ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Assessment of Antibiotics Utilization Pattern in Surgery Department in Rural Tertiary Care South Indian Hospital: A Prospective Study.

KV Ramanath*[1], Abel Abraham Thomas[2], Shaheera Said Muhammed[2], and Nunna Shiva Rama Krishna [2].

[1]Department of Pharmacy practice, Sri Adichunchanagiri College of Pharmacy, B.G. Nagara-571448, Karnataka, India.
[2]Pharm D Interns, Sri Adichunchanagiri College of Pharmacy, B.G. Nagara-571448, Karnataka, India.

ABSTRACT

Antibiotics are most widely prescribed drugs in today's scenario due to the increasing rate of infections. Irrational antibiotic prescriptions often lead to the emergence of antimicrobial resistance. Hence the present study was carried out in the rural hospital surgery department with the objective to know the drug utilization pattern & its cost in surgery department. A prospective and observational study was carried out in 207 patients from October 2014 to March 2015. Relevant information was obtained from the interview as well the treatment chart of patients, by using a case report form. The present study showed that most of the patients were females (72.94%).Among these patients most were belonging 59-68 years (23.1%), in which majority was farmers (59.4%).The diagnosis of patients showed Hernia (21.7%), Appendicitis (14.5%) in which surgery was done for 70.7%. 96.1% of treated patients outcome showed improvement and 26% patients had drug-drug interactions, in which 20.7% observed was mild. Only 3.8% of underwent with culture sensitivity test with blood and peritoneal fluid. Cephalosporin's (63.8%) and Nitro imidazole (53.1%) were the most commonly prescribed antibiotics. The antibiotic consumptions were calculated using DDD(defined daily dose), Metronidazole was the most utilized antibiotic followed by Ceftriaxone. Cost of pre-operative antibiotic was found to be Rs 133.6 ± 193.20, in which most of the cost were due to ceftriaxoneRs4795/- followed by MetronidazoleRs1735/-. The post-operative antibiotic cost was found to be Rs 763.94 ± 763.59 in which most of the cost were due to ceftriaxone + sulbactum Rs122597/- followed by metronidazole Rs.13252/-. This study clearly showed that prescribing pattern of drugs antibiotics needs to be continuously evaluated in the surgery department in order to promote more rational prescribing and to decrease morbidity cost of therapy to the patient.

Keywords: DDD: Defined daily dose. DDI: Drug -Drug Interactions. Surgical site infection (SSI)

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Infections are very common and are responsible for a large number of diseases which will affect human health hence the infections were to be treated with antibiotics properly. [1, 2, 3].Antibiotic forms the backbone of treating various infections and also second most commonly prescribed drugs in the world next to cardiovascular disorders [2].In surgical practice, antimicrobial agents are administered in three situations as: Prophylaxis, adjunct to operative treatment, and as therapy. Prophylactic antibiotics are paid preoperatively to reduce the incidence of surgical site infection [4] .Surgical site infection (SSI) is the most frequent post-operative complication and represents a significant burden in terms of patient morbidity and mortality, and cost to health services around the world. SSIs are also the second commonest nosocomial infections, accounting for approximately one quarter of the 2 million hospitals acquired infections annually [5]

Antimicrobial agents are given as Adjunctive in the operative management of infections such as secondary peritonitis or narcotizing fasciitis; and also antibiotics are used as primary therapy when an operation does not occur, such as for cellulitis or postoperative pneumonia. [4]. Infection at surgical sites is one of the most common causes of post-operative morbidity and mortality,so pre and post-operative cannot be complete without the use of antimicrobials,. Hence an appropriate selection of safe and effective antimicrobials with initial dosing at an appropriate time and re-dosing is essential, in order to maintain effective serum and tissue levels throughout the operation. When the patient is no longer part receiving benefit, it is better discontinue and shift to other classes of antibiotics. [5]

