A study of antibiotics used in adult respiratory disorders in Kathmandu and Bhaktapur

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ABSTRACT

Respiratory tract infections (RTI) are one of the major causes of morbidity and mortality, in Nepal, because of the climate, living conditions and economic status of the people. This study was done to find out the pattern of respiratory tract infections in adults and pattern of antibiotics (AB) prescribed in them and to explore the most economical treatment of patients without compromising the quality of it. Three hospitals of Kathmandu valley and two hospitals of Bhaktapur were selected. Out of 118 patients of RTI in which AB were prescribed, 110 patients were randomly selected in this study. Among them 53.6% were male and 46.4% were female, 43.7% patients were smokers and 56.3% were non-smokers. The average costs of treatment of upper respiratory tract infections (URTI) were lower then lower respiratory tract infections (LRTI). The cost of treatment of chronic respiratory cases was highest.

Keywords: Antibiotic (AB), chronic obstructive lung disease (COPD), Lower respiratory tract infection (LRTI), Upper respiratory tract infections (URTI)

INTRODUCTION

According to the report of Ministry of Health, Government of Nepal 3.4% of morbidity is caused by acute RTI. It is among top ten diseases of Nepal. RTIs are major causes of mortality and deaths worldwide.[1] It is the cause of death of 2.6 million people per year.[2] Control of RTIs presents a challenge.[3] Mild common symptoms like cough may be treated by simple methods like steam inhalation or lozenges.[4] AB need not be used erratically in every patient of respiratory disease but at the same time proper AB should be started at the correct time, correct dose and for correct duration are very important. But the tendency of the clinicians is to cure the patient quickly and the eagerness of the patients is to get immediate relief from symptoms it was observed that AB were used indiscriminately.[5,6] Plethoras of effective ABs are available for treatment of RTIs which causes a problem for prescriber in choosing a rational and cost-effective therapy.[7] AB are often most used or misused drugs. [5-17]

In Nepal there are few reports about AB survey.[18,19] Often, AB are prescribed for illnesses that do not require them.

In the United Kingdom[20] approximately 12 million AB prescriptions were for respiratory infections causing 47.2 million pounds expenditure. Moreover, there was a tendency of prescribing costly and latest AB.

We could not find any extensive study conducted in Nepal on the use of AB but there are evidences, which show a prevalence of AB prescription for respiratory tract infections.[21-23]

MATERIALS AND METHODS

A random sample of 110 patients of Respiratory diseases in whom ABs were prescribed, were collected from three different hospitals of Kathmandu valley (TU Teaching Hospital, Maharajganj; Bir Hospital and Kathmandu Hospital, Triprashwar) and two Hospitals of Bhaktapur (Bhaktapur Hospital and Kun Hee Nepal Hospital) between December 6,2002 to March 2, 2003. Patients were interviewed after they have consulted the doctor. The information given by them was filled on a form and their prescription copied for further analysis.

This study included adult patients from the Out Patient Department of these hospitals, diagnosed with RTI, in whom one or more ABs was prescribed. Indoors patients, patients suffering from tuberculosis and lung cancer, and patients using AB for other diseases along with RTI were excluded from this study.

Study variables of data in this study were age, sex, socio-economic status, smoking habits, occupation, clinical diagnosis, AB used, duration of the treatment, cost of investigations carried out, cost of all the drugs in prescription, consultation fee of Doctors (if any) and cost of AB alone. Results were statistically analyzed.

RESULTS

The general characteristics of patients have been shown in Table-1.

Age of patients varied from 14 yrs. to 70 yrs. Out of them maximum number of RTI cases were from 14yrs to 29 years, occupation wise they were students

Table-2 shows the pattern of drugs prescribed, and the number of drugs per prescription. The pattern of AB distribution with respect to diagnosis has been shown in Table-3 and Table-4 (a) and (b) shows the cost analysis.

For diagnosis patients were investigated. X-ray Chest and Skull was performed in 65.0% patients, sputum swab test in 19.0% cases and lung function tests in 16.0% Patients.

