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## RESEARCH ARTICLE

### AEROBIC BACTERIOLOGICAL PROFILE OF SURGICAL SITE INFECTIONS WITH ANTIBIOGRAM.

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#### Abstract

The present study was done on 236 clinically suspected pus samples from patients who underwent surgery between Jan 2017 to June 2017 from Obstetrics and gynecology, General surgery and Orthopedic departments in Government General Hospital, Vijayawada. This study was done to know the incidence of surgical site infections and the prevalence of aerobic bacterial pathogens along with their antibiogram. Surgical site infections (SSI) are the second most common nosocomial infections and have adverse impact on patients. Isolation and identification of the organisms was done by gram stains and culture growth. Antimicrobial susceptibility testing was performed by Kirby-Bauer disc diffusion method and results were interpreted as per Clinical and Laboratory Standards Institute (CLSI) guidelines. Out of 236 clinically suspected pus samples received in the microbiology laboratory, Siddhartha Medical College, 137 (58%) were culture positive and 99 (41.9%) were culture negative. The infection was found to be higher in female patients in age group 21-30 yrs than in male patients. The most commonly isolated pathogens were *Staphylococcus aureus* 38 (27.7%) followed by *Klebsiella* species 29 (21.1%) and *Escherichia coli* 26 (18.9%). Antimicrobial profile of gram positive isolates revealed highest sensitivity to amikacin (68.4%), followed by linezolid (60.5%), whereas gram negative isolates showed most sensitivity to amikacin (58.6%) and piperacillin tazobactam (44.8%). SSI are responsible for increasing the treatment cost, length of hospital stay and significant morbidity and mortality. Hence proper, formulation of infection control policies, hand hygiene techniques and optimal preoperative, intraoperative and postoperative patient care can be implemented to reduce the incidence of surgical site infections.

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#### Introduction:-

Surgical site infections (SSI) are one of the most important cause of healthcare-associated infections (HAIs) which have adverse impact on patients. They are responsible for increasing the treatment cost, length of hospital stay and significant morbidity and mortality. The majority of SSI is caused by the native flora of the patient's skin, mucous membranes, or hollow viscera. SSI can be caused when skin is incised, underlying tissue is exposed to overlying endogenous flora. It is also caused by the organisms present in the hospital environment that are introduced to the

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patient by medical procedures. It is important to recognise that SSIs can range from a relatively trivial wound discharge with no other complications to a life-threatening condition. Identification of SSI involves interpretation of clinical and laboratory findings rather than microbiological evidence alone. The majority of SSIs become apparent within 30 days of an operative procedure. However, where a prosthetic implant is used, SSIs affecting the deeper tissues may occur several months after the operation. The development of an SSI depends on contamination of the wound site at the end of a surgical procedure and specifically relates to the pathogenicity and inoculum of microorganisms present, balanced against the host's immune response. Risk factors other than microbiology can be due to systemic factors affecting the patient's healing response, local wound characteristics, or operative characteristics. In addition, irrational use of broad spectrum antibiotics and resulting antimicrobial resistance (AMR) has further deteriorated the condition. The problem gets more complicated in developing countries due to poor infection control practices, overcrowded hospitals and inappropriate use of antimicrobials.

### Methods:-

The present study was conducted in the Department of Microbiology, Government General Hospital, Vijayawada, where patients who underwent surgery between Jan 2017 to June 2017 from Obstetrics and Gynecology, General surgery and Orthopedic department. All the 236 pus samples from clinically suspected SSIs were processed in the microbiology laboratory.

SSIs were diagnosed according to the guidelines of the Centers for Disease Control and Prevention. The CDC criteria were used to define the type of surgical wound using the wound contamination class system. Surgical sites were considered to be infected according to the set of clinical criteria recommended by the surgical infection task force.

Swabs from deep part of the wound or pus were taken from the infected surgical sites using two sterile cotton swabs, and were subjected to gram staining, biochemical reactions and cultured aerobically. Care was taken not to touch the surrounding tissues to prevent contamination of the swab from endogenous resident flora. Bacterial pathogens were identified and tested for antimicrobial susceptibility by Kirby-Bauer disc diffusion methods and results were interpreted as per Clinical and Laboratory Standards Institute (CLSI) guidelines 2017.

