.

1. INTRODUCTION:

Antibiotics, also known as antibacterial, are medications that destroy or slow down the growth of bacteria. Antibiotics are not a substitute for definitive treatment but their use can shorten infection periods & minimize associated risks such as the spread of infection to adjacent anatomical spaces or systemic involvement [1]. Antibiotic misuse sometimes called antibiotic abuse or antibiotic overuse, is a contributing factor to the development of antibiotic resistance, including the creation of multidrug-resistant bacteria, informally called "super bugs"[2]. In the absence of the development of new generations of antibiotic drugs, appropriate use of existing antibiotics is needed to ensure the long term availability of effective treatment for bacterial infections [3]. If antibiotics become ineffective, newly emerging infectious diseases are becoming an increasing threat which may lead to increased morbidity and premature mortality [4]. Injudicious prescription of antibiotics by doctors, healthcare workers & patients using it on their own has resulted in emerging microbial resistance to various antibiotics and this trend is likely to continue [5]. In developing countries, antibiotics are prescribed to 44-97% of patients in hospital, which are often unnecessary [6]. WHO has considered the emergence of resistance microorganisms as a serious global health concern [7]. In fact, the WHO has stated that high priority should be given to interventions in the general community that can eliminate risk factors for resistance, such as misuse of antibiotic agents [8].

Worldwide, it is estimated that over half of all medicines are prescribed, dispensed or sold inappropriately and that half of all patients fail to take their medicine correctly [13, 14]. An estimated two-thirds of global antibiotic sales occur without any prescription, and studies in Indonesia, Pakistan and India show that over 70% of patients were prescribed antibiotics- and a great majority - up to 90% - of injections are estimated to be unnecessary [12]. In a study undertaken in Vietnam in 1997, researchers discovered that more than 70% of patients were prescribed with inadequate amounts of antimicrobials for serious infections. In Turkey, 15-20% of all prescribed drugs are antibiotics. In China, researchers found that 63% of antimicrobials selected to treat proven bacterial infections were simply the wrong choice [18]. Inappropriate use of medicines, and the related illness and deaths, are not restricted to low-income countries. Studies in high income countries like Canada, Australia, Kuwait and the USA, as well as in middle-income

countries such as South Africa and Thailand, have revealed that inappropriate use of medicines is widespread in teaching hospitals [13]. In many countries, the problem extends well beyond hospitals. In USA, it is estimated that physicians over-prescribe antibiotics by 50% [15]. To date, the rate of antibiotic resistance has steadily risen in North America [8]. In United States, a report says physician overprescribing for acute respiratory symptoms was common in Spanish emergency rooms; the percentage of inappropriate prescriptions was 34.7% for non specified acute respiratory infections in 11 hospitals [10, 11].

In Bangladesh many doctors are not prescribing antibiotics by following proper prescription guidelines of antibiotics. As a result, sometimes antibiotics are prescribed irrationally to give a quick relief to the patients without taking consideration of the patient's disease condition [16]. Physicians mostly prescribe broad spectrum antibiotics with only their long year's service experience [17]. This kind of antibiotic prescription habit of physicians not only increase antibiotic misuse pattern, but also increase resistance as well.

The present survey based study aims to assess the current antibiotic prescription pattern in local communities of Bangladesh. A one month study result over a general practitioner's surgery indicated a loophole in maintaining standard antibiotic guidelines or rationality. This is an alarming situation which should be properly taken care of by the relevant authority to save the people from growing antibiotic resistance.

2. MATERIALS:

Research site

The study site was Dhaka city situated in the centre of Bangladesh and the divisional headquarters of Dhaka Division. Dhaka Division is an administrative division within Bangladesh. The capital and largest city is Dhaka. The division covers an area of 31,051 km², and has a population of 46,729,000. Dhaka, also spelled Dacca, city and capital of Bangladesh. It is located just north of the Buriganga River, a channel of the Dhaleswari River, in the south-central part of the country. Dhaka is Bangladesh's most populous city and is one of the largest metropolises in South Asia. Dhaka consists of 47 Thanas. From a hospital located in Motijheel, Dhaka was selected for the collection of prescription base data.

