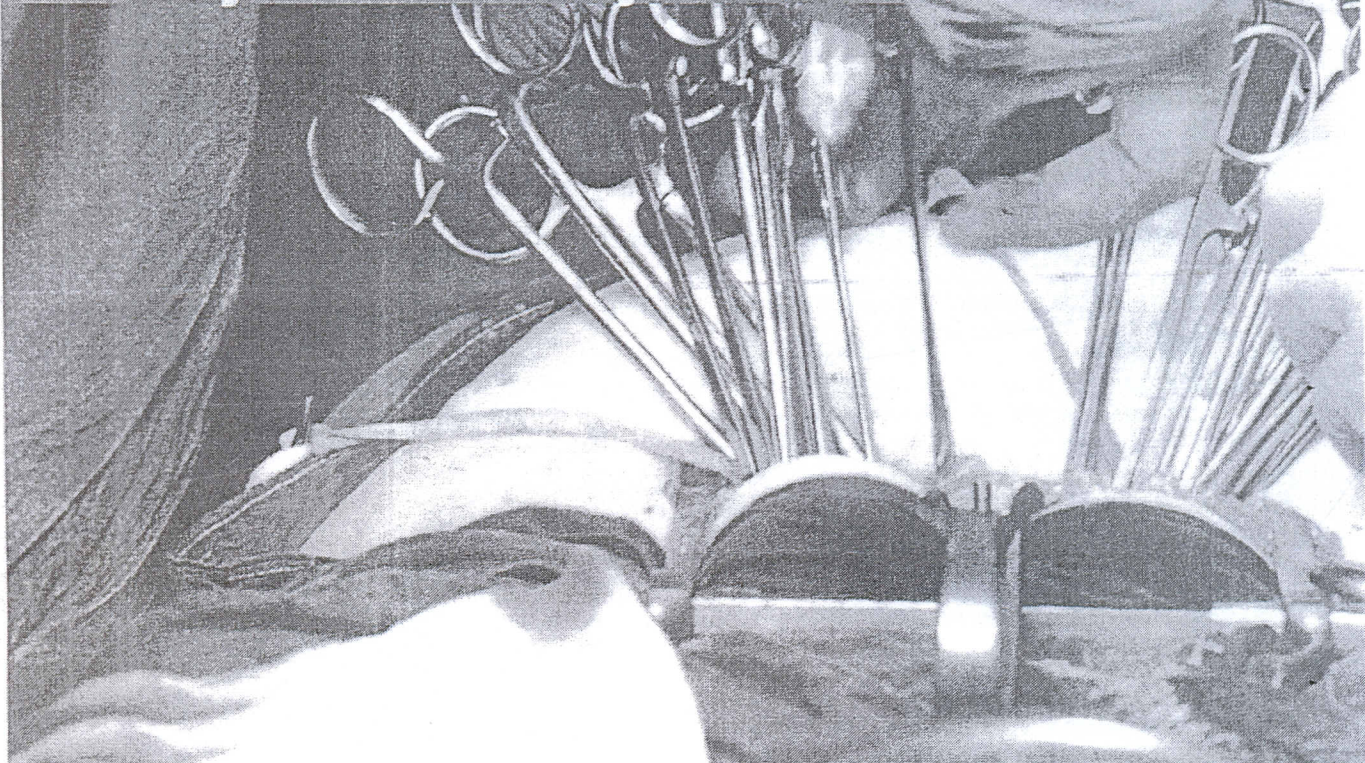


Prophylactic use of Antimicrobials in Hysterectomy



ABSTRACT:

Purpose : Prophylactic use of antimicrobials has become an accepted practice to minimize the incidence of post operative complications. Not many studies are available regarding the use of antimicrobial prophylaxis in hysterectomy, hence this study. The study aims at finding the pattern of use of antimicrobial prophylaxis in hysterectomy and also the frequency of post operative morbidity