The various factors considered in the antibiotic prescription are 1) educational qualification of the physician 2) experience of the physician 3) source of updating knowledge 4) practice setting 5) Patient Volume 6) age of the patient. Wound infections are the commonest nosocomial infection in surgical patients causes increased antibiotic use, increased cost, and prolonged hospitalization. In India, prevalence of antibacterial drugs use varies from 24% to 67% and estimated to account for 50% of total value of drugs. 64% of total antibacterial prescribed are either not indicated or in appropriate in terms of drug selection [6]

Appendicitis, haemorrhoids, hernia, phimosis, diabetic foot ulcer and carcinoma were commonly observed cases in the surgical ward. In this condition, only a little proportion of patients requires antibiotic therapy [7]

Most studies showed that, up to one third of all patients receive at least one antibiotic during hospitalization and up to 35% of a hospital's drug expenditure may be spent on antibiotics alone. Antibiotic use is likely to be higher in developing nations, because of the higher burden from infections. Which intern leads to misuse of the same has contributed to one of the world's most dangerous healthcare problems (i.e. antibiotic resistance)(2) for growing worldwide. . The widespread and often inappropriate use of broad spectrum antimicrobial agents is recognized as a significant contributing factor to the development and spread of bacterial resistance, and eventually lead to the evolution of 'super bugs' intern leads to overall morbidity, mortality, adverse effects, delay in treatment progression, increase in hospitalization and cost of treatment increased antibiotic usage, increased cost, and prolonged hospitalization. [5-7]

Irrational prescriptions of antimicrobial agents especially with broad spectrum antibiotics leads to difficulty in bacterial management of post-operative wound infections. [8]

Lack of knowledge among the patients, the use of antibiotics without prescription, as over- the-counter drugs (self-medication). Over use, under use, improper timing, duration, dose and use in inappropriate indication (eg. Viral infections) and noncompliance with medication leads to antibiotic resistance.[7]
The purpose of the Anatomical Therapeutic Chemical (ATC)/Defined Daily Dose (DDD) system is to serve as a tool for DUR in order to improve quality of drug use[8]

Defined daily doses (DDD) help us to compare drugs of different potency and to keep a control on nationwide consumption of drugs. DDD reflects the antibiotic exposure of a society. World Health Organization (WHO) defines DDD as the assumed average maintenance dose per day for a drug employed to its main indication in adults.[9]

Treating the infection with antibiotic is difficult because of increasing antibiotic resistance and decrease development of novel antibiotics. In clinical practice, control the spread of antibiotic resistance and investigations like antibiogram are essential and which will lead to the increasing cost of the treatment. Due to the inadequate data and guidelines for surgery prophylaxis, there is an extensive studies need to develop at baseline data on utilization pattern of antibiotics in surgery practice [9-15]. Hence prescribing patterns need to be monitored, evaluated and modified if need, to make the treatment more rational and cost effective. [3] Hence this study was carried over in our hospital of the surgery department with the Objectives

- To study the antibiotic prescription patterns in various diseased conditions.
- To identify the various pharmaceutical interventions (antibiotics susceptibility and rationality of antibiotics prescription)
- To calculate DDD/100 bed days of antibiotic.
- To estimate direct cost burden of antibiotics on the patients.

METHOD

This study is prospective. Observational study conducted in Adichunchanagiri Hospital & Research Centre for a period of six months from September 2014 to April 2015 after obtaining Institutional Ethical Committee approval. The Inclusion criteria in this study include was the patients who were admitted under surgery unit of Adichunchanagiri Hospital and Research centre irrespective of age and sex. The exclusion criteria include patients who were treated as outpatients &patients who had incomplete medical records. Study materials used are patient case sheet, medication chart, lab reports & Antibiogram of patient

Methodology

Patients was enrolled into the study, after taking their consent by considering the said criteria's, The patient's medical records were reviewed from all surgery unit cases by the investigator and the collected data was entered in the case record form which include demographics of the patient (name, age, sex, socioeconomic status, medical, medication, family and social history etc.), regarding the disease, type of surgery undergone, name of antibiotics prescribed and days of prescribing , route of administration ,days of hospital stay, cost of antibiotics prescribed, and other medications provided along with antibiotics. The sensitivity patterns of organisms isolated (samples taken from the wound (surface swabs or tissue). Body fluids viz. blood/urine/sputum was also collected. The collected data were reviewed for correctness of drug use, benefits by referring to various resources. The data were analyzed by using descriptive statistical method by using SPSS .

