COMMON TREND OF ANTIBIOTICS USAGE IN A TERTIARY CARE HOSPITAL OF PESHAWAR, PAKISTAN

Mohammad Shoaib Khan, Zahoor Ahmed*, Shah Jehan, Fasseh-uz-Zaman***, Salim Khan†, Safeer Zaman††, Farid Ullah Shah**

Department of Biochemistry, Bannu Medical College, Bannu, *Khyber Medical College, Peshawar, **Department of Pathology, Bannu Medical College, Bannu, ***Department of Forensic Medicine, Bacha Khan Medical College, Mardan, †Department of Pharmacy, Hayatabad Medical Complex, Peshawar, ††Department of Physiology, Bannu Medical College, Bannu, Pakistan

Background: Antibiotics are used to eradicate the pre- and postoperative infections in surgical procedures and in all others medical cases. However, inappropriate and indiscriminate use of antimicrobial agents can potentially have a number of problems. The emergence of antimicrobial resistant bacteria, an increased number of patients experiencing adverse drug events, and increased drug-related cost have been documented. The objective of the study was to determine the trend of use of antibiotics and hospitalisation of patients in various units of a tertiary care hospital, to investigate practice variation of antimicrobial agents within the hospital, and to identify and document any opportunity for its improvement. **Methods:** A questionnaire containing relevant information about the study was prepared. Patients' age, sex, diagnosis, duration of hospital stay and type of antibiotic used were recorded and analysed, with particular reference to antibiotic group and disease pattern, in 3 different treatment areas of Hayatabad Medical Complex (HMC), Peshawar, Pakistan, from July 2006 to June 2007. **Results:** During the period under report, a total of 519 patients were studied for their disease and the type of antibiotics used. The leading type of antibiotics reported were 3rd generation antibiotic used on 147 (28.33%) patients in the 3 units collectively, 1st generation 127 (24.47%), and penicillin 99 (19.08%), while macrolides were the least used. **Conclusion:** The available resources are needed to be effectively utilised, to minimise the hospital stay due to rational use of antibiotics, and to minimise burden of antibiotics on poor patients.

Keywords: Antibiotic usage, Tertiary care hospital, Peshawar, Pakistan

INTRODUCTION

In common usage, an antibiotic is a substance or compound that kills or inhibits the growth of bacteria. Moreover, antibiotics belong to the group of antimicrobial compounds used to treat infections caused by microorganisms including fungi and protozoa.[1] Some antibiotics such as aminoglycosides, are still produced and isolated from living organisms, in addition many more, such as the quinolones, have been created through purely synthetic means. Although antibiotics are generally considered safe and well tolerated, they have been associated with a wide range of adverse effects. The safety profiles of newer medications may not be as well established as those that have been in use for many years.[2]

Adverse effect can range from fever and nausea to major allergic reactions including photodermatitis. Inappropriate antibiotic treatment and overuse of antibiotics have been a contributing factor to the emergence of resistant bacteria. Antibiotics are used to eradicate the pre and post-operative infections in surgical procedures and in all others medical cases. However, inappropriate and indiscriminate use of antimicrobial agents can potentially have a number of problems including emergence of antimicrobial resistant bacteria. An increased number of patients experiencing adverse drugs events, and increased drug related costs have been documented. More importantly Methicillin Resistant Staphylococcus Aureus (MRSA) has been reported with increasing frequency worldwide and it already accounts for substantial morbidity and mortality as well as expenses.[3]

Under the health care service system, the overuse and misuse of post- and preoperative antibiotics have become a serious concern in Pakistan. Keeping all these in mind, this study was designed, to investigate practice variation of antimicrobial agents within the hospital and to identify any opportunity for its improvement.

MATERIAL AND METHODS

This study was conducted in 3 units of Hayatabad Medical Complex Peshawar, i.e., Medical, Orthopaedics and Gastroenterology, from 1st July 2006 to 13th June 2007.

A questionnaire containing relevant information about the study was prepared. Patients' age, sex, diagnosis, duration of hospital stay, and type of antibiotic used were recorded and analysed with particular reference to antibiotic group and disease pattern.