### Results:-

In the present study, out of 236 samples, 121 (51.27%) specimens were from male patients and 115 (48.72%) were from female patients. Among 137 culture positive cases, 70 (51.09%) were from specimens of female patients and 67 (48.90%) were from specimens of male patients. The infection (58%) was found to be higher in female patients in age group 21-30 yrs (44.2%). (Fig:1)

Out of 236 pus samples from clinically suspected SSIs which were processed in the microbiology laboratory, 137 (58%) were culture positive while 99 (41.9%) had no growth. (Fig:2). Out of 137 bacterial isolates 83 (60.5%) were Gram Negative Bacilli (GNB) and 54 (39.4%) were Gram Positive Cocci (GPC). *Staphylococcus aureus* was 38 (27.7%) followed by *Klebsiella* species 29 (21.1%), *Escherichia Coli* 26 (18.9%) and *Pseudomonas* 19 (13.8%). (Table 1). Antimicrobial profile of gram positive isolates revealed highest sensitivity to amikacin (68.4%), followed by linezolid (60.5%), (Fig:3), whereas gram negative isolates showed highest sensitivity to amikacin (58.6%) followed by piperacillin/tazobactam (44.8%). (Fig:4).

### Discussion:-

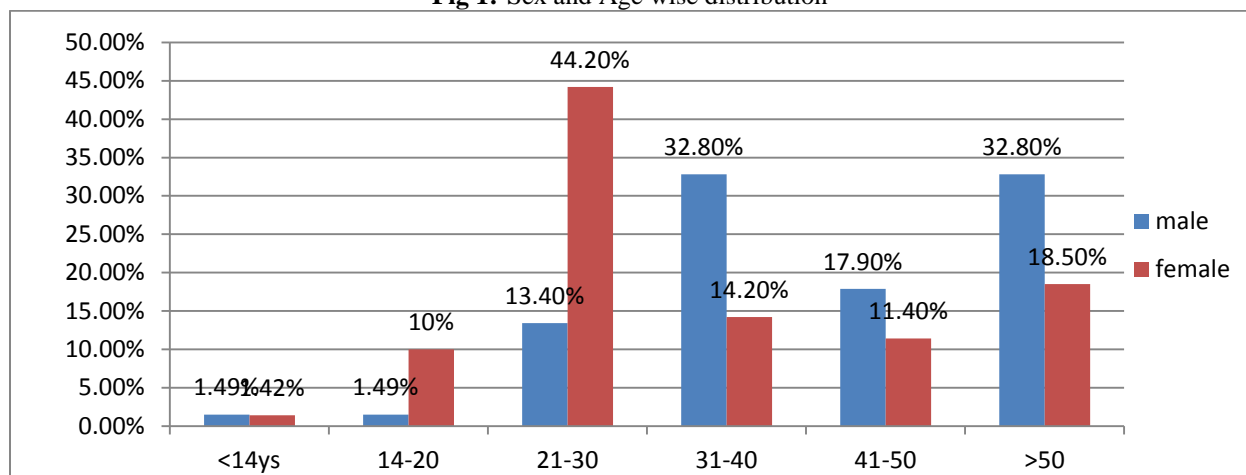
In the field of surgery wound infections have been a problem for a long time which remains as one of the most common nosocomial infection in surgically treated patients. During postoperative period an infected wound complicates and results in prolonged stay in the hospital and delayed recovery. In the present study, an attempt has been made to know the various bacterial pathogens responsible for SSIs and their antibacterial susceptibility pattern. The most common organism isolated was *Staphylococcus aureus* 38 (27.7%) which is nearer to the study conducted by Bastola et al. (21.8%) and Siddiqui et al. (22.03%). Gram negative isolates comprised of 60.5% out of which *Klebsiella* species (21.1%) was the commonest gram negative bacteria isolates followed by *E. coli* (18.9%) and *Pseudomonas* (13.8%). Some of the studies have reported *Pseudomonas* as the most frequent isolate in SSI (Kokate et al.) where as in this study it remains as a fourth most isolated organism. The present study also reveals that amikacin (53.2%) was the most effective drug against gram positive and gram negative bacteria.