RESULTS

Among the 207 study population enrolled in the study. The majority of the study population was females 72.94% and males were 27.06%. In which majority of the subjects i.e. belongs to the age group 59-68 years(23.1%) and followed by 39-48 years(14.4%) ,49-58 and 29-38 years (14%) have common pattern,19-28 years (13.6%),69-78 years (14%),11-15 years (5%),6-10 years (5%),16-18 years(2%). 1% of the patients belong to the age group >=79 years. BMI details showed majority were normal 59.4% followed by 21.7% were under nutrition,17.3% were overweight & 1.4% were purely obese. 69.5% annual income details of the majority of them showed between 50,000- 1, 00,000 lack. (**Table1**)

Among 207 subjects enrolled in the study , the majority of the subjects was diagnosed to have Hernia(21.7%) in which Right Hernia accounted to be 1.9 %, Left Hernia(1%), Epigastric hernia (3.9%),Inguinal Hernia (14%),Congenital Hernia(1%) followed by Appendicitis (14.5 %), Ulcer (30%) in which Venous Ulcer accounted for 4.8% and Diabetic Foot Ulcer accounted for 8.2%, Hemorrhoids accounted for 6.8%, Perforation,Cholilithiasis and Obstruction accounted for 3.9% wherein 2.9% of the obstruction was diagnosed to be Intestinal Obstruction and 0.5% of the obstruction was Gastric outlet obstruction and bowel obstruction. 3.4% of diagnosed cases were UTI followed by Cellulitis. Injury and gangrene accounted for 2.9%.Among 2.9% of the injury being diagnosed in 1.9% was Head injury and 1% was Abdominal Injury Among 2.9% of the gangrene diagnosed,2.4% was wet gangrene and 0.5% were dry gangrene .Breast Cancer, Prostomegaly, Left testis hydrosis and Lepoma accounted for 2.4%. Sinus infections accounted for 1.5% in which SacroccyalPylontal Sinus accounted 1% and traumatic Discharging Sinus accounted for 0.5%. Varicosevein,

Goiter, Phimosis, TB peritonitis, Pancreatis, right Epididomorchitis, B/L sinonasal polyps and Ethmoid polyps accounted for 1%. Obstructive jaundice with Pyloric Stenosis, Splenic laceration, Gall Stones, Adenocarcinoma of colon, Lymphadentitis accounted for 0.5%.There **was** also other diagnoses which were categorized as miscellaneous (7.7%)

Table 1: Distribution of demographic details of the patients

S.no	Parameters	N(%)
1	**Gender**	
	Male	56(27.06)
	Female	151(72.94)
2	**Patients age group**	
	2-5 years	3(1.4)
	6-10 years	1(0.5)
	11-15 years	6(2.9)
	16-18 years	2(1.0)
	19-28 years	28(13.6)
	29-38 years	29(14.0)
	39-48 years	30(14.4)
	49-58 years	29(14.0)
	59-68 years	48(23.1)
	69-78 years	29(14.0)
	≥79 years	2(1.0)
3	**BMI category of the patients**	45(21.7)
	<18.9 (Under Nutrition)	123(59.4)
	19-24.9 (Normal)	36(17.3)
	25-30 (Over Weight)	3(1.4)
	>30 (Obese)	
4	Annual Income of the patients	
	<50,000 Rs	3(1.4)
	50,000-1,00,000 Rs	144(69.5)
	1,00,000 - 2,00,000 Rs	2(1.0)
	>2,00,000 Rs	6(2.9)
	Not Applicable/No information	52(25.0)

Miscellaneous diagnosis included Bilateral breast abscess with mucosal breast tissue, Bed sores with reflected pliant sinus, Complete rectal prolapse, Foreign body broken cannula, Gynacomastia, Left undescended testis, Necrotizing fasciitis left foot, septicaemia+, DM,Post-operative inflammation over the abdominal wall, RTA, Sebaceous cyst on right breast, Splenic laceration with moderate to gross haemoperitoneum, Wound infection with acute gastritis, Type 2 DM, Bull Attack, Burn cases, Pyloric Stenosis(Table2).