Income pattern of patients was also assessed, 22.0% patients of RTI were poor with monthly income below NRs 2000/- par month, 42.0% patents had their monthly income between NRs. 2000/- to 5000/- and 36.0% had income above NRs 5000/- per month

DISCUSSION

Table-1 show base line characteristics of 110 patients. In this study there were 53.6% (n=59) male patients and 46.4% (n=51) female patients. This distribution is similar to the previous studies.[24- 26] among the patients 43.7% were smokers and 56.3% were non-smokers. But statistically there was no significant difference in the two (P=0.248) at 95% CI. It was seen that out of 59 males 34 (53.9%) were non-smokers and out of 51 females 29 (46.0%) were non-smokers. The reason of their illness 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 66.4 % (n=73) of the patients used wood or cow dung as firewood this fact has also been shown in previous study.[25]

The numbers of smokers were 25 (53.2%) males and 22 (46.8%) females shows that smoking habit is a little lower in women than in men.[1,27] The maximum number of patients was self employed (44.5%). It was also seen that infection was more common in the married population.

As far as age and occupation of patients were concerned, majority of them (38.0%) were between the ages of 15 to 30 years. The lowest numbers of the patients (4.0%) were above the age of 75, who were mostly housewives (9.0%). The most probable reason for their illness could be exposure to the daily dust, household smoke, and the climatic conditions.

According to the results, geriatric patients visited the OPD less often, which is contradictory. This is probably due to the less number of sample sizes.

Out of 333 drugs prescribed out of which 110 were AB. i.e. one AB was prescribed to each patient. The duration of AB treatment varied from 5 days to 10 days. The use of generic names was as little as 3.6%, brand names predominated the prescriptions (96.4%). This may be due to variation in the prices of the brands available, the activities of the marketing groups of pharmaceutical industries, multinational bias, of prescribers or there may not be any firm control on prescribing practices in the hospitals due to lack of a hospital formulary and pharmaceutical and therapeutic committee.

It was seen that 80.0% of the patients were prescribed three drugs or more whereas 20.0% were prescribed four drugs or more. No patient was prescribed more than five drugs or less than two drugs. Thus practice of poly pharmacy was observed. Generally in prescriptions for cases of RTIs, along with AB, vitamin, cough syrup and a bronchodilators or a degengestant is commonly prescribed.

It was observed that eleven different ABs were prescribed in this study. The most commonly prescribed AB was amoxicillin (61.0% for URTIs and 58.2% for LRTIs) unlike the findings of Mazzaglia[28] where the most commonly prescribed AB for URTIs was azithromycin and combination of- amoxicillin and clavulanic acid in LRTIs. This difference may be due to the variation in the practice of AB prescription in the two countries and the availability of the drugs in the market. Doxycycline was the AB of choice for chronic case comprising of 37.8% of the prescriptions and not clarithromycin. Clarithromycin was not a drug of choice of physicians because of its high cost (NRs.50.00) per tablet of 500mg and the use of 500 mg BD for 14 days, whereas 100mg doxycycline was prescribed once a day for 14 days, which was much economical (NRs.3.00 per capsule). Doxycycline is a broad spectrum AB whereas clarithromycin is a narrow spectrum AB.

Further it was found that penicillins (61.0%) was the most prescribed AB which comprised of amoxicillin, Amox + Clox, Amox + clav and Cloxacillin followed by doxycycline (17.0%) as shown in Table-3. The reason may be due to their broad-spectrum activity, physicians' choice, less side effects and easy availability.

The least prescribed was cephalosporins (2.0%) as this AB is not a choice for RTIs and it is very costly as compared to the other ABs.

The investigations performed for diagnosis of RTI were lung or skull x-rays, sputum and swab test, lung function tests LFT, clinical examination and other investigations like blood tests, urine analysis, ECG. In maximum patients Chest or skull x – ray was done (65.0%.) may be due to availably of fast results of test as compared to other tests Sputum or swab test was done in 19.0% of cases, may be due to time consuming results,

and therapy cannot wait for the results of culture. LFT was carried out in 15.0% of cases. Which were expensive and all out patient department are not equipped for this test.

