

PATTERN OF ANTIMICROBIAL PRESCRIPTION AND ITS COST ANALYSIS IN RESPIRATORY TRACT INFECTION

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ABSTRACT

Many reports from different parts of the world show that antimicrobials are used both widely and often indiscriminately. Indiscriminate usage could increase the cost of therapy, incidence of adverse drug reaction, and increase in the rate of emergence of bacterial resistance. There is evidence to show that antimicrobials are widely used in Nepal. This study relates to the drug prescribed treatment of Respiratory Tract Infection (RTI), which is a cause of morbidity and mortality in children and adults. This problem is important considering climate, geographical and living condition of the people. Out of total 190 patients 20% were diagnosed as having Upper Respiratory tract infection (URTI), 48.43% had Lower Respiratory Tract Infection (LRTI) and 31.57% as having chronic obstructive pulmonary disease (COPD) or asthma. 42.1% were male patients and 57.89% were females. Among the six different antimicrobials prescribed the most commonly used therapeutic group were penicillin's (47.36%) followed by tetracycline (43.15%), macrolides (4.2%), quinolones (3.1%) and cephalosporins (2.1%) .14.56% of the drug was prescribed using generic name and the remaining 85.43% of the drugs were prescribed using brand name. It was found that the Maximum and minimum price of antimicrobial regimen in two hospitals were same although slight difference in brands available was observed. The cheapest antimicrobial regimen in RTI treatment was Doxycycline, 100 mg once daily for 10 days and the most expensive was cefixime 400 mg for 7 days. The cost of the same drug varied according to the brands.

Key words : AMA-Antimicrobial agent, RTI-Respiratory tract infection, URIT-Upper Respiratory tract infection, LRTI-Lower Respiratory tract infection

INTRODUCTION

Respiratory tract infections are a major health problem in developing countries³. Infection of the respiratory tract is the most frequent and important cause of short-term illness in the population. It is frequently the first infection to occur after birth, and pneumonia is too often the final illness before death. Respiratory tract infections occur more frequently than they are reported and are often thought of as inconveniences of life that will pass away quickly; however, they are responsible for more days of bed disability, restricted activity and lost time from work and school than any other category of reported acute illness in the united states¹. Respiratory infections account for more than 40% of the disability days secondary to acute illness, and United States vital statistics indicate that pneumonia and influenza are among the ten leading cause of death in the population overall and the fourth leading cause of death in the elderly (65years of age or older). An estimated 2.2 million people, world wide, die yearly because of acute respiratory infections¹.

Every year Acute Respiratory in young children is responsible for an estimated 4.1 million deaths worldwide especially pneumonia⁵. It is estimated that Bangladesh, India, Indonesia and Nepal together account for 40% of global acute respiratory infection mortality. These respiratory infections can manifest in any area of the respiratory tract, including the nose, middle ear, throat, voice box, air passage and lungs. As an infection of lungs pneumonias is one of the major causes for ARI⁶. About 90% of ARI deaths are due to pneumonia, which is usually bacterial in origin (WHO, 1999). In developing countries, where poverty and no communicable respiratory disease have long been linked, most patients have poor access to health care; this is even true of the poorest minorities in industrialized countries⁵. Lung disease can affect people of all ages, both genders, and all incomes, but affects a disproportionate share of minority population⁵.

The human respiratory tract is exposed to many potential pathogens via the smoke, soot, and dust that are inhaled from the air. It has been calculated that the average individual ingests about 8 microorganisms per minute or 10,000 per day⁵. The respiratory tract is the most common site for infection by pathogens. This site becomes infected frequently because it comes into direct contact with the physical environment and is exposed to microorganisms in the air⁸.

MATERIAL AND METHOD

Selection of study area: Two hospitals were selected for the study, they are: Tribhuvan university teaching hospital, Maharajjung and Bir hospital, Kathmandu

Selection of Patient: Inclusive Criteria: Patients included in this study were patients of different age, diagnosed with one or more RTI either, URTI (Pharyngitis, common cold, sinusitis), LRTI (Pneumonia, Bronchitis), Chronic (Asthma, COPD) who visited OPD (out patient department) the two hospitals of Katmandu valley only.

Exclusive criteria: Patients excluded in this study were: The in-patient of the hospitals; Unwilling to participate in the study; Suffering from tuberculosis or lung carcinoma.

Size of sample: For this study 190 patients with their prescription were selected. Individual patients were interviewed using the prepared questionnaire for this study after their visit to the doctor.

Tool of data collection and technique: The tool used was a set of prepared questionnaire for each patient whose diagnosis was based on clinical evidenced by the doctor and other diagnostic test reports and the technique adopted was personal interview with the patient. All the patients were asked for information about as specified in the questionnaire. Their habits, socio economic status and occupation were also asked as mentioned in the patients' information. Verbal consent was taken from every patient before enrolling in this study. This was an observational study aimed at identifying the current practice and costs associated with antimicrobial prescription.