Among 207 study populations, 70.7% underwent surgery and remaining 28.8% were not undergo surgery. Interestingly most of study population199 (95.7%) has not gone for the culture test. Only 3.8% have gone for cultural sensitivity test

ISSN: 0975-8585

Table 2: Distribution of diagnosis of disease

s.no	Disease	N	%
1	Appendicitis	30	14.5
2	Calculi	15	7.2
3	Perforation	8	3.9
4	Cholilethiasis	8	3.9
5	Injury • Head • abdominal	 4 2	 1.9 1.0
6	Hemorrhoids	14	6.8
7	Goiter	2	1.0
8	Gangrene wet gangrene Dry gangrene	 5 1	 2.4 0.5
9	Breast cancer	5	2.4
10	Ulcer venous ulcer Diabetic foot ulcer	 10 17	 4.8 8.2
11	Pancreatitis	2	1
12	Obstructions Intestinal obstructions Gastric outlet obstructions Bowel obstruction	 6 1 1	 2.9 0.5 0.5
13	Vericosevein	3	1.4
14	Pimosis	2	1.0
15	TB Peritonitis	2	1.0
16	Lipoma	5	2.4
17	Cellulitis	6	2.9
18	Sinus Sacroccyalpylontal sinus Traumatic discharging sinus	 2 1	 1.0 0.5
19	Hernia Rt hernia+ LT hernia epigastric hernia Inguinal hernia congenital hernia	 4+2 8 29 2	 1.9+1 3.9 14.0 1.0
20	Obstructive jaundice pyloric stenosis	1	0.5
21	Splenic laceration	1	0.5
22	Right Epididomorchities	2	1.0
23	Gall stones	1	0.5
24	BL Sinonasl polyps BLsinonasal polyps Ethmoid polyps	**1** **1**	0.5 0.5
25	**Prostomegaly**	5	2.4
26	**Adenocarcinoma of colon**	1	0.5
27	**Lymphonidities**	1	0.5
28	**Lefttestieshydrosis**	5	2.4
39	**UTI**	7	3.4
30	**Miscellaneous**	16	7.7

Among the 207 cases ,most common pre-operative drug used was Cephalosporin which was accounted for 63.8% followed by Nitroimidazole (53.1%), Aminoglycoside (6.3%), Penicillins (1.4%), and Beta lactamase inhibitors (1.0%), Fluoroquinolones, Sulfonamides and Oxazolidinediones which accounted for the 0.5%.

The most common post-operative drugs used was Cephalosporin (62.3%), followed by Nitro imidazole(54.1%), Aminoglycosides(7.2%), Beta lactamase inhibitors(1.9%), Fluoroquinolones(1.4%), penicillins(1.0%), Oxazolidinediones(0.5%)(Table 3)

Table 3: Antibiotics usage pattern in Pre-operative and post-operative Based on class of antibiotics

Sl.no	Class	Preoperative		Postoperative	
		YES	%	YES	%
1.	Cephalosporin	132	63.8	129	62.3
2.	Penicillin	3	1.4	2	1.0
3.	Fluoroquinolones	1	0.5	3	1.4
4.	Nitro imidazole	110	53.1	112	54.1
5.	Beta lactamase inhibitors	2	1.0	4	1.9
6.	Aminoglycosides	13	6.3	15	7.2
7.	Sulfonamide	1	0.5	0	0
8.	oxazolidinediones	1	0.5	1	0.5