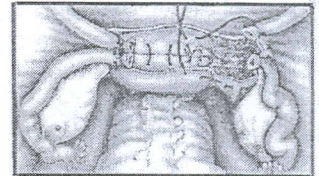
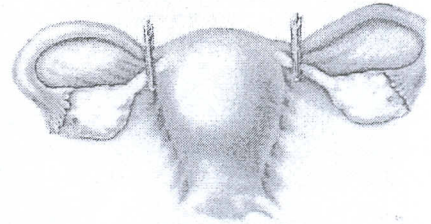
Methods: A prospective study was conducted which included 75 patients undergoing hysterectomy admitted to the obstetrics and gynecology department of R L Jalappa Hospital and Research Centre. Relevant information on each patient was collected according to the proforma designed for the study. Antimicrobials used, their dose, dosage schedule were recorded. Culture and sensitivity of pus, blood and urine was done for patients with post operative complications. Change of antimicrobial following culture sensitivity report was noted

Key words: Antimicrobial, Prophylaxis, Prospective study, Hysterectomy, Post operative complications

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INTRODUCTION

The term prophylaxis is derived from the Greek word "prophylaxis" which means advanced guard; this refers to actions taken to prevent disease. Prophylactic antimicrobials are those, given briefly in the absence of clinical infection but, in a situation where such an infection is likely to develop. The systemic use of antimicrobial prophylaxis has been common in the practice of obstetrics and gynecology. The overall aim for antimicrobial prophylaxis during obstetric and gynecological surgery is to prevent postoperative infection of surgical site and decrease postoperative morbidity and mortality, thus decreasing the duration of hospital stay and the cost of postoperative health care.



Postoperative infections comprise a major portion of the morbidity experienced in obstetric and gynecological operations. Hence, increased cost of medical care and the increased demand for hospital beds have given added impetus to the search for new methods to decrease postoperative morbidity and shorten the duration of hospital stay. This is attained by the prophylactic use of antimicrobials.

Our aims and objectives were to study the pattern of use of prophylactic antimicrobials in hysterectomy and to study the frequency of post operative morbidity with use of prophylactic antimicrobials.

MATERIALS AND METHODS:

A prospective study was conducted on 75 patients undergoing hysterectomy. The study was conducted on patients admitted in the obstetrics and gynecology department of Sri R L Jalappa Hospital and Research Center Attached to Sri Devaraj Urs Medical College and Research Center, which is situated in Kolar. A proforma containing detailed information on each patient was prepared according to the protocol designed for the study. Informed consent was taken from all the patients included in the study. Ethical clearance was obtained from the institutional ethics committee.

Inclusion criteria:

1. Patients in the age group of 19 to 65 years.
2. Patients undergoing Vaginal/Abdominal hysterectomy.

Exclusion criteria:

1. Patients who received any antimicrobials in the preceding two weeks of surgery.
2. Patients with diabetes mellitus, autoimmune disease, tuberculosis, HIV infection or prophylaxis for rheumatic fever.
3. Patients on cancer chemotherapy, radiotherapy, long term steroids or immunosuppressant.

Relevant data was taken from the patients undergoing hysterectomy while they were admitted in the hospital and also from the hospital records during their stay. The data included name and age of the patient, socioeconomic status, date of admission and discharge, diagnosis and type of surgery performed. It also included details of the use of antimicrobial prophylaxis such as choice of antimicrobial, dose and dosage schedule, route of administration and also any change in the antimicrobial following culture and sensitivity report. Patients were followed up during the postoperative period till the day of discharge. Postoperative complications and investigations relevant to the postoperative complications were also recorded.

Results: In our analysis most of the patients came from low socioeconomic status. We observed the use of third generation cephalosporin like ceftriaxone or cefotaxime and metronidazole in most of the patients. Two drug combinations were used which commonly included third generation cephalosporins with metronidazole, and along with them gentamicin was used in three drug combinations. Twenty four patients had post operative complications which included wound infection, UTI and fever. In the above 24 patients, E coli was the common organism isolated which was resistant to third generation cephalosporins and sensitive to amikacin.

