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DRUG UTILIZATION EVALUATION OF POST-OPERATIVE ANTIMICROBIALS USED IN SURGERY DEPARTMENT OF A TERTIARY CARE HOSPITAL IN SOUTH INDIA

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ABSTRACT

An antimicrobial is an agent that kills or inhibits the growth of microorganisms and use of antimicrobial agents need to be evaluated since misuse of antimicrobials may lead to increased adverse effects, resistance to antimicrobials, making illnesses more serious, and increasing expenses of health services. Objective: Drug utilization evaluation of antimicrobials are essential as it highlights the importance of assessing optimal drug use and provide a strong basis for therapeutic decision making. The aim of this study was to assess the Drug Utilization Evaluation of postoperative antimicrobials used in surgery department in a tertiary care hospital in India. Methods: This prospective observational study was carried out with 181 patients who had undergone various surgeries in the General Surgery department of Muthoot Healthcare Kozhencherry, for a period of 6 months to assess the antimicrobials used post-operatively Key findings: In this study it was found that majority of the surgeries were performed in males and the age group of 61-80 years. Most of the subjects had performed incision and drainage followed by hernioplasty. Conclusion: Postoperative antimicrobials prescribed were antibiotics (Cefoperazone –Sulbactam (55.2%) followed by Ceftriaxone) and antiprotozoal agent (Metronidazole).

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INTRODUCTION

Drug use evaluation (DUE) is a system of ongoing, systematic criteria based evaluation of drug use that will help ensure that medicines are used appropriately at the individual patient level. DUE may be applied either to a drug, therapeutic class, disease state or condition, a drug use process or outcomes. DUE provides a means of identifying drug use problems and a means to correct the problem hence there by contribute to rational drug therapy^[1]. This study basically focus on the drug utilization evaluation of post-operative antimicrobials used in general surgery department at tertiary care hospital in South India. The use of antimicrobials is an area of problems that may increase the hospital stay of patients.. This study helps us to analyze whether the use of antimicrobials is according to the guidelines.

The antimicrobial agents may be widely classified as antibacterial agents, antifungal agents, antiprotozoal agents, antiviral agents and anthelmintics. The most commonly used antimicrobial agents in our study were antibacterials and antiprotozoal agents. Antibacterial agents are substances, which are obtained from one microorganism and prove fatal for other microorganism at very low concentration. Antibiotics can either destroy 2 organisms (bactericidal) or prevent multiplication (bacteriostatic).

The main classes of antibiotics are:

- Beta-Lactams: Penicillins, Cephalosporins
- Macrolides
- Fluoroquinolones
- Tetracyclines
- Aminoglycosides^[3].

Any agent that kills or inhibits the growth of protozoal organisms is known as antiprotozoal agent. The most important drug in this class is Metronidazole. It has broad-spectrum cidal activity against anaerobic protozoa^[2].

Judicious use of antibiotics may help in decreasing the morbidity associated with SSI, but inappropriate antibiotic use may lead to antibiotic resistance. Assessment of current antimicrobial utilization pattern is an important step toward promoting the appropriate use of antimicrobial agents, and in India, there is inadequate information and standard guidelines for antimicrobials post operatively^[4]. Surgical site infection (SSI) is a postoperative complication and an important part of nosocomial infection^[6]. SSIs are the second-most common nosocomial infection accounting for approximately one quarter of 2 million hospital-acquired infections in the United States annually^[4]. The rate of occurrence of surgical site infections in clean surgeries is 1-5 %, in clean-contaminated surgeries 6-9 %, in contaminated surgeries 13-20 %^[5]

The diagnostic criterion for SSI is that the infection occurs within 30 days after operation or within 1 year after implantation, that is, the presence of a purulent exudate within the said period can be identified as an SSI. Preventive administration of antimicrobials can only reduce and not completely eradicate the possibility of postoperative infection. Therefore, therapeutic drugs are still necessary sometimes^[6].

Postoperative wound infections have an enormous impact on patients' quality of life and contribute substantially to the financial cost of patient care. Post-operative antibiotics should be indicated in case of active infection, or suspected post-operative infection (not fever alone)^[8]. Prolonged administration of drugs after the surgical procedure is unwarranted and potentially harmful. Use beyond 24 h not only is unnecessary but also leads to the development of more resistant flora and super infections caused by antibiotic-resistant strains.