3. METHODS:

3.1 Study design and data collection

Patient's base cross-sectional study was conducted in the Dhaka in September' 2016-October' 2016. For this purpose, a self-designed medical prescription based questionnaire was developed. The questionnaire contained some basic variables: age and sex of patients, type of surgery, types of antibiotics prescribed, dosage, frequency and duration of use of these antibiotics for appendectomy patients management. For this study 141 appendectomy patients were selected; and their prescription and discharge certificates were collected. Written consent was taken from each patient for this cross sectional study.

3.2 Data Analysis and Ethics

All data were entered into Microsoft Excel 2007 and IBM SPSS version 18 (IBM Corporation, Armonk, NY, USA) to analyze degree of antibiotic misuse. Written consent was taken from each patient for this cross sectional study.

4. RESULTS:

The aim of our study was to identify prescription base antibiotic misuse pattern (overuse, underuse or standard use) through medical practitioners among surgery patients in Bangladesh. For this study we selected appendectomy patients. Total 141 patients from Islami Bank Hospital, Motijheel, Dhaka were considered as test subjects to analyze antibiotic misuse. Among the subjects 50.4% (71) were male and 49.6% (70) were female. Fig-1 stated that male and female participants numbers were almost equal.

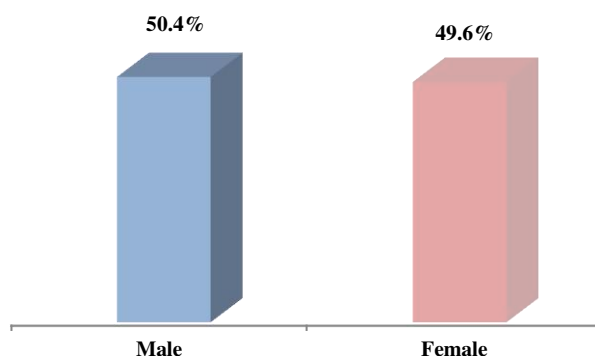


Fig-1: Percentage of gender distribution among subjects

In Fig-2 it was observed that appendectomy patients number 46 (32.6%) was highest in 36-45 years age group and then followed 26-35 years age group (31.2%), 46-55 years age group (19.9%), 16-25 years age group (10.6%); and 6-15 and 56-65 years age groups consisted 2.1% individually. Lowest percentage (0.7%) of appendectomy patients found in the 66-75 and 76-85 years age group. Appendectomy patients were found more in the age boundary 26 to 55 years. Among them female patients were found more (46.1%).

