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Original Research Article

Measurement of antibiotic consumption in surgical ward of a tertiary care hospital

Rashmi R. Pujari¹, Bhabagrahi Rath¹, Tapan Kumar Nayak^{2*}

¹Department of Pharmacology, ²Department of Surgery, Veer Surendra Sai Institute of Medical Science and Research, Burla, Sambalpur, Odisha, India

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***Correspondence:**

Dr. Tapan Kumar Nayak,

Email: rashmipujari13@gmail.com

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ABSTRACT

Background: Antibiotic resistance is a global health problem. Improper use of antibiotics leads to development of antibiotic resistance, side effects, superinfections and increase in treatment costs. There are few publications on antibiotic consumption. Serious morbidity and mortality are associated with postoperative wound infections. The use of peri or pre-operative antibiotics has resulted in a reduced risk of postoperative infection when appropriate principles of prophylaxis are applied.

Methods: An observational study during a 2-month period was carried out in the department of surgery of Veer Surendra Sai Institute of Medical Science and Research, Burla. We utilized the administrative data for expression of antibiotic consumption using anatomical therapeutic classification (ATC) / defined daily dose (DDDs) methodology. The information included were drug names, strength, pharmaceutical form, quantity dispensed, total number of patients admitted during the study period and average length of stay. Each drug was then given a code according to the ATC classification. The number of DDDs and DDDs/100 bed days was calculated.

Results: The most frequent antibiotic used was cephalosporin group with DDDs 62.70 DDDs/100 bed days (44.34%) followed by metronidazole with 23.10 DDDs/100 bed days (16.34%). Among cephalosporin group most common antibiotic used was ceftriaxone with 24.46 DDDs/100 bed days. The mean duration of stay was 7.2 days.

Conclusions: The results of this study are similar to previous studies and it showed that there is irrational use of antibiotics as there is no antibiotic policy in our hospital. Drug utilization research should be carried out at frequent intervals to improve rational use of antibiotics.

Keywords: Antibiotic resistance, Anatomical therapeutic classification, Defined daily dose, Bed day

INTRODUCTION

Anti-infective agents are the most frequently used group of drugs in our country.¹ Unnecessary use of antibiotics has led to increased resistance, side effects, treatment costs.²

Use of peri-operative antibiotics is an essential component in virtually all surgical procedures.³ There is no sufficient data on antibiotic use in our country.⁴ For the proper use of antibiotics, there is urgent need for

vigilant surveillance, stringent infection control, rational antibiotic prescription.⁵

Drug utilization research

The marketing, distribution, prescription and use of drugs in a society, with special emphasis on resulting medical, social and economic consequences.⁶ It is carried out to achieve cost-effective health care and it forms the basis for making amendments in drug policies and helps in rational drug use. Antibiotic utilization studies help in

improvement of appropriate and effective use of antibiotics.

METHODS

The design of this observational study was 2 months (1st July 2019 to 30th August 2019) Patients admitted to Department of General Surgery, VIMSAR, Burla.

Inclusion criteria

Records of all patients admitted to Dept of General Surgery

Study procedure

After obtaining permission from Institutional Ethics Committee (IEC), VIMSAR Burla, data were collected from drug administration and admission discharge records.

Study tool

(Anatomical therapeutic classification/Defined daily dose (ATC/DDD) methodology.⁷ Each antibiotic has an ATC code and DDD developed by WHO. The no. of DDDs, DDDs/100 bed days (ACI) and PDD (prescribed daily dose) were calculated.

DDD - the assumed average maintenance dose per day for a drug used for its main indication in adults.⁷

No. of DDDs = (No. of units administered in a given period × Strength)/DDD

ACI (Antibiotic consumption index) (DDD/100 bed days) = DDDs/no. of bed-days × 100

No. of bed days = No. of admissions × Average length of stay

Prescribed daily dose (PDD) of individual antibiotic were calculated and compared to its DDD.

Statistical analysis

All the data obtained were entered into Microsoft excel and analysed. Data were expressed in number and percentage.

RESULTS

Among the different antibiotics used in surgery ward, Cephalosporin group is the most commonly used group of antibiotics with 62.7 DDDs/100 BD (48.41%) followed by Nitroimidazoles (18.24%) followed by Amino glycosides (9.1%) (Table 1) (Figure 1). Percentage of Total no. of DDDs represent in (Figure 2).

Table 1: DDDs/100 BD of different Antibiotic classes.