Systematic reviews have shown that the extension of prophylactic doses of antibiotics, that is the postoperative antibiotic use most often does not cause any individual benefit to patients of surgical specialties, rather than increasing hospital costs and exposing users to unnecessary risks. In India the prevalence of use of antimicrobial agents varies from 24-67%. The use of antimicrobial agents before, during and after surgery is done to prevent post-operative complications^[7]. The purpose of this study was to assess the Drug Utilization Evaluation of postoperative antimicrobials used in surgery department in a tertiary care hospital in India, and to assess its rationality.

MATERIALS AND METHOD

This is a prospective observational study conducted for a period of 6 months in the General Surgery department of Muthoot Healthcare Hospital Pvt Ltd, Kozhencherry, Kerala, India after obtaining the approval from the Institutional Ethics Committee of the hospital. A sample size of 181 patients of either sex prescribed with antimicrobials post-operatively who were undergoing the following surgeries, that is Laparoscopic appendectomy, laparoscopic and open hernioplasty, thyroidectomy, lipoma excision, breast lump excision, circumcision, laparoscopic and open cholecystectomy, video assisted anal fistula treatment, infected sebaceous cyst incision and drainage, slough excision-bedsore, stapler hemorrhoidectomy and fistulectomy were included in the study. Patients who were immunocompromised, with uncontrolled diabetes mellitus were excluded from the study. All subjects were provided with a brief introduction regarding the study and the confidentiality of the data. A written Informed Consent printed in their understandable language was obtained from the patient or care-giver, if the subject was unable to give the same. Relevant information was collected according to the approved pre-designed data collection form. Data of each subject was individually screened to assess the drug utilization pattern of antimicrobials used in the post-operative period. Data was then statistically analyzed in Microsoft excel -2010 version and results were analysed as tabular form and percentages. Paired T-test was used for analysis of data.

RESULTS

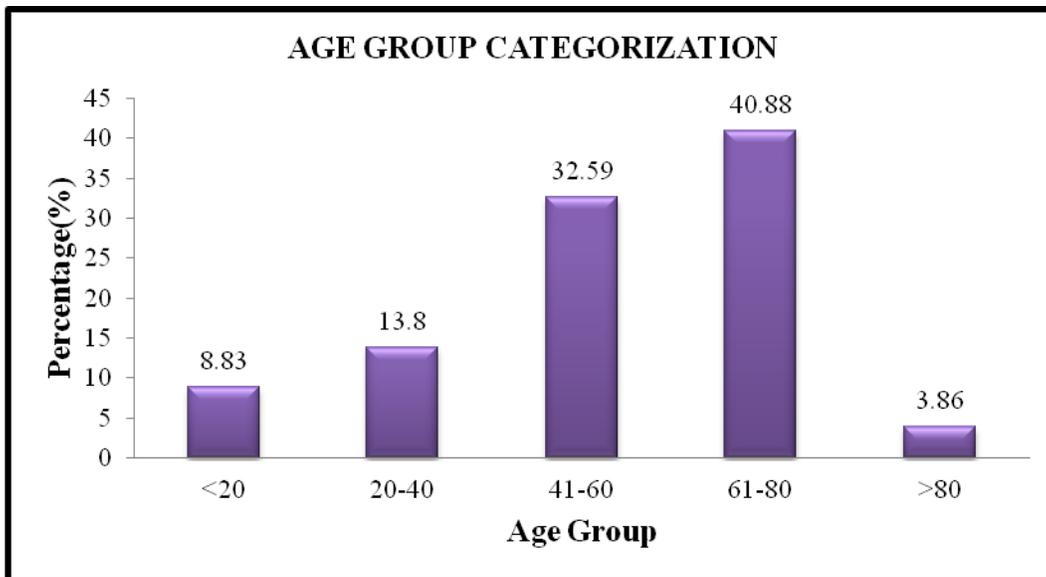


Figure 1: Distribution Of Patients Based On Age Group.

8.83% of the surgeries performed were in the age group of less than 20 years, followed by 13.8% in the age group of 20-40 years, 32.59% in the age group of 41-60 years, 40.88% in the age group of 61-80 years and 3.86% in the age group above 80 years.