In this study it was observed that fifty percent of patients were suffering from LRTIs, this supports the pervious findings of other workers.[2,25-27] Thirty five percent were chronic cases and sixteen percent were suffering from URTIs. The number of patients visiting the OPD for URTI was less; probably due to the fact in most cases home remedies were used for the treatment.

Comparing the diagnosis and the ABs prescribed it was seen that 78.0% of the cases of URTI and 71.0% of the cases of LRTI was treated using penicillin group of ABs unlike a study conducted in UK in 1989. [29] in which 92.0% cases of URTIs were treated using penicillins and 90.0% cases of LRTIs were treated using macrolides especially erythromycin. But, in our study as little as 5.5% of erythromycin was used (Table III.). This variation may be due to the difference in the choice of AB by physicians, here and, in developed countries like UK where ABs are prescribed only after microbiological tests.

For the treatment of chronic case AB of choice were tetracycline's (doxycycline 38.0%) and penicillin's (amoxicillin 38.0%) unlike amoxicillin or Clarithromycin used by international standards [7].

Table-4 (a) and (b) shows cost analysis in this study. It was seen that in maximum number of patients 42.0%, their monthly income was between Rs.2000.00 to Rs.5000.00 whereas, 36.0% had monthly income above Rs.5000.00 and 27.0% below Rs.2000.00. Cost of all the investigations carried out was calculated along with the cost of all the drugs in the prescription. It was seen that the average cost of only the ABs was NRs.221.2 ±36.8 whereas the average cost of treatment was found to be NRs. 611.4 ± 190.6 showing that AB made up 36.2% of the total expenditure on the treatment of RTI and 72.6% of the total drug cost. This shows that AB use is high in case of RTIs. According to the linear regression analysis carried out it was seen that a significant linear relationship was seen between the total cost of treatment and the cost of the ABs (p=0.000, F=62.149). It was seen that if the AB cost was increased by Rs.100.00 then the total treatment cost increased by Rs.99.00.

Besides the economic impact of Treatment of RTIs upon the low income group

For majority of RTIs patients 42.0% (Income between NRs 2000/- to NRs 5000/- per month) AB costed 8.8%, Total drugs costed 12.2% and total treatment costed 24.5% of mean monthly income of Patient's family. Almost 1/4th of income /month was spent in treatment of RTIs

AB therapy for common URTIs, such as sore throat or common cold has been a controversy.[30] To the best of our effort we could not find any data in Nepal, to indicate the emergence of resistance to common bacteria causing RTIs for amoxicillin and doxycycline, the most prescribed ABs for all the cases. Nor there was any data on randomized controlled trials in Nepal to compare these Abs with newer and more expensive ABs.

We think that 1.Standard treatment guidelines for adults designed for both acute and chronic cases,[31] should be followed.

Generic drug prescribing and use of essential drugs should be encouraged

Use of vitamins with ABs especially Vitamin B- complex is recommended.

And lastly but not the least .the prescriber should be aware of the costs of the drugs they are prescribing. In some studies from USA,[30,31] it has been reported that many prescribers have rather poor knowledge of the drug they are prescribing.

