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A STUDY ON ISOLATION OF DIFFERENT TYPE OF BACTERIA FROM POSTOPERATIVE WOUND INFECTION AND THEIR ANTIBIOTIC SUSCEPTIBILITY PATTERN

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ABSTRACT

Purpose: *Post-operative wound infections have been an important cause of morbidity and cost burden for the patients. The objective of this study was to evaluate the antimicrobial susceptibility pattern among the most common bacteria which are associated with post-operative wound infections.* ***Method:*** *The present study was carried out in Government Medical College, hospital, kannauj one-year study. 120 isolates were obtained from 150 pus samples which were collected from clinically suspected post-operative wound infections. Gram staining &culture was done via conventional techniques followed by AST by Kirby Bauer disk diffusion technique.* ***Result:*** *Escherichia coli (35) was the most frequently isolated pathogenic bacteria followed by Staphylococcus aureus (25), Klebsiella sp.(14), Pseudomonas aeruginosa (18), Proteus sp.(8),Citrobacter(13) and Acinetobacter(7).****Conclusion:*** *In these study Escherichia coli (35) was the most common isolated organism and Tobramycin(TOB), Tetracyclin(TE), Ciprofloxacin(CF) Imipenem(IPM), showed the highest antimicrobial activity to gram negative organism.*

KEY WORDS

Bacterial isolation, Drug sensitivity, Postoperative wound infection, surgical site infection (SSI).

1. INTRODUCTION

Surgical site infection (SSI) is defined as a proliferation of pathogenic microorganisms which develops in an incision site either within the skin and subcutaneous fat (superficial) and musculofascial layers (deep) or in an organ or cavity, if opened during surgery (Walelign dessie *et al*.,2016). Post-operative infections have been a problem in the field of surgery for a long time. Advances in control of infections have not completely eradicated the problem because of development of resistance (Biswajit batabyal *et al.,* 2012).

Invasion of the body by disease causing organism that become established, multiply and produce symptoms. Bacteria and viruses cause most diseases, but diseases are also caused by other microorganism, protozoans and other parasites (Poonam verma, 2012). Surgical site infections are the second most common cause of nosocomial infections. It has been estimated that surgical site infection develops in at least 2% of hospitalized patients undergoing operative procedures, although this is a likely under estimate because of incomplete post discharge data, other data indicate that surgical site infections develop following 3-20% of certain procedures (Khyati jain *et al*., 2014).

Unrestrained and rapidly spreading antimicrobial resistance among bacterial populations has made the management and treatment of post-operative wound infections a serious challenge in clinical and surgical practice. Patients with post-operative wound infections face additional exposure to microbial populations circulating in a hospital set up as the hospital environment is always charged with microbial pathogens. Most post-operative wound infections are hospital acquired and vary from one hospital to the

other and are associated with complications, increased morbidity and mortality (Moh.Shahid raza *et al.,* 2013). Hence the treatment of infection are required to assess the right kind of antibiotics and the appropriate concentrations to be used in infections, taking into consideration the etiology of the infection and the duration of the antibiotic treatment (Poonam verma,2012).

2. MATERIAL & METHODS

Sample collection: The pus swab samples were obtained before cleaning of the wounds and were processed for isolation and identification of bacterial pathogens according to the standard microbiological techniques. Two pus swabs were collected aseptically with a sterile cotton swab one is used for direct microscopic examination and other is used for the culture from clinically suspected of infected wounds.

Inclusion Criteria: All the post-surgical patients with wound infections admitted in different surgical wards were included for study.

Exclusion Criteria: Patients with wound Infections without surgery were excluded.

Sample Processing: The pus specimen was inoculated on blood and MacConkey agar plates. The streaked plates were incubated at 37°C for 24 hr. Bacterial colonies on blood agar plates were later Gram stained. Characterization of bacterial isolates was based on standard microbiological methods. Identification of isolates were done based on

colony morphology, motility, catalase test, oxidase test, coagulase test and biochemical tests like Tripal sugar iron agar, Hydrogen sulfide test, Carbohydrate fermentation test, Phenylalanine deaminase test, Methyl red test, Nitrate reduction test, Urease test, Voges proskauer, Citrate utilization test, Indole test (Koneman *et. al*., 2005).

Antibiotic susceptibility test:

All the isolates were subjected for antibiotic sensitivity testing by disk diffusion method. Using ampicillin, gentamicin, amikacin, cefotaxime, ceftriaxone, piperacillin, imipenem, meropenem, piperacillin, piperacillin + tazobactum, ceftazidime, Ciprofloxacin(CIP) disks. A fresh subculture of each isolate was suspended in a sterile bottle containing 5 ml peptone water, and incubated overnight at 37°C. The overnight broth cultures were diluted with sterile saline to 106 colony forming unit/ml by adjusting the turbidity of the inoculums to 0.5 McFarland turbidity standards. A sterile cotton-tipped applicator was introduced into standardized inoculum and used to inoculate Mueller-Hinton agar plates. Sterile antibiotic discs were placed 15 mm apart on each plate and incubated for 24 h aerobically at 37°C. Zone diameter of inhibition of each isolate to the disc was read with a calibrated ruler and compared with zone diameter interpretive standard of the National Committee for Clinical Laboratory Standards (NCCLS) to determine sensitivity or resistance. The NCCLS values were cross-checked for correctness with the new guidelines for antibiotic disc susceptibility test of the Clinical and Laboratory Standards Institute (K. R. Sanjay *et. al.,* 2010).

3. RESULT & DISCUSSION

The present study which was conducted on 150 patients of all age group with postoperative wound infections admitted in different surgical wards, after taking a relevant clinical history whose samples were processed, in the department of microbiology at Govt. medical college hospital, Kannauj (U.P).