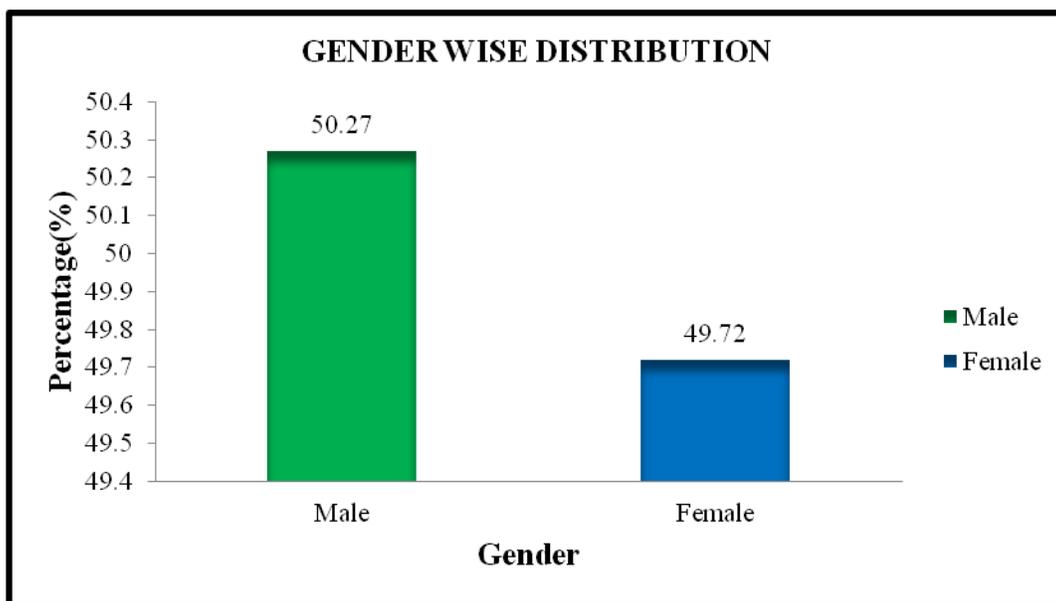


Figure 2: Distribution Of Patients Based On Gender.

The study result shows that 50.27% of the patients were male and 49.72% were female.

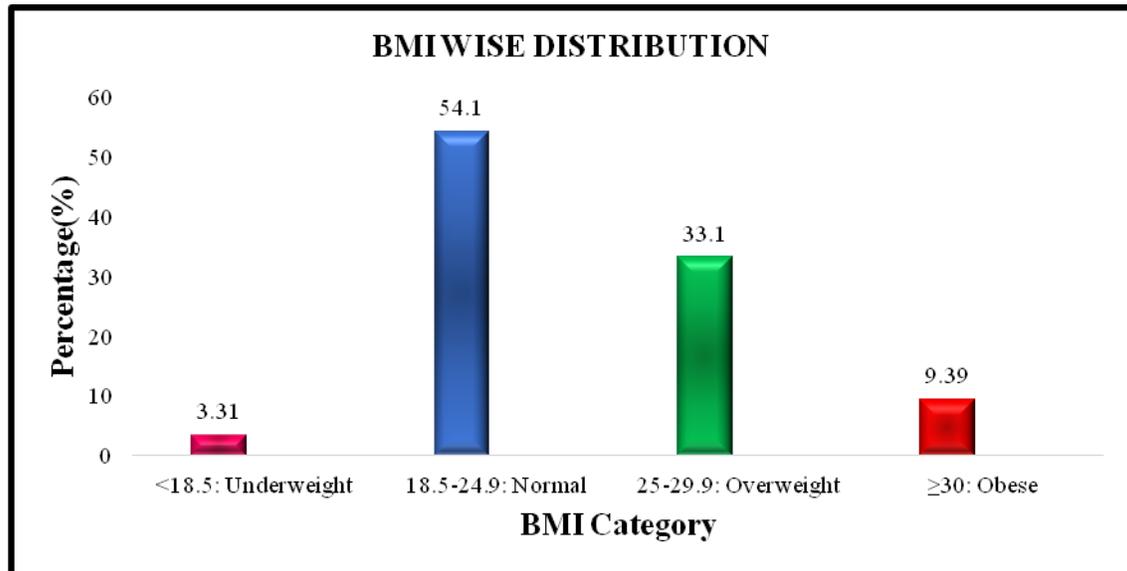


Figure 3: Distribution Of Patients Based On Body Mass Index.

BMI distribution of the patients were analysed and it was found that 3.31% of the patients were underweight, followed by 54.1% had normal weight, 33.1% were overweight, 9.39% were obese.