Conclusion: Pre operative antimicrobial administration ensures therapeutic concentration of the drug during the period of potential contamination. Periodic surveillance of antimicrobial prophylaxis is essential to detect the emergence of antimicrobial resistance.

In patients who developed wound infection, which was characterized by erythema, induration, serous and purulent discharge from the site of incision, pus culture and sensitivity was done by the department of microbiology. The patients presenting with burning micturition and fever were considered to be suffering from UTI and urine culture and sensitivity was done. Patients presenting with oral temperature of more than 38°C on two occasions at an interval of six hours, 24 hours after surgery were considered to be suffering from fever. Blood sample was collected from these patients and culture sensitivity was done.

Anti-microbials were administered by the intravenous route of administration preoperatively and approximately first three days postoperatively. Later it was changed to oral route of administration whenever oral formulation of the drug was available. The data obtained were subsequently analyzed using descriptive statistics. The results were expressed as mean \pm standard deviation; unpaired student t-test was employed for comparison between the two means as a measure of significance. Chi Square was used when proportions were compared. $P < 0.05$ was regarded as statistically significant and $p \text{ value} < 0.001$ and 0.0001 were considered highly significant.

RESULTS

A total of seventy five women were included in the study. The most common indication was fibroid uterus (40%) followed by prolapse. 59% underwent abdominal hysterectomy while 41% underwent vaginal hysterectomy. All were elective surgeries. The mean age of the patients was 46.2 ± 7.6 yrs and the mean hemoglobin was 10 ± 1.6 g%. When the Hb was compared between low socioeconomic status patients and upper middle; lower middle and upper middle the P value was statistically significant ($P < .0001$). The P value was $< .05$ when Hb was compared between lower middle and upper middle.

Characteristics of the patients:

Table 1:

No of Patients	Indications	No of Patients [%]	Elective/ Emergency [%]	Socioeconomic Status* [%]	Age [Mean \pm SD]	Hb [Mean \pm SD]
75	Fibroid Uterus	30 [40%]	Elective 75 [100%]	Low-32 [42.6%]	42.6yrs ± 7.64	8.9 \pm 1.39 g% \clubsuit
	Prolapse	23 [30.6%]				9.8 \pm 0.99 g% \clubsuit
	Dysfunctional Uterine Bleeding	10 [13.3%]				11.6 \pm 0.97 g% \clubsuit
	Chronic Pelvic Inflammatory Disease	4 [5.3%]		Upper Middle-29 [38.6%]		
	Chronic Cervicitis	4 [5.3%]				
	Carcinoma Cervix	2 [2.6%]				
	Cervical Elongation	1 [1.3%]				
	Twisted Ovarian Cyst	1 [1.3%]				

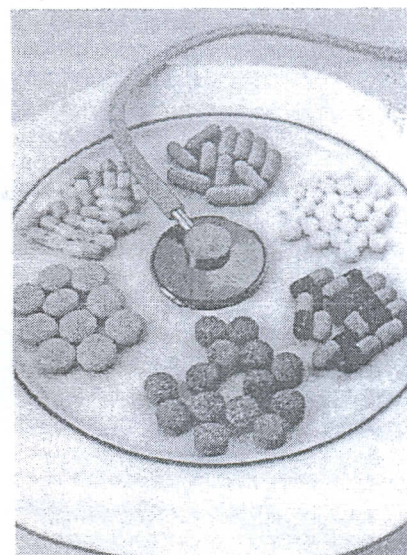
*Socioeconomic Status (rupees per annum): Low-Up to 20,000; Lower middle-20,001-40,000; Upper middle-40,000-62,000 $\clubsuit P < 0.0001$; $\spadesuit P < 0.0001$; $\heartsuit P < 0.05$

The drugs used in the prophylaxis of Hysterectomy:

Table 2:

Drugs used	Dose and Dosage schedule
Ceftriaxone	1g twice daily
Metronidazole	400mg thrice daily
Cefotaxime	1g twice daily
Gentamicin	80mg twice daily
Ampicillin+Cloxacillin	500mg thrice daily
Tinidazole	500mg twice daily
Ornidazole	500mg twice daily
Ampicillin	500mg thrice daily
Ciprofloxacin	500mg twice daily

Table 2 shows, the rank order of the drugs used, dose and dosage schedule in prophylaxis of hysterectomy.