REFERENCES

1. *WHO Health situation in South East Asian Region*, 2000; Technical Report series185
2. *Davidson's Principles and Practice of Medicine,* Churchill Livingston, Eighteenth edition, 1999 and Roger Walker, O.Edwards, Clinical pharmacy and Therapeutics, Churchill Livingston, 1994.
3. Lopez AD. Causes of death in industrial and developing countries: estimates for 1985-1990.In: Jamison DT Eds, *Disease control priorities in developing countries.* Washington DC, Oxford Medical Publications, 1993: 35-50.
4. Mainous AG 111, Hueston WJ, Clark JR. Antibiotics and upper respiratory tract infection: do some folks think there is a cure for the common cold? *J Family Pract* 1996; 42: 357-61.
5. Schwartz B. Preventing the spread of Ant microbial resistance among bacterial respiratory pathogens in industrialized countries; *Clin Infect Dis J* 1999; 28: 211-13.
6. Gonzales R, Steiner JF, Sande MA. Antibiotic prescribing for adults with colds, upper respiratory tract infections and bronchitis by ambulatory care physicians, *J Amer Med Assoc* 1997; 278: 901-4.
7. Jauhari AC, Pokhrel A, Palikhe N, Shrestha N. Pharmacoeconomic aspects of antibiotic prescriptions in some clinics in Kathmandu. *J Nepal Med Assoc* 2004; l43: 83-7.
8. Jauhari A.C, Pokhrel A., Palikhe N., Shrestha N, Pharmaco-economic aspects and pattern of antibiotic prescriptions in four major hospitals in Kathmandu *J.Nepal Med.Assoc.*, 2004; Jan-Feb. 43:31-35.
9. Jauhari AC., Pokhrel A, Johorey AC. A Comparative study of cost analysis of Antibiotic Use in Clinics and Hospitals of Kathmandu Valley. *Nepal Med College J* 2004; 1: 56-9.
10. Harvey K Initiates to improve "antibiotic use" Editorial, *Australian Prescriber* 1999; 2: 26.

11. Pellizzer AM, Callanghan CJO, Branley P, Thomson B, Krum H. Polypharmacy in a major Australian Teaching Hospital. *Aus J Hosp Pharmacy* 1998; 28: 432-5.
12. McManus P, Hammond ML, Whucker SD, Primrose JG, Mant A, Fairail SR. Antibiotic use in Australian community1990-1995 *Med J Aus* 1997; 167: 154 –6.
13. Couper MR. Strategies for rational use of Antimicrobial. *Med J Aus* 1997; 1: 154-6.
14. Pricst P, Yudkin P, McNulty C, Mant D. Antibacterial prescribing and antibacterial resistance in English general practice cross section study. *Brit Med J* 2001; 328:1037-41.
15. Wong-Beringer A Empirical Antimicrobial prescribing: impact on outcome and cost. *Hos Pharm* 1998; 10: 1208-13.
16. Jauhari AC, Johorey AC. Antibiotics in acute coronary heart diseases. *Nepal Med College J* 2001; 2: 103-4.
17. Kafle KK, Pradhan YMS, Shrestha SB, Prasad RR, Shrestha N, Das PL. Prescribing and dispensing practices in PHC facilities of Terai districts of Nepal. *J Inst Med* 1996; 18: 61- 6.
18. Joshi MP, Srivastave K, Maeda K. Study of antibacterial usage at T.U. Teaching Hospital, Today's drugs –3. *J Inst Med* 1991; 13: 207-13.
19. Ronald F. Grossman, Disease Management of Pulmonary Infections, *CHEST* 1998; 113: 205 – 10.
20. Kafle KK, Rajbhandari SM, Acharya SM. Anti-infective usage in TU teaching hospital. *J Inst Med* 1989; 11: 115-20.
21. Khan G.M. and Jauhari A.C. Study on the practice of Polypharmacy in selected Hospitals on Nepal, *Bulletin of Nepal Pharmacutical Association*, 2003, 14:25-27.
22. Angela Missaggia RNNP, CV-CNS, MSN, examining antibiotics resistance in respiratory tract infection. Bay islands, Honduras, *Supplement to clinical revision*, Feb 2002.
23. Bharat MP, Bimmi S, Achyut PS. A prospective study of adult lower respiratory tract infections at TUTH in Kathmandu. *J Inst Med* 1997; 19: 30-6.
24. Pandey MR. Domestic smoke pollution and chronic bronchitis in a rural community of Hill region of Nepal. *Thorax* 1984; 39: 337-9.
25. Pandey MR, Basnyat B, Neupane RP. Chronic bronchitis and Cor Pulmonale in Nepal. *J Inst Med* 1988; 10: 263-70.
26. Mazzaglia G, Grew SC Lando *et.al*. Adult acute upper respiratory tract infection in Sicily: pattern of antibiotic drug prescription in primary care. *Journal of Antimicrobial Chemotherapy* 1998; 41: 259 – 6.
27. Woodford EM, Marriott JF, Wilson KA. Antibiotic prescribing for lower respiratory tract infections within secondary care. *Int'l J Pharm Pract* 2001: 9: 39.
28. Mac Donald TM, Collins D, Mc Gil. The utilization and economic evaluation of antibiotics prescribed in primary care. *Medicine monitoring unit, University of Dundee,* 1989.
29. Karlsson M, Nilsson SO, Ransjo U. Antibiotic usage in surgery in a large teaching hospital. *Scand J Infect Dis* 1987; 19: 123-30.
30. Neelam Adhikari, Acute Respiratory Tract Infections in Nepal and problem faced in their management. *Proceedings of an International Workshop Sydney,* 1984, Ed: R.M.Douglas; E.Kerby Eaton, Adelaide 985.
31. Agunawela I, Diwan V, Tomson G. The effect of information- an intervention study on antibiotic prescribing among primary health care practitioners in Sri Lanka. *International Rational Use of Drugs News* 1990; 1: 10 -1.