Table 4: Defined daily dose of antibiotic class of drugs

S.no	Drugs	DDD/100 bed days
1.	ceftriaxone	0.0680 ±0.320
2.	Cefixime	0.0267±0.202
3.	Cefoperazone	0.0001± 0.001
4.	Cefixime+clavulanic acid	0.0093± 0.0486
5.	Metronidazole	0.0951±0.282
6.	Piperacillin +tazobactum	0.0002±0.002
7.	Amikacin	0.010±0.055
8.	Cefotaxime	0.000034±0.00048
9.	Norfloxacin	0.000011±.0001529
10.	Ornidazole	0.000754±.0076483
11.	Ofloxacin +ornidazole	0.003294± .0159436
12.	Moxifloxacin	0.000021± .0003058
13.	Clarithromycinesmeprazoleamoxycylin	0.022657± .3259775
14.	Amoxycilin +clavalunic acid	0.000265± .0017484
15.	Ciprofloxacin +tinidazole	0.009504± .0766480
16.	Ofloxacin	0.000952± .0079236
17.	Feropenam	0.000005± .0000780
18.	Cotrimaxazole	0.000000± 0E-7
19.	Linezolid	0.000276± .0027461
20.	Azithromycin	0.009199± .0891142
21.	Levofloxacin	0.018249±.1802531
22.	Ciprofloxacin	0.022460± .1341382
23.	Amipicilin	0.000348± .0028388
24.	Nitrofurantoin	0.001240± .0178419
25.	Ketoconazole	0.000000±0E-7
26.	Streptomycin	0.000217± .0031201

The DDD/100 bed days of Antibiotics in sequence shown as follows Metronidazole > Ceftriaxone >Cefixime> Clarithromycin + Omeprazole + Amoxicillin > Ciprofloxacin > Levofloxacin > Amikacin > Ciprofloxacin + Tinidazole>Cefixime+ Clavulanic acid > Azithromycin >Ofloxacin + Ornidazole> Nitrofurantoin >Ofloxacin>Ornidazole> Ampicillin > Linezolid > Piperacillin + Tazobactum> Amoxicillin + Clavulanic Acid > Streptomycin >Cefaperazone>Cefotaxim> Moxifloxacin >Norfloxacin>Feropenem>Cotrimazole> Ketoconazole. (Table4)

ISSN: 0975-8585

Pre-operative cost of antibiotics sequence is shown as follows:Ceftriaxone> Metronidazole >Ceftriaxone+salbactam>Cefoperazone+sulbactam>Cefoperazone>Piparacillin+tazobactam> Amikacin >Amoxicilline+clavulonic acid > Streptomycin > Ciprofloxacin >Cotrimoxizole>Cefixime.The total cost of pre operative antibiotic was found to be Rs 27,527

The post-operative antibiotic cost of antibiotics in sequence as shown is Ceftriaxone+ sulbactum> Metronidazole >Cefixime + Clavulanic Acid > Amikacin > Piperacillin + Tazobactum> Ceftriaxone > Amoxicillin + Clavulanic acid >Ofloxacin> Azithromycin > Levofloxacin > Ciprofloxacin >Cephaperazone>Norfloxacin>Streptomycin.The total cost of post-operative antibiotic was found to be Rs 15,813