RESULTS

During the period under report, a total of 519 patients were studied for their disease and the type of

antibiotics used, in 03 units i.e. medical, orthopedic and gastroenterology of Hayatabad Medical Complex, Peshawar, Pakistan. The leading type of antibiotic reported was 3rd generation antibiotic used by 147 (28.33%) patients in the 03 units as a whole, followed by 1st generation 127 (24.47%) and penicillin 99 (19.08%), while macrolides are the least. In orthopedic unit the most common antibiotic group was Cephalosporin 1st generation in 123 (46.76%) patients, while in medical unit the antibiotic group of choice was the 3rd generation Cephalosporin in 36 (35.64%) of patients. Similarly in Gastroenterology unit the 3rd generation Cephalosporin used by 95 (61.25%) of the patients, was the leading group. In the Gastroenterology unit, the maximum duration of stay at hospital was in the range of 5–8 days by 38 (42.22%) patients, in medical and orthopedic unit the maximum stay at hospital reported was 1–4 days by 51 (44.34%) and 5–8 by 21 (29.17%) respectively.

Table-1: Unit-wise Antibiotic Types

Antibiotic Types	Orthopedic Ward		Medical Ward		Gastroenterology Ward		Total	
Cephalosporin	No	%	No	%	No	%	No	%
1st	123	46.76	2	1.98	2	01.29	127	24.47
2nd	6	2.28	-	-	2	01.29	8	1.54
3rd	16	6.08	36	35.64	95	61.29	147	28.33
4th	-	-	-	-	-	-	-	-
Quinolones	-	-	33	32.67	10	06.45	43	08.28
Penicillin	70	26.62	27	26.74	2	01.29	99	19.08
Macrolides	-	-	3	2.97	4	02.58	7	1.35
Others	48	18.25	-	-	40	25.81	86	16.95
Total	**263**	**100**	**101**	**100**	**155**	**100**	**519**	**100**

Table-2: Hospital stay of the patients in various units

Duration (Days)	Gastro Ward	Medical Ward	Orthopedic Ward
	No of Cases	No of Cases	No of Cases
1–4	21 (23.33%)	51 (44.34%)	12 (16.66%)
5–8	38 (42.22%)	38 (33.05%)	21 (29.17%)
9–12	24 (26.67%)	20 (17.39%)	18 (25.00%)
Above 12	07 (07.78%)	06 (5.22%)	21(29.17%)

DISCUSSION

The international differences in the hospital use of antibiotics were not in the intensity of use, but in the prescription preferences. The wards of similar medical specialties used similar total amounts of antibiotics, but from different pharmacological subgroups and, thus, with different microbiological activities.[3] Ideally, the selection of antibiotic drugs should be based on the microbiological data on bacterial sensitivity and on prevalence of resistance in the respective hospital.

The use of antibiotic is frequently reviewed, usually of in-house purposes, in many hospitals in several countries.[4,5] Such reviews have not been conducted before in our set up at 3 wards of the teaching hospital at Peshawar, Pakistan. A study conducted in the three teaching hospital in European countries showed 41-51 DDD/100 bed-days, which are up to 24% higher than those reported for Denmark , Germany and the Nether-Lands, at the same level as Belgium[5] and significantly lower than 74 DDD/100 bed-days, which was the reported average of the 450 hospitals in the USA in 1981[4], while, the hospital stay at our study showed that in the Gastroenterology unit, the maximum duration of stay at hospital was in the range of 5-8 days by 38 (42.22%) patients, in medical and orthopedic unit the maximum stay at hospital reported was 1-4 day by 51(44.34%) and 5-8 by 21(29.17%) respectively.