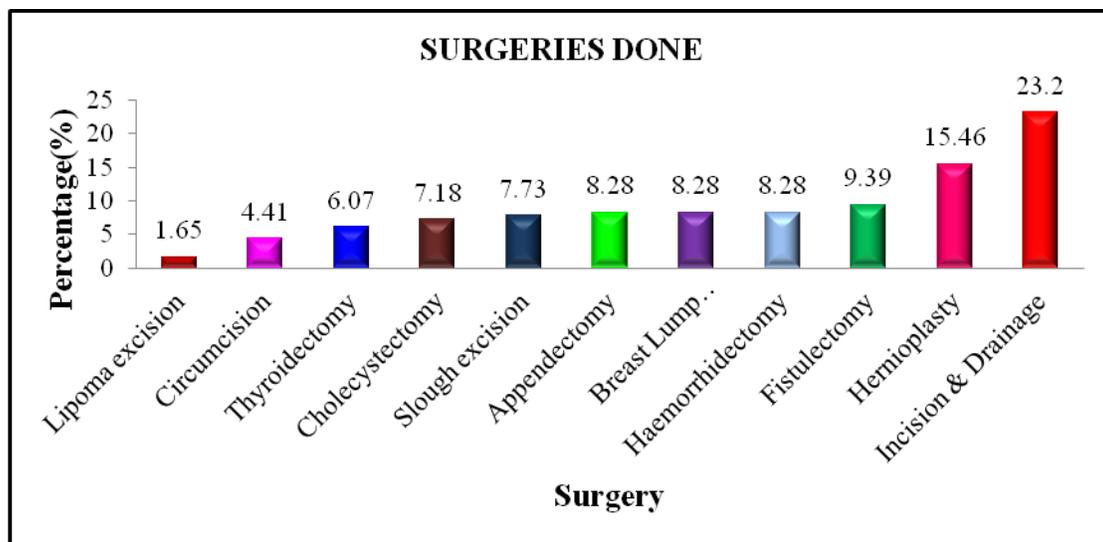


Figure 4: Distribution Of Patients Based On Surgical Procedures Undergone.

In the study on analysing the number of surgeries performed in the study population it was noted that 1.65% surgeries done were lipoma excision, 4.41% surgeries were circumcision, 6.07% surgeries were thyroidectomy, 7.18% surgeries were cholecystectomy, 7.73% surgeries were slough excision, 8.28% surgeries were appendectomy and breast lump excision each, 9.39% surgeries were fistulectomy, 15.46% surgeries were hernioplasty and 23.2% surgeries done were incision & drainage. (Figure 4)

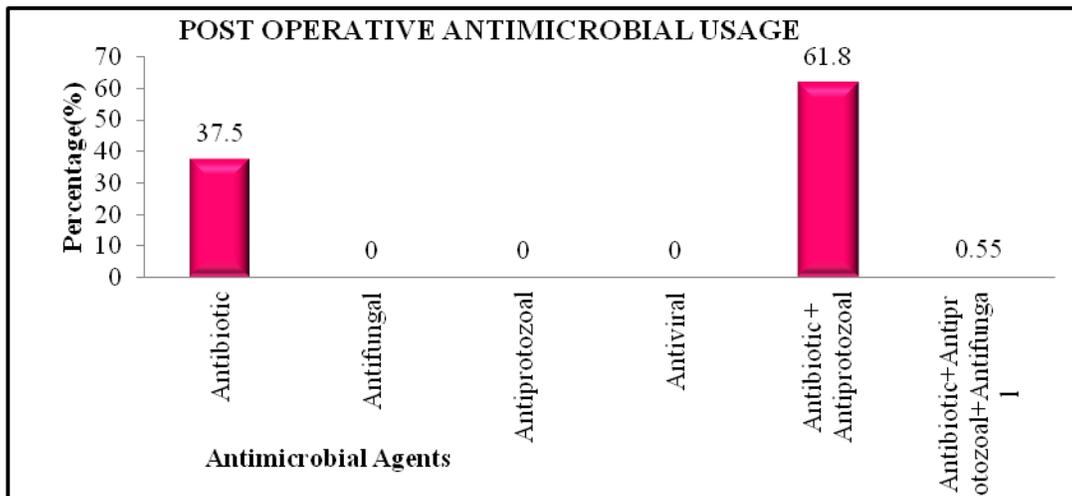


Figure 5: Assessment Of Post Operative Antimicrobial Usage.