Table 5: Cost of antibiotics in Pre& Post-operative Surgery

S.no	Drugs cost	Preoperative cost			Post-Operative cost		
		Mean+Sd	Sum	Range	Mean+Sd	Sum	Range
1.	Ceftriaxone	23.17 ± 67.521	4795	522	13.2144± 48.53574	2735.39	294.00
2.	Amikacin	3.06 ±12.802	633	62	20.3068±80.96631	4203.50	620.00
3.	Cefazolin	.00 ± .000	0	0	.0000± .00000	.00	.00
4.	Piperacilin+tazobactum	4.44 ± 45.106	920	460	19.8068± 150.08076	4100.00	1800.00
5.	Ciprofloxacin	.33 ± 3.393	68	40	1.1242 ± 8.34880	232.7	85.00
6.	Levofloxacin	00 ± 00	0	0	1.1401± 7.35731	236.0	54.60
7.	Mefloquine+artesunate	00 ± 00	0	0	.0000± .0000	.0000±.0	.0000± .0000
8.	Tetracycline+doxycycline	00 ± 00	0	0	.0000±.00000	.00	.00
9.	Cefotaxime	00 ± 00	0	0	.0000±.00000	.00	.00
10.	cefixime+clavulanic acid	00 ± 00	0	0	29.9589±94.44291	6201.50	540.00
11.	Norfloxacin	00 ± 00	0	0	.4638±4.09686	96.00	48.00
12.	Cefixime	.06±.851	12	12	.0000±.00000	.00	.00
13.	Amoxycillin+clavulanic acid	1.56±14.781	323	150	13.1266±81.98874	2717.20	852.00
14.	Ofloxacin	00 ± 00	0	0	3.7024±32.6688	766.40	425.00
15.	Cefuroxime	00 ± 00	0	0	.0000±.00000	.00	.00
16.	Azithromycin_	00 ± 00	0	0	3.4783±41.34233	720.00	578.40
17.	Cefoperazone	5.1884± 63.37949	1074.00	895.00	.8647±12.44136	179.00	179.00
18.	Cefopodoxime+clavulanic acid	00 ± 00	0	0	.0000±.00000	.00	.00
19.	Ceftazidime_	00 ± 00	0	0	.0000±.00000	.00	.00
20.	Cefodoxime	00 ± 00	0	0	00 ± 00	0	0
21.	Ceftriaxone+sulbactum	66.5604± 83.69127	13778.0	4725.40	592.2572±725.85457	122597.25	3180.00
22.	cefoxamine_clavalunic	00 ± 00	0	0	00 ± 00	0	0
23.	Chloramphenicol	00 ± 00	0	0	00 ± 00	0	0
24.	Cefoperazon+sulbactam	5.8599± 45.69734	1213.00	522.00	00 ± 00	0	0

25.	Cotrimaxazole	.1049± 00	21.72	21.72	00 ± 00	0	0
26.	Piperacilin	00 ± 00	0	0	00 ± 00	0	0
27.	Gentamicin	00 ± 00	0	0	00 ± 00	0	0
28.	Vancomycin	00 ± 00	0	0	00 ± 00	0	0
29.	Cloxacillin	00 ± 00	0	0	00 ± 00	0	0
30.	Fusidic acid	00 ± 00	0	0	00 ± 00	0	0
31.	Streptomycin	.5411± 6.40688	112.00	89.50	.2343± 3.37098	48.50	48.50
32.	Meropenam	00 ± 00	0	0	00 ± 00	0	0
33.	Imipenam	00 ± 00	0	0	00 ± 00	0	0
34.	Faropenam	00 ± 00	0	0	00 ± 00	0	0
35.	Metronidazole	22.8280± 126.95033	1735.00	460.00	64.0218± 109.28711	13252.51	520.50
36.	Total cost of antibiotics	133.6283±193.20056	27527.43	1865.00	763.9466±763.59880	158136.95	3573.90
37.	Total number of drugs	2.77± 2.125				574	6

The total number of antibiotics prescribed in the surgery department was found 574 and the mean number of drugs per prescriptions 2.77± 2.125(Table 5)

DISCUSSSION

Antibiotics are the second most widely prescribed drugs to treat various infections in the worldwide. Irrational prescriptions of antimicrobial agents lead to the emergence of high antimicrobial resistance which will intern increase the treatment cost and harm the human life. Due to the inadequate data and guidelines for surgery prophylaxis. Hence the usage of antibiotics properly can save lives. Due to the scanty data and guidelines for surgery prophylaxis, there is an extensive studies need to develop at baseline data on utilization pattern of antibiotics in surgery practice. Hence prescribing patterns have to be monitored, evaluated and modified if need, to make the treatment more rational and cost effective.