In another study conducted by Kivet RA and colleagues, it has been reported that the broad-spectrum antibiotics dominated in all the units of the teaching hospitals. Tetracycline and aminoglycosides were the type of antibiotics used most commonly in Tartu Hospital, broad spectrum Penicillin and Cephalosporin in Badajoz Hospital, narrow-spectrum Penicillin and Cephalosporin in Dinge Hospital.[3]

The worldwide increase in antibiotic pharmaceuticals consumption on yearly basis has recommended being 8-10%.[1] The most popular antibiotic drugs in the Tartu university hospital were doxycycline and ampicillin, which ranked first and second throughout the study years. Which is in accordance with the data from national use of drugs in countries of central and eastern Europe as well[6], where doxycycline headed the lists in Bulgaria, Estonia and Hungary, and ampicillin ranked between third and fifth in all countries studied in 1992, while in our study we find that The leading type of antibiotic reported was 3rd generation antibiotic used by 147 (28.33%) patients in the 03 units as a whole, followed by 1st generation 127 (24.47%) and penicillin 99 (19.08%), while macrolides are the least. In orthopedic unit the most common antibiotic group was Cephalosporin 1st generation in 123 (46.76%) patients, while in medical unit the antibiotic group of choice was the 3rd generation Cephalosporin in 36 (35.64%) of patients. Similarly in Gastroenterology unit the 3rd generation Cephalosporin used by 95 (61.29%) of the patients, was the leading group.

Frequent use of aminoglycosides has been reported in West. High aminoglycosides consumption has been known to select multi-resistant bacteria[7,8], which might be of concern for some of the university hospitals. Significant associations have also been established between the consumption of cephalosporin and methicillin resistance in Staphylococci.[9] In addition, development of fluroquinolone resistance in Staphylococci and Pseudomonas aeruginosa has been reported.[11]

CONCLUSION & RECOMMENDATION

In our country the available resources are needed to be effectively utilised, as there is lack of treatment protocol in terms of the use of antimicrobial agents in the hospitals, which needs to be rationalised, so that to minimize the hospitalisation due to rational use of antibiotics, which will minimize burden of antibiotics on poor patients.

REFERENCES

1. Davey PG. Antimicrobial chemotherapy. In Ledingham JGG, Warrell DA. (eds) Concise Oxford Textbook of Medicine. Oxford: Oxford University Press; 2000.p.1475.
2. Slama TG, Amin A, Brunton SA, File TM Jr, Milkovich G, Rodvold KA, *et al*. A clinician's guide to the appropriate and accurate use of antibiotics: the Council for Appropriate and Rational Antibiotic Therapy (CARAT) criteria. Am J Med 2005;118(Suppl 7A):1S–6S.
3. Kivet RA, Dahl M L, Llerrena A, Maimets M, Wettermark B, Berecz R. Antibiotics use in 3 European University Hospital. Sand J Infect Dis 1998;30:277–80.
4. Kennedy DL, Forbes MB, Baum C, Jones JK. Antibiotic in US hospitals in 1981. Am J Hosp Pharm 1983;40:7.
5. Janknegt R, Wijnands WJ, Caprasse M, Brandenburg W. Schuitenmaker MG, Stobberingh E. Antimicrobial drug hospitals in the Netherlands, Germany and Belgium. E Clin Microbiol Infect Dis 1993;12:832–8.
6. Kiivet RA, Biba V, Enache D, Foltan V, Gulbinovic J, G vanyi N, *et al*. Changes in the antibacterial drugs in the countries of central and eastern Europe. Eur J Clin Pharmacol 1995;48:299–304.
7. Staehr Hohansen K, Storgaard M, Carstensen N, Frank U Daschner FD. An international study on the occurrence of multi-resistant bacteria and aminoglycoside consumption terms. Infection 1988;16:313–22.
8. Kumana CR, Li KY, Kou M, Chan SC. Cephalosporin and aminoglycoside utilization in different parts of the world. J Antimicrob Chemother 1989;24:100–10.
9. Mouton RP, Hermans J, Simoons-Smit AM, Hoogkamprstanje JA, Degener JE, van Klingreen B. Correlation and consumption of antibiotics and methicillin resistance i lase negative staphylococci. J Antimicrob chemother 1999;573–83.
10. Gold HS, Moellering RC. Antimicrobial-drug resistance. Engl J Med 1996; 335:1445–53.

Address for Correspondence:

Dr. Zahoor Ahmed, Assistant Professor, Department of Biochemistry, Khyber Medical College, Peshawar, Pakistan. **Cell:** +92-333-9304808

Email: zakhan70@yahoo.co.uk