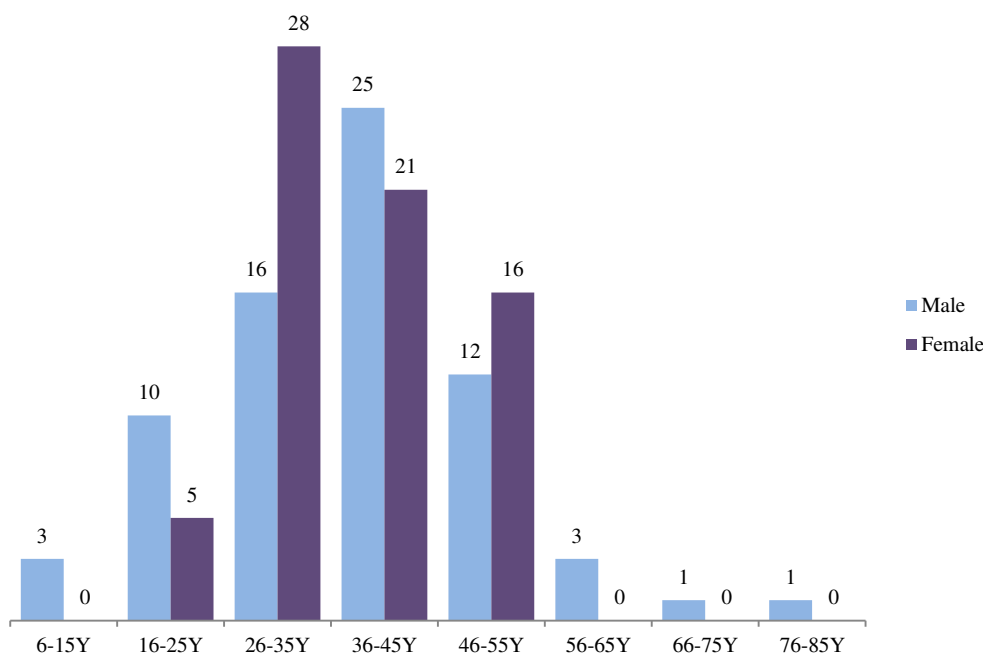


Fig-2: Number of male and female patients in different age groups

Fig-3 showed that 91 patients (64.5%) among 141 were prescribed two antibiotics, 32 patients (22.7%) three antibiotics, 7 patients (5.0%) 4 antibiotics and 11 patients (7.8%) five antibiotics. Use of one antibiotic and more than five antibiotics found zero in our study.

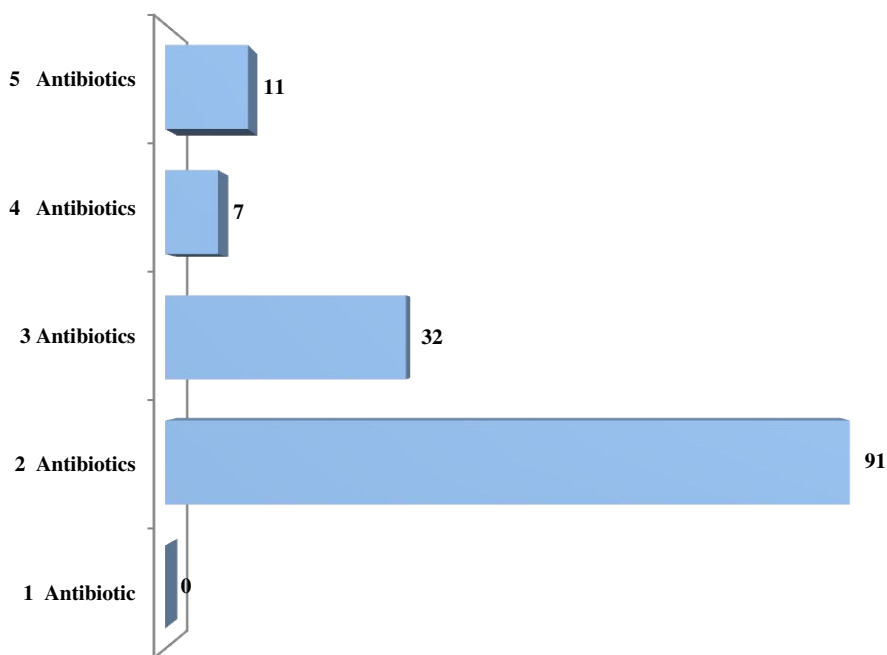


Fig-3: Spectrum of prescribed antibiotics for patients

Fig-4 showed that Cefixime and Ceftriaxone were used mostly. They are third generation cephalosporin. After these two cephalosporin drugs then followed Metronidazole, Amikacin, Clindamycin, Gentamicin, Flucloxacillin and Ceftazidime. Fig-3 showed two antibiotics combination used for 64.5% patients and Fig-4 identified them as Cefixime and Ceftriaxone.