Table-1: General characterstics of patients

Characterstics of patients	n..	%
Males	59	53.6
Females	51	46.4
Average age 40.43±21.75		
Smokers males	25	53.2
Females	22	46.8
Non-smokers males	34	54.0
Non-smokers females	29	46.0
Farmers	22	20.0
House wife	23	20.9
Self emplyoyed	49	44.5
Students	16	14.5
Literate	74	67.3
Illiterate	36	32.7
Married	79	71.8
Unmarried	31	28.2

Table-2: Pattern of drugs prescribed, number of drugs/prescription

Total no. Of Drugs Prescribed	333	No of drugs Prescribed	No of Patients	%
Total no. of Ab.	110 (33.0%)	2	22	20
Duration of Treatment	7.0± 2.3	3	56	50.9
Use of Generic Names	12(3.0%)	4	25	22.7
Use of Brand names	321(96.4%)	5	7	6.4

Table-3: Pattern of antibiotic distribution

Diagnosis		**Antibiotic %(n=18,55,37 respectively)**									
	Amox	**Amox Clox**	**Amox clav**	**Azi**	**Clox**	**Co-tri**	**Cipro**	**Cefa**	**Doxy**	**Eryth**	**Roxy**
URTI	**61.1**	**11.11**	**0**	**0**	**5.55**	**5.55**	**0**	**0**	**11.11**	**0**	**5.55**
LRTI	**58.18**	**1.81**	**7.27**	**3.63**	**5.45**	**3.63**	**3.63**	**0**	**5.45**	**5.45**	**5.45**
Chronic cases	**27.0**	**2.70**	**5.40**	**0**	**0**	**8.10**	**2.70**	**5.40**	**37.83**	**0**	**10.81**

Table-4: (a). Cost analysis

Various costs (NRs.)	Costs per patient (NRs.)
Total cost of treatment	611.9 ± 421.3
Cost of investigation	307.1 ± 317.5
Cost of drugs	304.8 ± 271.3
Cost of antibiotics	221.2 ± 258.0
Percentage cost of antibiotics (Total treatment cost)	
Percentage cost of antibiotic (Total drug cost)	36.1± 258.0
	72.6 ± 258.0

(The values are in Mean ± Standard deviation)

Table-4: (b). Cost analysis (treatment/diagnosis wise)

Diagnosis	Total treatment cost (NRs.)			Antibiotic cost (NRs.)		
	Maximum	Average	Minimum	Maximum	Average	Minimum
URTI	584.40	293.18	76.71	211.12	121.56	27.02
LRTI	1824.00	561.32	139.67	1234.59	241.49	27.02
Chronic cases	1934.45	842.19	119.22	1234.59	239.53	27.02