In this study on analysing the study population receiving postoperative antimicrobials, it was found that, 61.8% received a combination of an antibiotic and an antiprotozoal, followed by 37.5% of the population receiving only antibiotics 0.55% with a combination of an antibiotic, antiprotozoal and an antifungal, and none of the patients received a monotherapy of an antifungal, antiprotozoal and antiviral agent. (Figure 5).

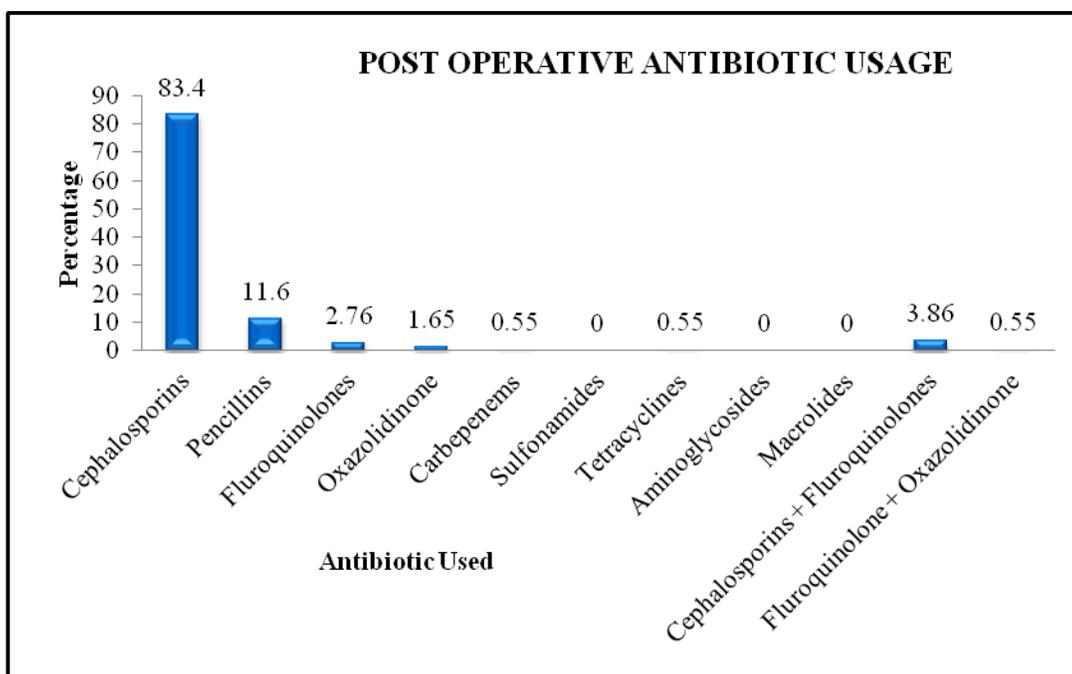


Figure6: Assessment Of Post Operative Antibiotic Usage.

Here, on analysing the study population on antibiotic usage, it was found that 83.4% of the patients received only cephalosporins, which was followed by 11.6% receiving only penicillins, following 3.86% receiving a combination of cephalosporins and Fluroquinolones, 2.76% received a monotherapy of fluroquinolone, 1.65% received oxazolidinone, 0.55% each with carbepenems and tetracycline, and none of the patients received sulphonamides, aminoglycosides and macrolides. (Figure 6)