Antibiotic class	No. of DDDs	DDD/100 bed days	%
Cephalosporin	6400	62.70	48.41
Nitroimidazoles	2414	23.65	18.24
Aminoglycosides	1210	11.85	9.1
Linezolid	950	9.31	7.1
Penicillin	846	8.29	6.4
Fluoroquinolones	837	8.20	6.3
Carbapenem	375	3.67	2.83
Macrolides	182	1.78	1.3
Glycopeptides	5	0.05	0.03
Total	13219	129.5	100

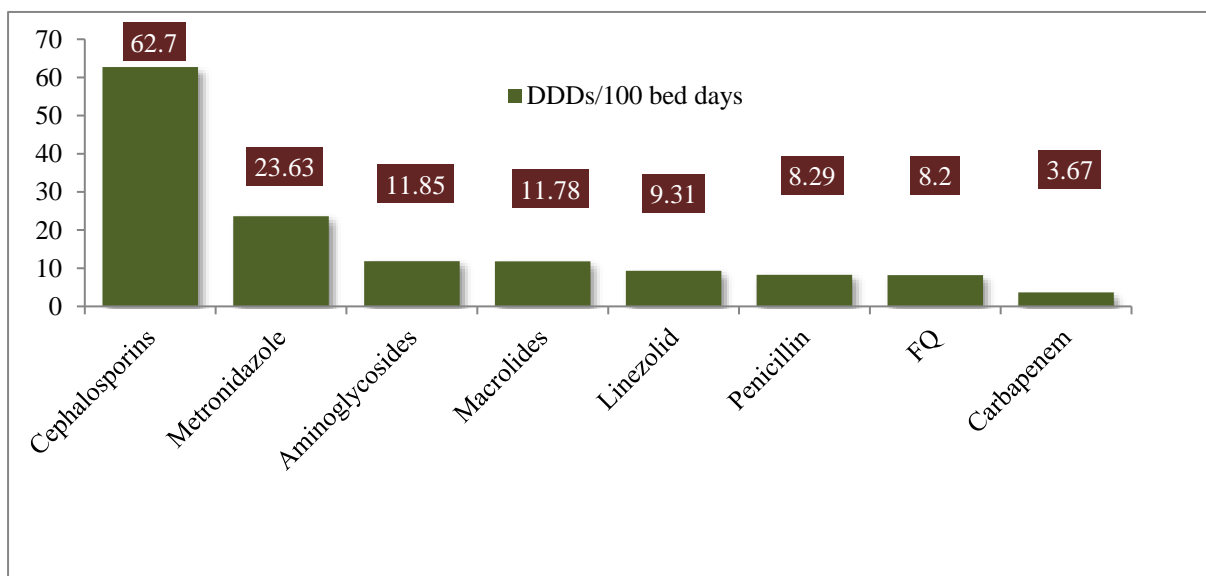


Figure 1: DDDs/100 bed days.

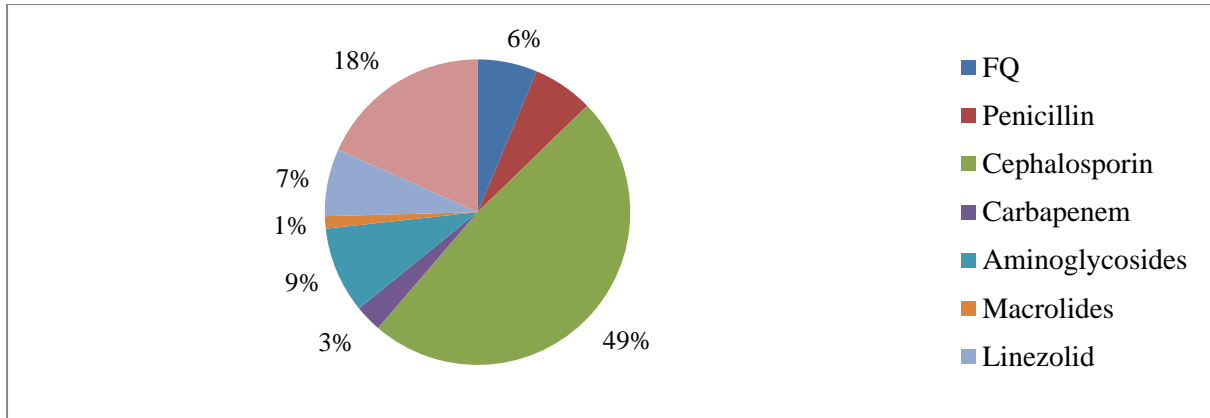


Figure 2: Percentage of Total no. of DDDs.

Injectable antibiotics (61.83%) are commonly preferred over oral antibiotics (38.17%) in the Dept of General surgery (Figure 3).

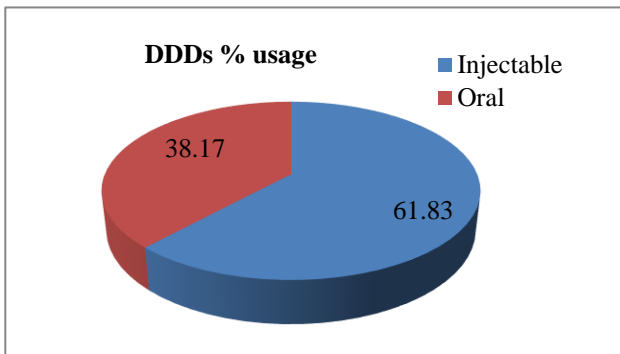


Figure 3: DDDs % usage.