Combination of drugs used in hysterectomy with duration of treatment and of hospital stay:

Table 3:

Drugs	No of patients (%)	Pre operative Administration (Mean hrs) \pm SD	Post operative Administration (Mean days) \pm SD	Duration of hospital stay (Mean days) \pm SD
Ceftriaxone+metronidazole	28 (37.3%)	3.5 \pm 0.9	8 \pm 1.23	16.8 \pm 5.65
Cefotaxime+metronidazole	16 (21.3%)	3.2 \pm 1.1	9.6 \pm 2.82	17.2 \pm 9.17
Ampicillin-cloxacillin + metronidazole + gentamicin	7 (9.3%)	4.3 \pm 0	8.5 \pm 2.37	19.1 \pm 7.66
Ceftriaxone+ornidazole	5 (7%)	2.60 \pm 8	9.2 \pm 1.30	18.4 \pm 7.86
Ceftriaxone+tinidazole	5 (6.6%)	4.7 \pm 1.0	8 \pm 1.58	11.6 \pm 0.89
Ampicillin-cloxacillin+metronidazole	4 (5.3%)	3.61 \pm 6	7.7 \pm 1.2	17.2 \pm 3.86
Cefotaxime+ornidazole	3 (4%)	4.0 \pm 1.5	7.3 \pm 0.57	13.6 \pm 3.21
Ceftriaxone+metronidazole+Gentamicin	3 (4%)	3.7 \pm 0.3	7.3 \pm 2.51	23 \pm 6.55
Cefotaxime+tinidazole	1 (1.3%)	4 \pm 0	10 \pm 0	22 \pm 0
Ciprofloxacin+metronidazole	1 (1.3%)	2 \pm 0	6 \pm 0	13 \pm 0
Cefotaxime+metronidazole+gentamicin	1 (1.3%)	1.35 \pm 0	4 \pm 0	43 \pm 0
Ampicillin+metronidazole+gentamicin	1 (1.3%)	1 \pm 0	1 \pm 0	52 \pm 0

Table 3 represents the combination of drugs used, duration of administration and hospital stay. Two drug (84%) and three drug (16%) combinations were used. Rank order of the combinations used is shown in table 3. Single dose of each drug was administered 1 to 4 hours before surgery for 61 patients. Fourteen patients did not receive antimicrobials preoperatively. Postoperative complications were more in patients who did not receive preoperative antimicrobials as compared to those who received; the P value was statistically significant ($P < 0.05$). Post operatively antimicrobials were administered for a period of 5 to 8 days; the duration of administration was prolonged for patients with complications. Patients with postoperative complications had longer duration of hospital stay (23.7 ± 10.3 days) than who did not have (16.09 ± 5.87 days) p value being < 0.001 .

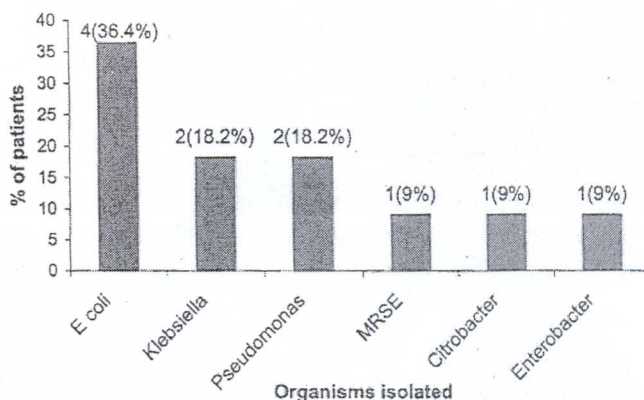


Fig 2: ORGANISMS ISOLATED IN WOUND INFECTION (HYSTERECTOMY)