Study Variables of Data: The study variable in the study are - Age, sex, smoking, occupations, clinical diagnosis, investigation carried out, antimicrobial prescribed, other drugs prescribed, brand name, generic name, cost of antimicrobial.

Cost analysis of antimicrobial: The cost of antimicrobial was taken into account. Maximum and the Minimum price among the different brands were taken. All the cost of antimicrobial regimen was calculated in Nepalese Rupees.

Analysis of data:

1. Compilation of data was done
2. Data were classified in different independent variable
3. The data was tabulated using Excel in the computer
4. Using SPSS did statistical analysis of the collected data.
5. The test used to compare data was chi square at 5% level of significance. The data were significant if $P < 0.05$
6. Using EXCEL-98 plotted graphs.

RESULTS AND DISCUSSION

Survey of the Patient: The Table 1 shows the characteristics of the 190 patients from two hospitals of Kathmandu. It was seen that 42.10%(n=80) were males and 57.89%(n=110) were female patients. The number of smokers were 62.5% (n=50) in male and 56.36% (n=62) in female showing that smoking habit was a little lower in women than in men unlike the study conducted by prevalence of smoking as conducted by WHO in 1998 which supports the fact that percentage of smoking habit was more in male than in female. Also the relation between the smoking habit and RTI has been proven by this study ($p=0.000$, $p < 0.05$).

It was observed that out of 80 males 37.5%(30) were non-smokers and out of 110 females 43.6% (n=48) of them were non-smokers. In context of Nepal one study with medical doctors by Madan et.al in 1995 states that 65% of the male doctors and 93.75% female doctors were non-smokers ⁶.

The reason of illness of the non smokers in the present study could be due to exposure to domestic smoke caused by wood and straw fires used for cooking and heating purposes in the ill ventilated houses without chimneys and exposure to environmental pollutions and insecticides. It was noted that 73.68% (n=140) patients used wood or cow dung as firewood. The maximum number of patients was farmer 100 (52.63%) .It was also seen that that the illiterate people was more than literate people.

Pattern of drugs prescribed: The total number of drugs in each prescription was counted along with the number of antimicrobials. Further, the number of drugs prescribed using generic and brand names were also counted. The total number of drug prescribed was 412.

The Figure 1 shows that a total number of 412 drugs were prescribed out of which 190 were antimicrobials. This means that an antimicrobial was prescribed to each patient. It was also seen in the study that only 14.56% of the drug was prescribed using generic names whereas the remaining 85.43% of the drugs were prescribed using the brand name. This was also supported by the Research conducted in different hospitals of Nepal (Katmandu Medical college teaching hospital –KMC and Nepal medical college teaching hospital- NMC,) by Nami et.al in 2003, which implies that majority of drugs, were prescribed in brand name rather than generic name. In KMC 92 out of 95 drugs were prescribed using brand name and

in NMC 84 out of 100 drugs were prescribed using the brand name⁸. Thus, there was no apparent control over the prescribing habits of physicians. The only control was patient's purchasing power. The drug prescribers tend to use excessive brands of drugs available in the market. The most likely reasons could be the variation in the prices of the brands available and the activities of the marketing groups from the pharmaceutical industries or multinational biasness. The most probable reason for such prescribing is lack of a hospital formulary and pharmaceutical and therapeutic committee.

The Figure 2 shows that among 190-prescription studied penicillin (47.36%) was the most prescribed antimicrobial followed by tetracycline (43.1%), macrolides (4.2%), quinolones (3.1%), and cephalosporin (2.1%). The reason may be due to their broad-spectrum of activity and fewer side effects, physician's choice and also due to easy availability of these antimicrobials in the market. Similarly, the children hospital in Winning peg (schoolenbergand Albritton), also shows that penicillin was the most commonly prescribed antimicrobial preferred in RTIs³. Another study conducted in medical wards of University Hospital, Bangkok revealed that penicillin was the most frequently use atimicrobial agents followed by cephalosporin and gentamycin⁶. 43.15% of tetracycline was chosen due to their broad spectrum antimicrobial and their antipneumococcal activity. Also the tetracycline is the cheapest among other antimicrobials. The least prescribed was cephalosporins (2.1%). The probable reason could be there higher in price.