In conclusion, SSI causes considerable morbidity among surgical patients. Appropriate active surveillance and infection control measures such as proper hand hygiene techniques should be introduced during preoperative, intra-operative, and postoperative care to reduce the incidence of surgical site infection. Thus, every hospital needs to organize its infection control program. Irrational use of antibiotics should be stopped. The information obtained from this study allows a better understanding of the microbial etiology of SSIs in our hospital. In spite of modern surgical and sterilization techniques and the use of prophylactic antimicrobials, SSIs still continue to be an important clinical challenge.

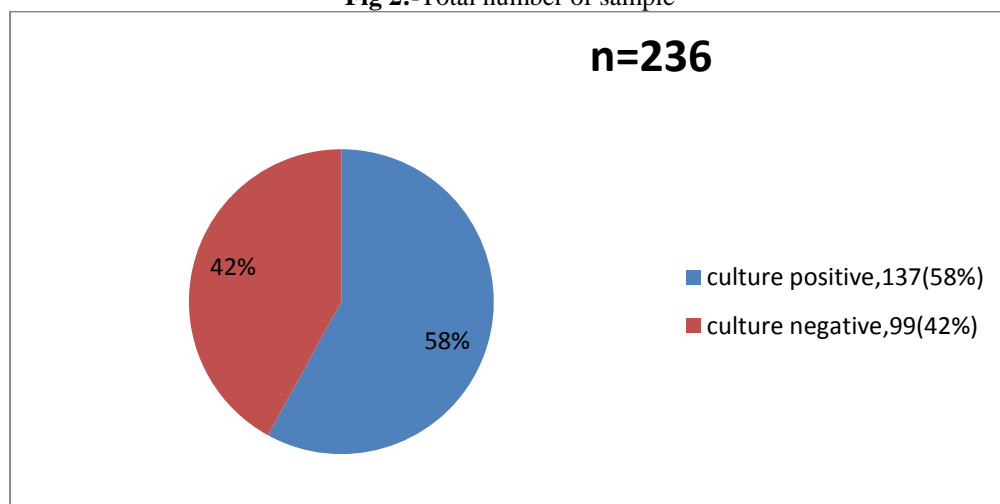
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**Fig 1:-Sex and Age wise distribution**