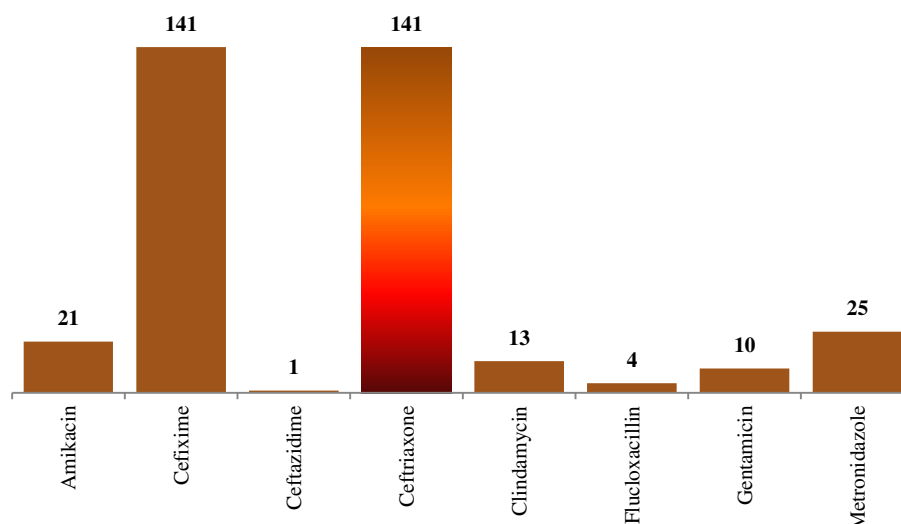


Fig-4: Antibiotics occupancy diagram in the prescription of appendectomy patients for post operative purposes

Fig-5 demonstrated that misuse of antibiotics were very high (77.8%). Misuse consisted overuse (22.9%) and underuse (44.9%) of antibiotics for post operative treatment of appendectomy patients. Underuse found high in comparison with overuse (44.9% > 22.9%). Standard use of antibiotic was found for 32.2% patients.

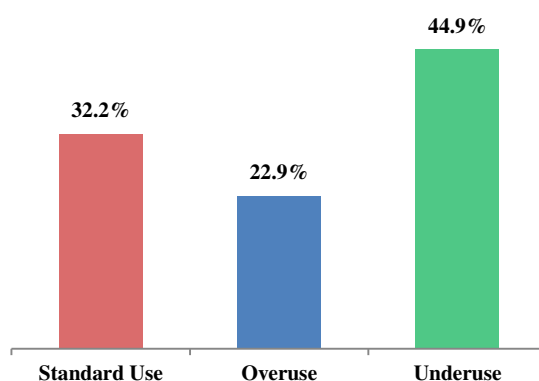


Fig-5: Antibiotic use pattern

5. DISCUSSION:

Amid growing concern over drug-resistant superbugs, the World Health Organization (WHO), communities, health workers, and government officials around Asia and the Pacific are joining together in calling for overuse and misuse of antibiotics to stop. Antibiotic resistance is rising to very concerning levels in all parts of the world, threatening the ability to treat common infections. Pneumonia, tuberculosis, blood poisoning and gonorrhoea, and infections that affect animals, are becoming harder, and sometimes impossible, to treat as antibiotics become less effective. When bacteria in the body of a human or animal are exposed to antibiotics, they change to resist the effect of the drug. The more antibiotics are used, the faster resistance develops. Antibiotic-resistant bugs then spread between humans and animals through direct contact, food, or the environment [19].

To assess the overuse or misuse of antibiotic in Bangladesh we studied antibiotic usage pattern among appendectomy patients. Appendicitis is occurred due to inflammation of the appendix [20]. Appendicitis is the result of the blockage of the hollow portion of the appendix [21]. Most frequently it is occurred due to a calcified stone made of feces [22]. Tumors, gallstone, inflamed lymphoid tissue may form the blockage [22]. Most common symptoms are abdominal pain, nausea, vomiting, and decreased appetite [20]. The end result of a primary obstruction of the appendix is acute appendicitis [21, 23]. Due to the occurrence of this obstruction, the appendix becomes filled with mucus and swells. This triggers to increased pressure within the lumen and the walls of the appendix and this pressure leads in thrombosis and occlusion. At this point, Appendectomy, the surgical removal of appendix is known as the standard treatment for acute appendicitis [21, 23]. Most frequently Bacteroides (especially B. fragilis) and Escherichia coli are isolated from the wound after appendectomy [25]. Ceftriaxone and metronidazole are used as Postoperative antibiotic therapy after appendectomy frequently [26]. In this study, Ceftriaxone, metronidazole, amikacin, cefixim, Gentamycin, Clindamycin, Flucloxin, Ceftazidime were used after appendectomy to prevent bacterial infection;