Pattern of antimicrobial distribution with respect to diagnosis: The Table 2 shows the anitimicrobial prescribed in URTI, LRTI and chronic cases. It was seen that six different antimicrobial were prescribed in the study. The most commonly prescribed antimicrobial was amoxycillin 52.6% for URTIs and 54.3% for LRTI. According to the survey conducted on antimicrobial resistance in Nepal by Bisista et.al it was found that amoxycillin was 100% sensitive and 0% resistance when tested in 5 strains of streptococcus pyogens, 100 % sensitive and 0% resistance when tested in 14 strains of H.influenza and 72.7% sensitive and 27.3% resistance when tested in 11 strains of streptococcus pneumoniae (these three are the etiological agents responsible for causing RTIs)⁵. According to the findings in Sicily in 1998 the most commonly prescribed antimicrobial for URTIs was azithromycin and coamoxiclave in LRTIs⁸. Also Study conducted in UK in 1989 showed that 92% of URTI was treated using amoxycillin and 90% of LRTI was treated using macrolides especially Azithromycin². But in this study only 21.7% of azithromycin was used. This difference may be due to the variation in the choice of antimicrobial by physician. Doxycycline was the antimicrobial of choice for chronic case comprising of 41.6% and amoxycillin 25%, unlike amoxycillin or clarithromycin used by international standards. Clarithromycin was probably not a drug of choice to the physicians because of its high cost.

Cost analysis: The Maximum and minimum price of antimicrobial regimen in the two hospitals were same although slight difference in brands available was observed. All brands of each generic were taken into account and the cost was expressed in Nepali Rupees (NRs).

The above table 3 shows that there was the variation in the price of the brand available. The cheapest antimicrobial regimen in RTIs was Doxycycline i.e. 100 mg once a day for 10 days and the most expensive was 400 mg cefixime for 7 days. The cost of the same drug varies according to the brands and thus the patients had to bear the high cost of the drugs available as per brand prescribed. This difference of cost within the brands and can be reduced by prescribing the drugs according to the generic names.

CONCLUSION

The proper and correct use of antimicrobial is an utmost necessity of current situation in today's world. The emerging antimicrobial resistance is a global problem directly related to inappropriate use. This study has shown that antimicrobial is widely prescribed for RTI in all the cases. Six antimicrobial agents being used, they are Amoxicillin, Doxycycline, Ciprofloxacin, Azithromycin, Roxithromycin, Cefixime. However the prescribing pattern was not based upon any laboratory test.

Recommendations:

The following recommendations can be made regarding the use of antimicrobials in RTIs of all age groups.

- 1) The prescriber should be aware of the costs of the drugs they are prescribing. In some studies from USA ⁶¹ has been reported that many prescribers have rather poor knowledge of the drug they are prescribing. Institutional and independent educational training programmes can achieve this. Institutions should encourage practitioners to examine their own prescription and to compare the cost effectiveness of alternative therapeutic regimens.
- 2) Appropriate information about the antimicrobials should be available to the public at all levels
- 3) Public should be made aware that antimicrobials are strong drugs having side effects and drug interactions. It should not be used for common cold right away because in most cases they are of viral origin and antimicrobials are of no use in viral infections, therefore, should not be taken on their own unless prescribed by a doctor. Old prescriptions for any RTIs should not be used for new and recent illnesses. The patient should not discuss their disease with neighbors, friends and chemists to avoid improper use of drugs in general and antimicrobials in particular. National awareness programmes can achieve this and massive education programmes especially at school levels.
- 4) Prescriber should be encouraged to use minimum of drug regimen without sacrificing the efficacy of treatment, or therapeutic benefits.
- 5) Effective antimicrobial national policy should be implemented.
- 6) Prescription of expensive drugs should be discouraged.

REFERENCES

1. Kimble M, Young L. The Clinical Use of Drugs, Applied Therapeutics, 4th edition.
2. Yach Derek, Hawkes Corinna, J Karen, 2004. The Global Burden of Disease, 291:2616-2622.
3. Erling V, Jalil F, Zaman S, 1999. The impact of climate on the prevalence of respiratory tract infection in early childhood in Lahore, Pakistan, Journal of public Health Medicine, 21:331-339.
4. Pradhan S, 2003. Pattern of antibiotic prescription and its cost analysis in adult respiratory tract infection unpublished work.
5. World Health Organization, 2003. Report 2003, shaping the future, Geneva, Switzerland.
6. World Health Organization, 2000. Health situation in South East Asia Region, 185.
7. M. Gabriel, J.Anthony, 2004. The Epidemiology of Severe Acute Respiratory Syndrome in the 2003 Hong Kong Epidemic, 662-673.
8. Chantler C, Griffith S, 2004. Learning from SARS in Hong Kong and Toronto, 291:2483-2487.