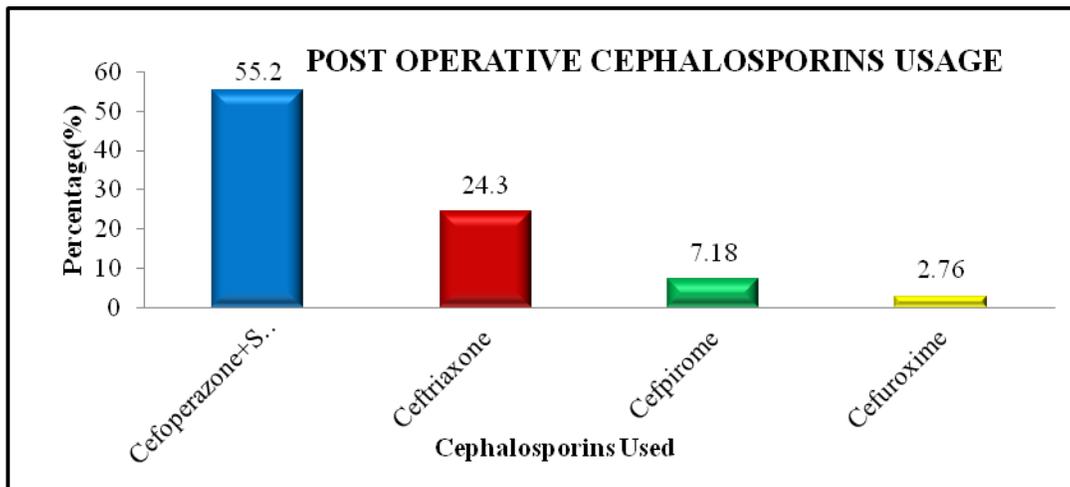


Figure 7: Assessment Of Post Operative Cephalosporins Usage.

Here on analysing the study population receiving cephalosporins post-operatively, it was found that, 55.2% of the patients have been treated with a combination of Cefoperazone and Sulbactam, followed by 24.3% with Ceftriaxone ,7.18% with cefpirome, and 2.76% with cefuroxime.

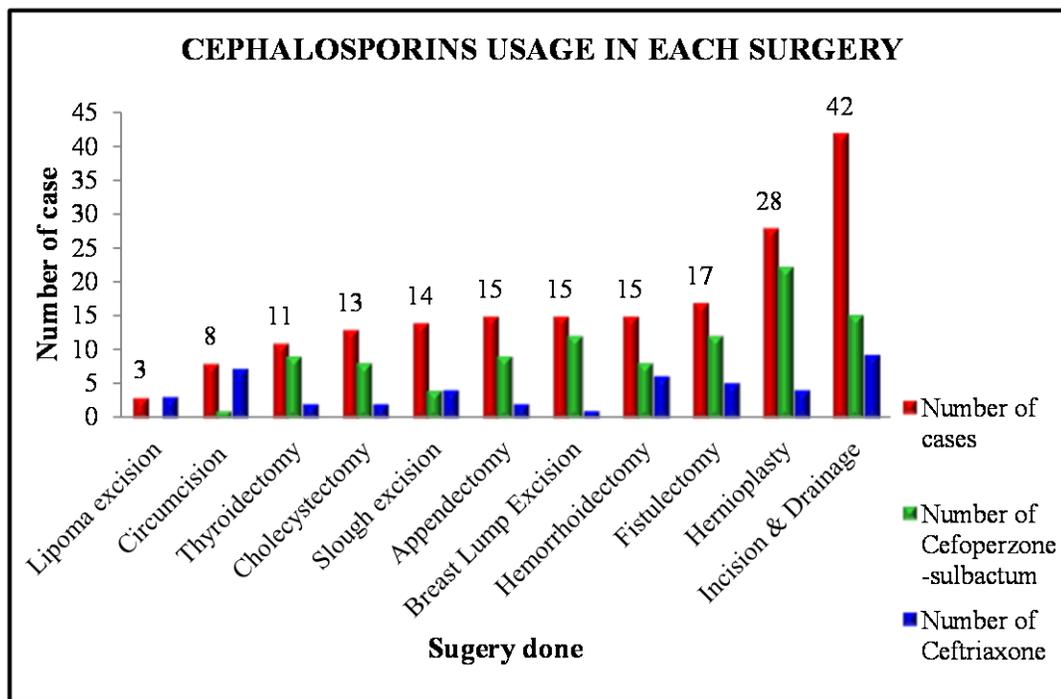


Figure 8: Assessment Of Cephalosporins Used In Each Surgery.

On analyzing the use of Cefoperazone-Sulbactam combination and Ceftriaxone in each surgery we found out that, the former said antibiotic was used for none of the lipoma excision case, 1 case of the circumcision, 9 case of thyroidectomy, 8 cases of cholecystectomy,4 cases of slough excision, 9 cases of appendectomy, 12 cases of breast lump excision, 8 cases of hemorrhoidectomy, 12 cases of fistulectomy, 22 cases of hernioplasty and 15 cases of Incision & drainage. The antibiotic Ceftriaxone was used for 3 case of lipoma excision, 7 case of circumcision, 2 cases of thyroidectomy, 2 cases of cholecystectomy, 4 cases of slough excision, 2 cases of appendectomy, 1 cases of breast lump excision, 6 cases of hemorrhoidectomy, 5 cases of fistulectomy, 4 cases of hernioplasty and 9 cases of Incision & drainage.(Figure 8)

Table 28: Mean Of Post-Test Of Antimicrobials.