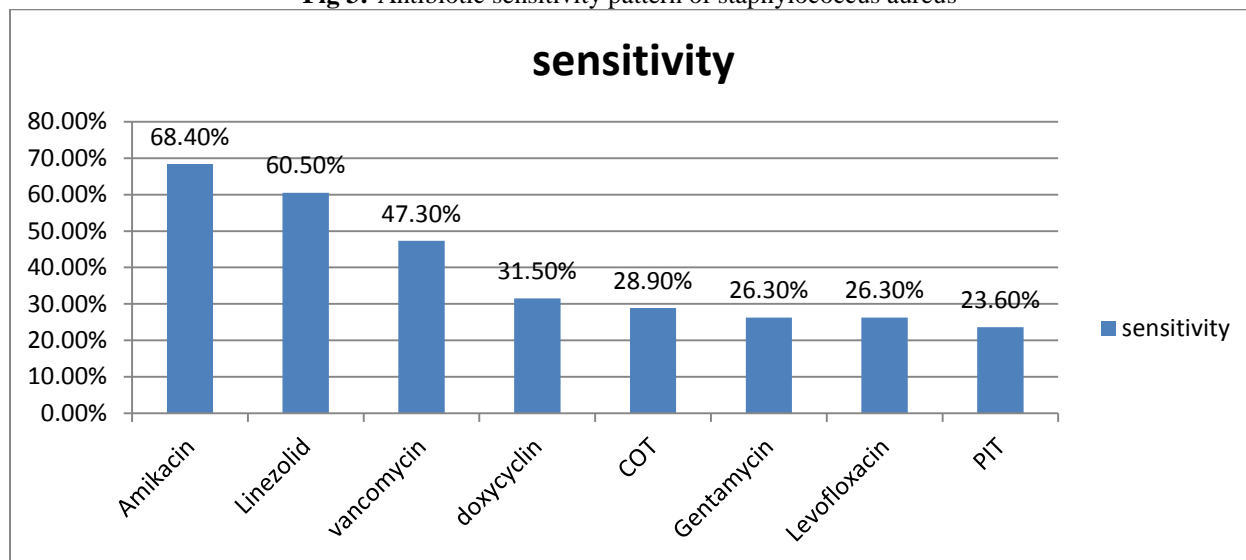
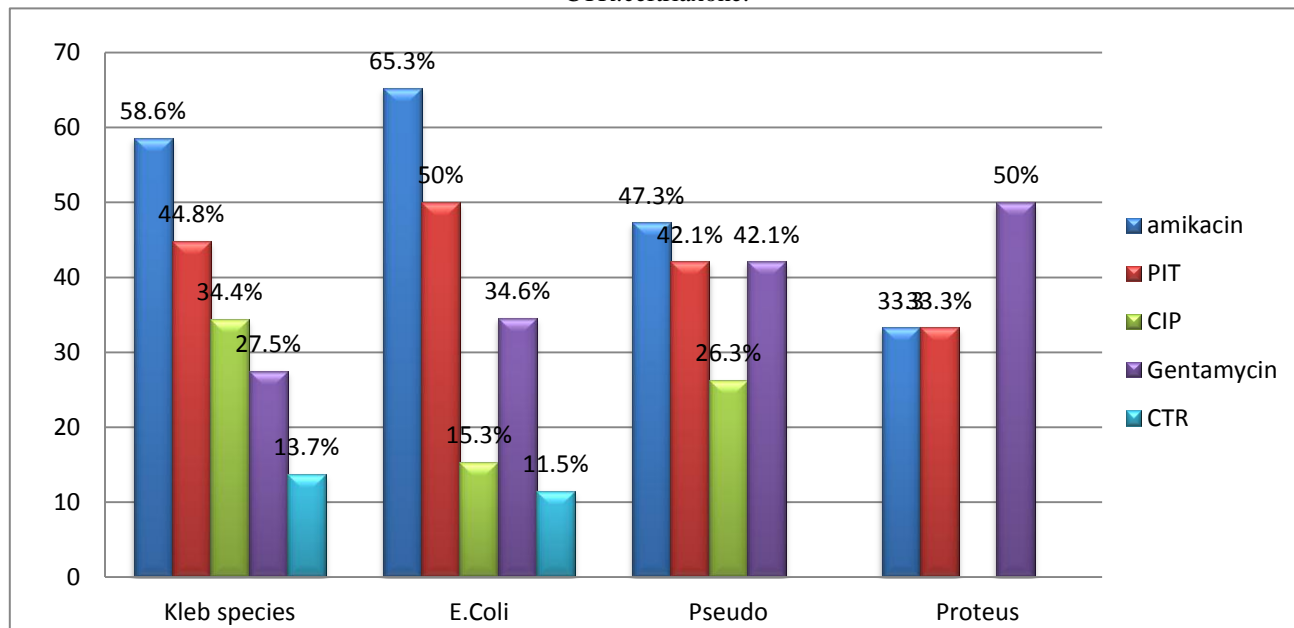


**Fig 2:-Total number of sample**



**Table 1:-**Organisms isolated in pus culture(n=137)

S.NO	Organism Isolated	Number of isolates(n=137)	%
1	Staphylococcus aureus	38	27.7
2	Klebsiella species	29	21.1
3	Escherichia Coli	26	18.9
4	Pseudomonas	19	13.8
5	CONS	16	11.6
6	Proteus	6	4.37
7	Enterobacter	3	2.18

**Fig 3:-**Antibiotic sensitivity pattern of staphylococcus aureus**Fig 4:-**Antibiotic sensitivity pattern of Gram Negative Bacilli PIT: piperacillin and tazobactam, CIP: ciprofloxacin, CTR: ceftriaxone.

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