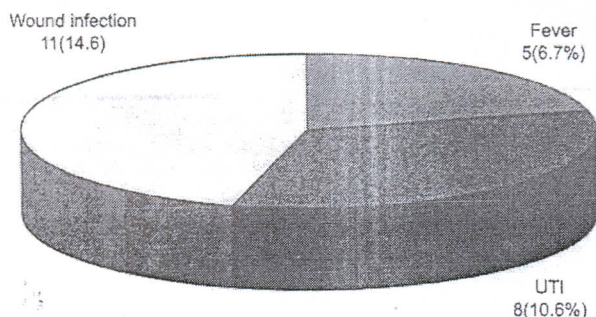


Fig 1: POST OPERATIVE COMPLICATIONS IN HYSTERECTOMY

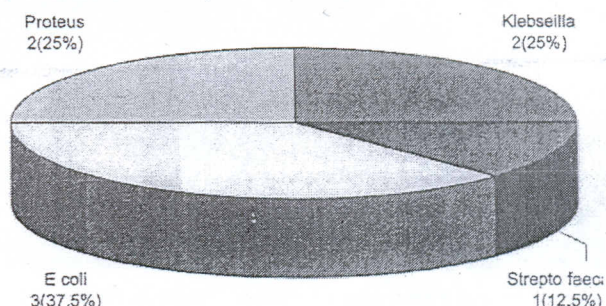


Fig 3: ORGANISMS ISOLATED IN UTI (HYSTERECTOMY)



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Post operative complications encountered with hysterectomy were wound infection, UTI and fever in 24 patients (Fig 1). Abdominal hysterectomy patients had more of wound infections, whereas vaginal hysterectomy had UTI. The organisms isolated from wound infection and UTI are shown in Fig 2 and 3. *E. coli* was the common organism in both infections. Patients with fever did not show any growth in blood culture. All the patients had unimicrobial infection.

Most of the organisms were resistant to gentamicin and ceftriaxone, but sensitive to amikacin in wound infection. In case of UTI, organisms were resistant to gentamicin and norfloxacin but sensitive to amikacin. The patients were given amikacin in the dose of 15mg/kg wt twice daily for a period of 7 days and 6.5 days in wound infection and UTI respectively following culture sensitivity report, in some patients fluoroquinolones and third generation cephalosporins were used.

DISCUSSION

In our study most of the patients came from low socioeconomic status. The mean age of these patients was 42.6 ± 7.6 yrs and the mean Hb% was 10.1%. This shows that most of the patients were anemic. The Hb% of different socioeconomic status was compared and it showed statistically significant results (table 2). Studies have shown that low socioeconomic status and anemia are some of the risk factors for postoperative complications; this could be due to the poor nutritional status of these patients.^{1,2}

The incidence of post operative complications in our study was 32%. The infections likely to develop in patients undergoing hysterectomy are vaginal cuff infection, pelvic cellulites, pelvic abscess, wound infection, UTI and fever.³ In our study the post operative complications encountered were wound infection, UTI and fever. Wound infection was common in patients who underwent abdominal hysterectomy and UTI in patients with vaginal hysterectomy this is probably due to the indwelling catheter for ≥ 48 hours whereas in abdominal hysterectomy the catheter is kept for a maximum of 24 hours. In patients undergoing vaginal hysterectomy for prolapse, the common postoperative complication was UTI. This could be because prolapse is one of the common cause of urinary tract infection due to retention of urine. It is generally assumed that vaginal hysterectomy is associated with higher incidence of postoperative complications because of the vaginal flora. However, the CREST (collaborative study of sterilization) study showed that



infections were more common after abdominal than after vaginal hysterectomy.⁴ Even our study, we found a higher incidence of postoperative complications with abdominal hysterectomy.