Ceftriaxone and Cefixim were used predominantly. We observed overuse or underuse of antibiotics as per recommended dosage for per kg body weight.

Among 141 patients 83.7% (118) was in the age range 26-55 years; and female patients were higher (55%) than male (45%).

The rates of antibiotic misuse are higher in surgery than in medicine [27]. The percentages of misuse of antibiotics in Asian countries are 66.3% and 42.0% for prophylactic and therapeutic antibiotics respectively [28]. In our study the rate of misuse of antibiotic was 67.8% where the percentages of antibiotic overuse and underuse were 22.9% and 44.9% respectively which matched with Asian countries. From different studies, it is found that antibiotic misuse in Asian countries for prophylaxis is higher (48-100%) than developed countries (23.4%-55.2%) [29-33]. Among developed country, in Switzerland, the percentage of antibiotic misuse is 47% [25]. Among Asian countries, in china, the rate of using inappropriate antibiotics is more than 60% [34] and in Saudi Arabia 72% of the antibiotics is judged to be misused [35].

Inappropriate usage of antibiotics is associated with the problem of antibiotic resistance [36]. Epidemiological studies have clearly stated a direct relationship between antibiotic consumption and the emergence and spreading of resistant bacterial strains [37]. The overuse of antibiotics undoubtedly triggers the evolution of resistance [37]. Due to the overuse of antibiotics, the extraordinary genetic capacity of microbes can exploit all sources of resistance genes as well as every means of horizontal gene transmission to develop multiple mechanisms of resistance for each and every antibiotic introduced into practice clinically, agriculturally etc [38]. It is observed that acquired bacterial resistance is common in developing countries, where the incidence of infectious disease is high and that lead the increased need for antibiotics [39]. Among developed countries, the rate of antibiotic resistance is higher in southern and eastern Europe than in northern Europe probably because of the rate of antibiotic consumption is southern and eastern Europe than in northern [40].

Antibiotic resistance threatens at all levels of health care and globally challenges public health interventions. There is no single solution to overcome antibiotic resistance problem. Multi aspects approach supported with strong political will from authorities is needed. As the economic condition plays an important role to the irrational use of antibiotics, authorities have to set up a health insurance system to assure the healthcare services to their citizens. This will assure the healthcare professionals to implement the appropriate antibiotic-use policies. Without a health insurance scheme that covers most of the populations, any guidelines and policies regarding the appropriate use of antibiotic will be hard to implement. Furthermore, efforts to educate the physicians, patients and community on the danger of antibiotic misuse and overuse, as well as enforcement of existing regulations that will control this potentially vast reservoir of antibiotics must continuously be optimized [41].

6. CONCLUSION:

In the conclusion our study demonstrated that misuse of antibiotic use was found higher than standard use for post operative treatment of appendectomy patients. Misuse of antibiotics plays major role in the development of drug resistance. Rapidly emerging resistant bacteria threaten the extraordinary health benefits that have been achieved with antibiotics. This crisis is global, reflecting the worldwide specially overuse of these drugs and the lack of development of new antibiotic agents by pharmaceutical companies to address the challenge. Antibiotic-resistant infections place a substantial health and economic burden on the population. Antibiotics should use or prescribe by following the antibiotic guidelines in order to prevent emergence of multi drug resistant organisms and risk of lives.

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