Among the cephalosporin group of antibiotics, ceftriaxone is the most common antibiotic used with 26.46 DDDs/100 BD (42.2%) followed by cefpodoxime (22%) followed by cefixime (17.57%) (Table 2).

Table 2: DDDs/100 BD of Cephalosporins.

Cephalosporins	DDDs	DDDs/100 bed days	%age
Ceftriaxone	2700	26.46	42.2
Cefpodoxime	1414	13.85	22
Cefixime	1125	11.02	17.57
Cefoperazone	1031	10.1	16.1
Cefadroxil	118	1.15	1.8
Cefepime	10	0.10	0.15
Cefotaxime	3	0.02	0.03

In my study, ceftriaxone has has higher PDD than DDD indicating that it is used at higher than normal doses. In other cephalosporins, PDD is lower than or same as DDD (Figure 4).

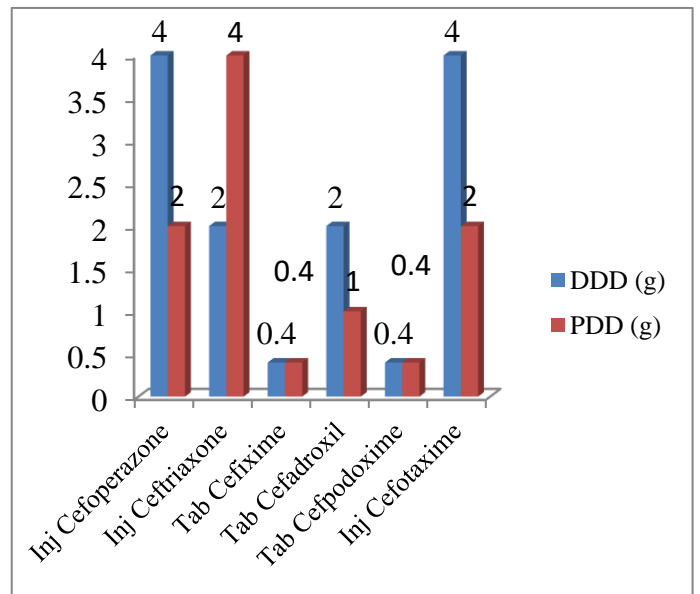


Figure 4: PDD Vs DDD of Cephalosporins.

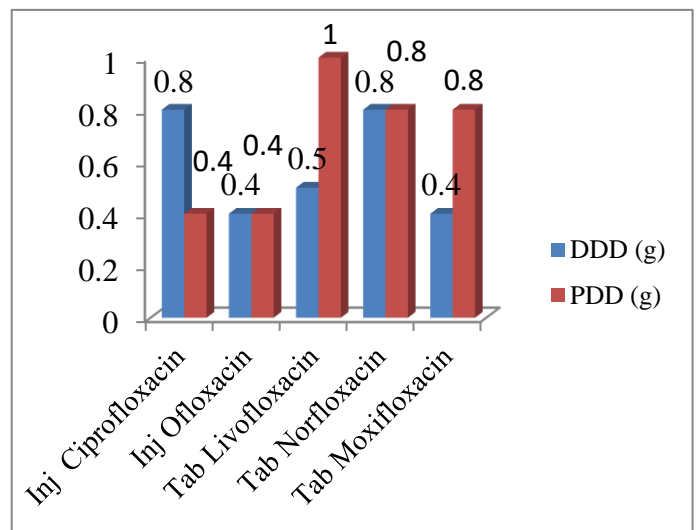


Figure 5: PDD Vs DDD of FQs.

DISCUSSION

In our study, most frequently prescribed antibiotic Cephalosporin group with ACI of 62.70 DDDs/100 BD (48.41%) followed by Metronidazole with ACI of 23.65 (18.24%) followed by aminoglycosides with ACI of 11.85 (9.1%) Sozen et al reported Cephalosporins constitute 57% followed by FQs with 14.70%.⁸

Among cephalosporin group, ceftriaxone constitute 42.2% (ACI of 24.46) followed by cefpodoxime with 22% (ACI of 13.85)- Aparna Williams et al 2019- the most frequently prescribed antibiotics were 3rd generation cephalosporins (ACI of 18.48) followed by metronidazole (ACI of 14.65).⁹

In contrary to this, a study done by Pesic et al cotrimoxazole was the most utilized antibiotic with 204.35 DDD/100 BD or 77.54% in Nis and 129.03 DDD/100 BD or 57.39% in Novi Sad.¹⁰ In another Indian study, the most commonly prescribed antibiotics at admission were cefaperazone/sulbactam or piperacillin/tazobactam.¹¹

CONCLUSION

In this study, Cephalosporin group is the most frequently used antibiotic in surgical wards. Amongst Cephalosporins, Ceftriaxone (3rd Gen.) is most commonly used. In comparison to Oral, Injectable antibiotics are more preferred. In our study- PDD of most of the antibiotics were found to be less than DDD. The average length of stay of patients is 7 days.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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