Among 207 patients in our study showed the majority of our subjects were females, which are contradictory to the Indian scenario that female populations are reluctant to utilize health care facilities even if they are critically ill and especially from lower socioeconomic strata. A similar study done by Elbur A. I et.al also showed that 82% of the study population was females. [12]The majority of patients enrolled were within the age group of 59-68 years of age, which agrees with the common concept of age related issues even which may be similar in many countries. The occurrence of chronic diseases among these patients decreases their immunity and contributes to the increased risk of an infection. BMI of enrolled patients showed that the 21.7% under nutrition and overweight were 18.7% these findings may be due to lack of proper knowledge about the diet management. As our study was conducted in a rural setup most of the subjects were farmers followed by small scale business persons which constituted their annual income to be between Rs 50,000-1,00,000.Most of the study population in our study had some social habits such as tobacco chewing, smoking, alcoholism etc. which shows their lack of knowledge on how these social habits could harm their health especially during the event of an infection. Most of the hospitalizations were due to Hernia, Appendicitis. A similar study did by Khan et.al also showed that 40% of the operated cases were Hernia. This was because our study hospital centre is a referral hospital from the Taluq.[4] A large number of acute abdomen cases reporting even in this hospital indicate insufficient healthcare facilities at the primary and secondary health care centres of this region. Moreover, excess cases of ulcer and haemorrhoids might be due to lack of awareness to get early medical help in population. Moreover, poverty may also be a reason for the late arrival of the cases since the region is relatively less developed on developmental indices in comparison with other districts of the state. Endoscopy was used in the majority of the cases as a diagnostic tool for the majority of our diagnosis especially in acute abdominal cases.

Most of our study patients, especially acute abdominal cases underwent surgery. The majority of hospitalized subject's conditions (96.1%) were improved which showed the effectiveness of the treatment provided in the hospital. During the treatment, drug interaction was observed in some subjects which were

really brought into the notice of the medical practitioners in which most of the drug interaction which was mild and was necessary a few cases. The treatment was modified according to the suggestions.

Interestingly our study was able to show that only 3.8% of the study population has medical practitioners accepted to prescribe with the culture sensitivity test which could be due to the financial constraint of the study population. This may be one of the reasons which may lead to antibiotic resistance. All the cases in our study received prophylactic antimicrobials prior to the surgery and the antimicrobial was continued after the surgery also and the most common pre-operative and post-operative class antibiotic used was cephalosporin followed by nitro imidazole. The similar study done by R. A. Kulkarniet.al showed that a third generation cephalosporin along with an anti- anaerobic agent was the most preferred antimicrobial combination for treatingintra-abdominal infections (84%).[5] Other studies did byKapure NL et.al showed that Cephalosporin's was found to be prescribed for the largest number (71.42%) followed by Nitro imidazole (39.68%). [13-15] The similar study did by Khan et.al showed that a third generation cephalosporin like ceftriaxone was prescribed in 237(92%) cases and ceftriaxone + salbactum was prescribed in 21(8%) cases. Metronidazole, Ornidazole or Ami-kacin were prescribed along with Cephalosporin's to 77(30%) of the patients. The intravenous route was ideally recommended in our study, as it produced a reliable and predictable serum and tissue concentrations. similar study done by Kade A et.al showed that the most preferred route of drug administration was intravenous route (174 drugs, 68.2%).[7]The use of antimicrobials in most of these cases seemed to be empirical and which may be because of operating surgeon's clinical experience. The local resistance pattern might have a major influ-ence during the drug selection of antibiotics. The combination of amikacin/metronidazole with the third generation cephalosporin's was observed as major use of antibiotics in many of the pre and the postoperative cases. Metronidazole wide spectrum coverage helps them to recommend as a combination of the majority of cases as a surgical prophylaxis, to provide an adequate anaerobic cover.

In order to find rough estimate of drug consumptions. antibiotic consumption was calculated with respect to DDD/100 days formula concept, to overcome objection against traditional units measurement of drug consumption. The DDD of antibiotics prescribed was found by using the formula obtained from the literature the result showed that Metronidazole was most utilized antibiotic followed by Ceftriaxone. The probable reason for this type of antibiotic utilization may be due to adequate antimicrobial coverage with these drugs can provide in terms of a better infection control. From our study the cost of pre-operative antibiotic was Rs 133.6 ±193.20 , in which most of the cost was due to ceftriaxone use followed by metronidazole. The post-operative antibiotic was Rs 763.94 ±763.59in which most of the cost was due to ceftriaxone + sulbactum use followed by metronidazole use. The total cost was increased because of more spectrum coverage antibiotics like ceftriaxone and metronidazole.