Post-operative wound infections have been found to pose a major problem in the field of surgery for a long time. The surveillance of nosocomial infections with an emphasis on antimicrobial audit will reduce the risk of postoperative wound infections. (Shriyan A *et. al*.,2010).

In the present study 120 positive cultures were found out of 150 patients undergoing various surgical procedures were assessed. In the present study *Escherichia coli* (35) were the most frequently isolated microorganism followed by *Staphylococcus aureus* (25), *Klebsiella sp.* (14) and *Pseudomonas sp.* (18), *Proteus sp*. (8), *Citrobacter* (13), *Acinetobacter* (7). *Escherichia coli* were commonest gram-negative organisms isolated from pus specimens. Similarly, gram negative organism has been reported by (Iffat Javeed *et. al.*, 2011 Masoud,E.A *et. al.,*2011).

According to age wise distribution (S.K.Shau *et.al.* 2002) reported that maximum numbers of patients were found in age group of 41-60 (38%) lowest infection was in age group of 21-40 (4.1%) (Sohn *et.al.* 2002) reported an average of 39 years. (Anush.S e*t. al*.,2010) reported maximum of infection (28%) in 41-50 years of age group. The lowest at (1.4%) at 81-90year age group. The present study reveals the maximum no. of SSI in 40-50years of age group (29%). Reason being heavy work

load, stress at this age group and less number of patients.

According to the previous studies males were predominant over females having surgical site infection. (S.k.Sahu *et.al.,* 2002) recorded higher infection in males as compared to females.(Hermandez *et.al*.,2005) reported (65.6%) males and (34.4%) females among the SSI patients. (Anush.S *et.al*. 2010) screaned patients out of which maximum number were males (62.68%) and (37.32%) were females. Similarly, in present study reveals that males (77.5%) and females (22.5%) have significant difference. In these studies, 80% were found to be pathogenic organism causing different kind of surgical site infection and nosocomial infection and (20%) were nonpathogenic (i.e. they were considered as contaminants). According to (Poonam Verma *et. al.,*2012, R. Shyamala *et. al.,*2012) Gatifloxacin(GT), Amikacin(Ak), Azithromycin(Az), Ampi/subbactum(As) and Ciprofloxacin(CF) showed the highest antibacterial activity to gram negative organism.In present study E.coli was highly sensitive to Imipenem(IPM) followed by Meropenem(MRP) Nitrofurantoin(NIT) and Ciprofloxacin(CIP). (Jr Anguzu and D Olila, 2007) reported that Ceftazidine and Ciprofloxacin are third-generation cephalosporins that are relatively rare in the hospitals and are expensive. Their high cost and being less readily available to patient's means these drugs have not been misused and hence are more effective compared to those that have been in use for quite a long time. According to (Mohammad Shahid Raza *et. al.,* 2013) Susceptibility outcome revealed that vancomycin was the most effective antibiotic against the gram-positive bacteria. Similarly, also in present study vancomycin was the most effective antibiotic against the gram-positive bacteria.

Table no. 1- Total no. of male and female patients

S.No.	Group	Number	Percentage
1.	No. of male patient	115	76.66%
2.	No. of female patient	35	23.33%
3.	Total no. of patients	150	100%

Table no.2- Total Positive and Negative Sample

S. N	Group	Number	Percentage
1.	Total no. Of positive sample	120	80%
2.	Total no. of Negative sample	30	20%
3.	Total no. of sample process	150	100%

Table no.3- Different Organisms Isolated from clinical sample:

S. N	Name of isolated organisms	Number	Percentage
1.	Escherichia coli	35	28.33%
2.	Staphylococcus aureus	25	20.83%
3.	Klebsiella spp.	14	11.66%
4.	Proteus spp.	8	6.66%
5.	Pseudomonas spp.	18	15%
6.	Citrobacter spp.	13	10.83%
7.	Acinetobacter spp.	7	5.83%
Total		120	100%

Table no. 4- Gender wise distribution of Positive Isolates:

S. N	Group	Number	Percentage
1.	No. of isolates in male	93	77.5%
2.	No. of isolates in female	27	22.5%
3.	Total no. organism isolated	120	100%

Table no.5-Age-wise distribution of sample & Positive isolates:

Age group	No. of sample	Positive	Percentage
0-10	1	0	100%
10-20	14	11	64.28%
20-30	18	16	83.33%
30-40	42	30	71.42%
40-50	41	35	92.68%
50-60	22	20	81.81%
60-70	10	8	80%
70-80	2	0	50%

6. *Staphylococcus aureus* showed maximum antibiotic sensitivity to Linazolid (LZ) (97.05%) followed by Chloramphenicol (C) (94.11%) and Vancomycin(VA) (94.11%).
7. *Escherichia coli* was highly sensitive to Imipenem(IPM) (96%)followed by Meropenem(MRP) (88%) and Nitrofurantoin(NIT) (88%) whereas for *P.aeruginosa*, Polymixin-B (PB) (94.44%) was the choice of drug and followed by *Klebsiella sp*., polymixin-B (PB) (100%) then for *Proteus sp.,* Gentamicin (GEN) (87.5%) and Ciprofloxacin(CIP) (75%) showed maximum sensitivity.
8. *Citrobacter* showed highly sensitive to Imipenem(IPM) (92.30%) followed by Cefepime(CPM) (84.61%) whereas for *Acinetobacter,* Cefotaxime (CTX) (57.14%) and Piperacillin (PI) (42.85%) was maximum sensitivity.

4. CONCLUSION

Gram negative organisms with multiple drug resistance were commonly associated with postoperative surgical site infection. After the assessment of 150 samples from post- surgical patients with wound infection, *Escherichia coli* (23.3%) was the commonest pathogen isolated.

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