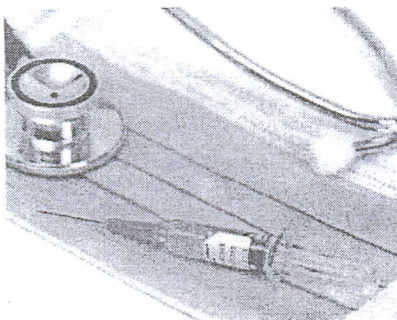
Optimal prophylaxis ensures that adequate concentrations of an appropriate antimicrobial is present in the serum, tissue and wound during the entire time when the incision is open and at risk for bacterial contamination.⁵ The antimicrobial should be active against bacteria that are likely to be encountered during the particular type of surgery, should be safe and economical to the patient. Most of the patients received third generation cephalosporins like cefotaxime or ceftriaxone and nitroimidazoles like metronidazole. The most frequently used combinations were third generation cephalosporins like cefotaxime or ceftriaxone with metronidazole and gentamicin was added in case of three drug combinations. Antimicrobials were administered preoperatively

around 1 to 4 hours before surgery in most of the patients. Thus, therapeutic concentration of the drug would have been achieved during the operative period. We compared the postoperative complications among the patients who underwent hysterectomy with pre operative antimicrobial and without pre operative anti-microbials. P value was (< 0.05) statistically significant. Intravenous route was given for the first four days postoperatively so that therapeutic concentrations of the drug is achieved faster. Later, they were changed to oral route for better compliance and cost effectiveness.

Studies have proved that there is no added advantage of long term administration of antibiotics over short term administration.⁶ Prolonged use may lead to development of resistance and increase the duration of hospitalization which may in turn lead to increased cost for the patient. In our study patients undergoing hysterectomy were administered antibiotics for a period of

5-8 days postoperatively. Such prolonged administration may increase the cost for the patient. Studies have shown that post operative complications increase the duration of hospital stay.⁷ We too have found an increase in the hospital stay by around 7 days after the change of antimicrobial in patients who developed post operative complications after hysterectomy.

The common pathogens responsible for post operative complications in hysterectomy are *gram negative bacilli, enterococci, group B streptococci and anaerobes*⁸. In our study *E coli* and *Klebsiella* were the common organisms isolated (Fig2&3), they were resistant to ceftriaxone and gentamicin and these patients were treated with amikacin. The reason could be that prolonged use of cephalosporins have led to the development of resistant strains of *E coli*.⁹ The antimicrobials were changed according to the culture sensitivity report and the patients responded to the treatment. 6.7% of them developed fever as a postoperative complication.

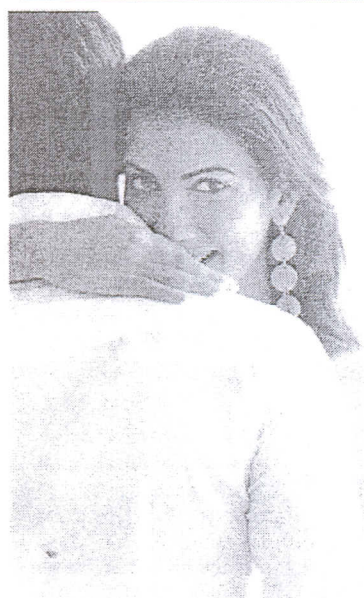


Blood culture was negative in these patients.

Use and misuse of antimicrobials not only affects individual patient but also hospital and community environment. The prophylactic use of antimicrobials in surgery may be limited to 1-2 doses of a suitable agent perioperatively and never more than 24 hours unless specifically indicated. If we can predict and selectively administer antimicrobial prophylaxis to only those population who are at high-risk, majority of the patients would be spared from unnecessary drug administration.

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