Table-1: Characteristics of study participants

Characteristics		%	N
Male		42.1	80
Female		57.89	110
Habit	Smoker-Male	62.5	50
	Smoker-Female	56.4	62
	Non-Smoker-Male	37.5	30
	Non-Smoker-Female	43.6	30
Occupation	Farmer	52.0	100
	Business	23.0	45
	Others	23.0	45
Education	Literate	42.1	80
	Illiterate	57.9	110

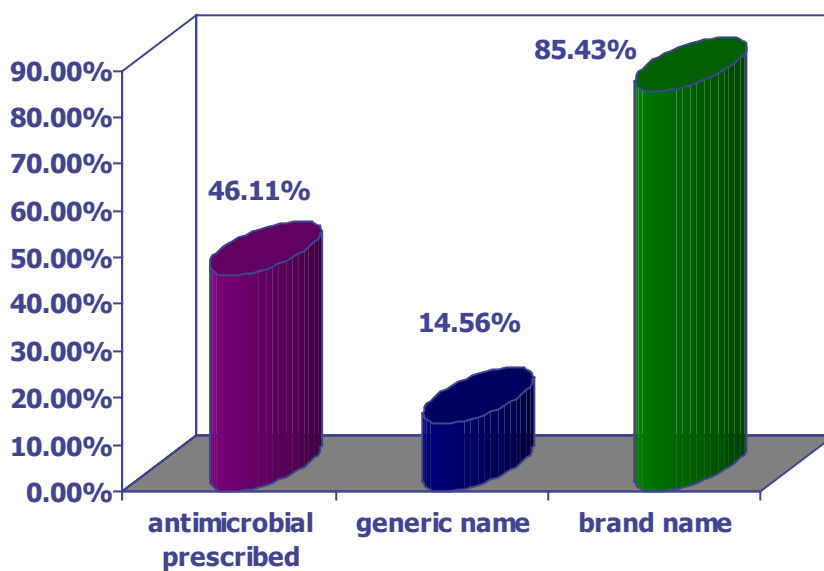


Fig 1: Pattern of drugs prescribed to the patient

Antimicrobial Distribution With Respect To The Diagnosis:

Figure 2. Selection of the class of antimicrobials for RTIs

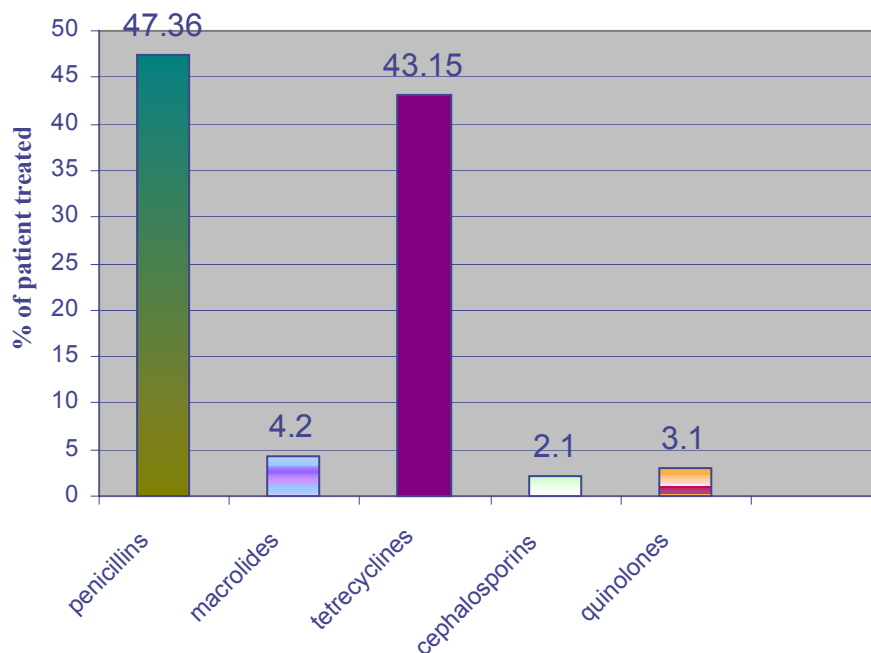


Table 2 Pattern of antimicrobial distribution with respect to diagnosis

Diagnosis	Antimicrobial %(n=38,92,60)					
	Amox	Azi	Doxy	Roxy	Cipro	Cefixim
URTI	(52.6%)	(13.15%)	(7.8%)	(26.3%)	0	0
LRTI	(54.34%)	(21.73 %)	(16.3%)	0	(5.43%)	(2.17%)
CHRONIC	(25%)	(16.6%)	(41.6%)	0	(8.3%)	(8.3%)

Table 3 Cost of antimicrobial regimen in NRs.

Sr. No.	Regimen	Minimum price (Rs.)	Maximum price (Rs.)
1	Amoxicillin 500 mg three times a day 7 days	182	187
2	Azithromycin 500 mg once daily 5 days	150	180
3	Doxycycline 100 mg once daily 10 days	35	50
4	Roxythromycin 150 mg twice daily 7 days	154	196
5	Ciprofloxacin 500 mg twice daily 7 days	112	196
6	Cefixime 400 mg once daily 7 days	252	266