MEAN SCORES	MEAN	SD	T VALUE	P VALUE
POST TEST	90.3333	66.0929	2.5706	0.05

DISCUSSION

According to various standard guidelines such that of WHO 2016 guidelines, the use of antimicrobials post operatively is not recommended unless the patient has or had an active infection. Extended durative use of antimicrobials after the completion of the posted surgery, may lead to certain cons among the patient and the society, such as increased antimicrobial resistance, increased length of hospital stay which may lead to rise in the treatment cost for the individual. In our study it was found that, most of the patient received combination of an antibiotic and antiprotozoal out of which most of the patients received cephalosporins (83.4%) alone which was followed by 11.6% receiving only penicillins. Similar studies conducted by Naveen V *et.al*, and Arul B *et.al*, Cephalosporins were also the most frequent group prescribed postoperatively^[11,12]. In studies conducted by Raut A *et al.*, and Babu KJ *et al.*, it was found that the most frequently prescribed antiprotozoal was Metronidazole (19.74%)^[9,10]. Combination of an antiprotozoal and an antibiotic is given post-operatively in majority of the sample population, so as to provide a wide coverage of action against microorganisms responsible for SSI's. The important advantages of combination antimicrobial therapy include achieving synergistic action, to reduce the severity or incidence of adverse effects, to prevent the emergence of resistance, and to broaden the spectrum of activity^[2]. Metronidazole, remains the criterion standard for the management and prophylaxis of anaerobic infections as well effective against gram positive and gram negative bacteria, thus proving an extended antimicrobial action that is even cost effective and shows a least resistance towards microbes with an advantage that it does not affect normal cells. In our study on analysing the study population receiving cephalosporins post-operatively, it was found that, 55.2% of the patients have been treated with a combination of Cefoperazone and Sulbactam, followed by Ceftriaxone(24.3%), cefpirome(7.18%), and cefuroxime(2.76%). In a study, total 110 patients total number of cephalosporins prescribed, Ceftriaxone were the most used (59.1%), followed by cefotaxime (5.4%), Cefaperazone-Sulbactam (4.5%)^[13] Third generation cephalosporins were most commonly prescribed among post-operative patients in our study, because it has an antimicrobial activity against both gram positive as well as gram negative bacteria. Cefoperazone differs from other 3rd generation cephalosporins in having stronger activity on Pseudomonas.

New guidelines on surgical site infections (SSIs) from the World Health Organization (WHO) 2016 say antibiotics should be used to prevent infection before and during surgery, but not after. But in our study on the contrary it has been found that, atleast 3 doses of antimicrobials are used post-operatively. This is because in Indian scenario the risk of acquiring surgical site infections is much higher than other European countries due to the climatic condition of Indian continent which is favorable for the growth of microbes^[14]. According to National Treatment Guidelines for Antimicrobial Use in Infectious Diseases Prophylaxis, India should not be given beyond surgery duration (except for cardiothoracic surgery, up to 48 hours permissible). But in our study almost all patients undergoing surgery are being treated with post-operative antimicrobials. This is so as to give an extended blanket of protection against the expected or possible SSI's found in an environment that is pretty much favorable for the growth of microorganisms^[15].

CONCLUSION

Drug utilization review of antimicrobial agents is essential among health care professionals as it highlights the importance of assessing optimal drug use. The study was conducted prospectively by using a sample size of 181 patients of which all the patients were prescribed with antimicrobials post-operatively. To conclude our study, defines that post-operative antimicrobials preferred were combination of antibiotic and antiprotozoal followed by the antibiotic alone, which were given intravenously. The most commonly used antibiotic were third generation cephalosporins, i.e, Cefoperazone -Sulbactam combination and Ceftriaxone and among Penicillins, was fixed dose combination of Piperacillin / tazobactam. The most commonly used antiprotozoal was Mentronidazole. Hence the prescribing pattern of antimicrobial agents need to be evaluated continuously on the basis of WHO guidelines which helps in therapeutic decision making and promoting the effective, non-profit based drug therapy which can improve the patient satisfaction by providing expected therapeutic outcome as well as by avoiding the use of post-operative antimicrobials when not needed. Thereby future researches can be carried out on the same.

AREAS OF CONFLICT:

NIL

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