CONCLUSION

Drug utilization study continuously contributes to modify if an irrational prescribing of drugs. The majority of cases observed were Hernia and Appendicitis irrespective of whether an operative procedure was carried out or not. Cephalosporin's is widely used which replaced Penicillin in most of the conditions, along with metronidazole. Multiple antibacterial drug use was very commonly observed. Irrational and inappropriate choice of drug, use of antibacterial agents for surgical prophylaxis on inappropriate and duration use was observed due to inadequate and almost minimal use of microbiological support (culture sensitivity test). The antibiotic resistance and cost of the therapy can be minimizing if the culture sensitivity is strongly suggested even in rural hospital setups.

Prescription by generic drugs helps in increasing the cost effective options and also reduce the administrative inconvenience. Hence prescribing pattern of antibiotics needs to be evaluated continuously for further in surgery department in order to develop and implement hospital formulary for promoting the more rational prescribing of drugs and to minimize the morbidity and cost of therapy.

Limitations:

- The study was conducted in a short period i.e. 6 months; even this study can be extended.
- This study was conducted only for in-patients not included in out-patients due to lack of information in out-patients (e.g.: cardiac surgery referred cases)

Future directions

- This type of study can be conducted for a longer period for getting a clear understanding about complications associated with surgery and prescribing patterns in surgery department.
- Creating awareness regarding surgical site hygiene is essential for the rural population.
- Conducting / auditing of Antibiotic resistant studies are essential in surgery department

Conflict of interest: The author's doses do not have any conflicts

ACKNOWLEDGMENT

We are thankful to Dr. Sri NirmalanadhanathaSwamy, SAC Shikshnatrust President, Dr. B. Ramesh Principal, all staffs of Surgery department and medical superintendent (Dr. Manohar) of Adichunchanagiri institute of medical sciences (AIMS) for their, support and encouragement for completion of this research.

REFERENCES

[1] Kamath SG, Varun HV, Rani UD, Aithal S, Patil UN; International Journal of Pharmaceutical Sciences and Research; 2014; 5(3);1051 – 58
[2] Sharma N, Bhargava.M, Chaudhary.v ,Advani.U, Jain.A, Bansal.A;. Universal journal of Pharmacy. 2014; 3(2):47 – 50
[3] Vadajiya SR, Naik V, Mevada A;. International Journal of pure and applied Bioscience. 2014; 2(3):77 – 82
[4] Khan AK Afzal, Mirshad PV, Rashed MR, Banu G;. Journal of Clinical and Diagnostic research. April 2013; 7(4):671 – 74
[5] Kulkarni RA, Kochhar PH, Dargude VA, Rajadhyakshya SS, ThatteUM; Indian journal of Surgeons. 2005; 67:308 – 15
[6] Kumar BA, Adiveni T, Manna PK, Kumar VPM, SundreshNJ;. World Journal of Pharmacy and Pharmaceutical Sciences. June 2014;3(7):832 – 71
[7] Khade A, Bashir MSM, SheethalA; Annuals of Medical and Health Science research. July – Sept. 2013;3(3);438 – 41
[8] Charan N, et.al. Journal of Biomedical and Pharmaceutical research. 2013;.2(3);71 – 73
[9] Rehan HS, Kakkar AK, Goel S; International Journal of Infection Control. 2010;.6(2):1 – 6
[10] Sharma N, Bhargava M,Mahawar D, Parakh R, Sharma D; International Journal of Pharmaceutical Research and Bioscience. 2014;.3(2):99 – 105
[11] Kreutzer k ,Strock k ,Weitz j ; Biomedical Research International. vol. 2014, Article ID 879437, 7 pages, 2014. doi:10.1155/2014/879437
[12] Elbur A.I yousuf, MA,ElsayedASA,Rahman MEA ; International Journal of Infection Control;8(4);01-10
[13] Kapure NL, Nayak BB, Raul AR, Vijaykumar AN, Vijayprasad S, Vakade KP, Jadhav AR; International Journal of Medical Research & Health Sciences;2013; 3(1) 100-10
[14] Katakam ,P,ElfituriAA,RamadanZ.H,Abadi O.G; J Med BS; 2012; 4(1);13-19
[15] Abdi S.A.H, Churi.S, Kumar Y.S.R et.al Indian Journal of Pharmacology ;2012 ;44(2) 23-29