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To Study Bacteriological Profile and Antibiogram of Surgical Site Infections in a Tertiary Care Hospital of Western Rajasthan, India

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Surgical site infections (SSIs) are defined as infections occurring within 30 days after a surgery or within one year if an implant is left in place after the procedure. This was a hospital based Prospective Observational Study carried out at department of Microbiology, Dr S.N medical college, Jodhpur, Rajasthan. The study was done between December 2021 to December 2022. Total 210 wound samples were collected. 210 patients were enrolled in the present study. Age-wise distribution shows more SSI in age group of 21-30 (58.57%) years. *Escherichia coli* was most predominant isolate in 45.83% cases followed by *Staphylococcus aureus*39.25%.42.08 % MRSA and 55.55% ESBL were found in the present study. Appropriate preoperative, intra-operative and post operative patient care, proper infection control, sterilization protocols in OT and Post operative ICUs and juidicious use of antibiotic can decrease the risk of Surgical Site Infection and cost of treatment.

Introduction

Surgical site infections (SSIs) are defined as infections occurring within 30 days after a surgery or within one year if an implant is left in place after the procedure and affecting either the incision or deep tissue at the operation site or infections involving organ or body space other than the incision, which was opened or manipulated during an operation (Norman S. Williams *et al.,* 2018).

According to the National Nosocomial Infection Surveillance program (NNIS), it is classified into superficial, deep, organ/space infections. Wounds are classified as Clean wound, Clean contaminated, Contaminated and Dirty (Mangram *et al.,* 2016). The patient's own normal flora, organisms present in the hospital environment that are introduced into the patient by medical procedures, specific underlying disease, trauma or burns which may cause a mucosal or skin surface interruption are the sources of SSIs. Many studies reported that SSIs rank third among common nosocomial infection next only to urinary tract and respiratory tract infections (Collee *et al.,* 2019).

Materials and Methods

This was a hospital based Prospective Observational Study carried out at department of Microbiology, Dr S.N medical college, Jodhpur, Rajasthan. The study was done between December 2021 to December 2022. Total 210 wound samples were collected. Ethical approval was taken from Institutional Ethical Committee. SNMC/IEC/2022/Plan/555.

Statistical analysis

The comparison between antibiotic resistance pattern in microbial isolates will be statistically analysed. Categorical data will be analysed using nonparametric measures and numerical data will be analysed using parametric measures.

Sample Size Calculation

Sample size was calculated at 95% confidence interval to verify an expected 16% prevalence of MRSA among pus samples from SSI cases at absolute allowable error of 5% sample size was calculated using the formula for sample size for estimation of proportion –

$$N = \frac{Z\alpha/2^2 P(1-P)}{E2}$$

$$N = \frac{1.96 \times 1.96 \times 16(1-16)}{.5 \times .5} = 206$$

Zα/2 - Standard normal deviate for 95% confidence interval (taken as 1.96)

P - expected prevalence of MRSA among pus samples from SSI cases (taken as 16 % as per reference article)[126]

E - allowable error (taken as 5%)

Before collecting the wound sample, careful cleaning of infected surgical site has to be done using 70% ethyl alcohol followed by 10% povidone iodine and allowed to remain for 2 minutes. After 48 hours of surgery, dressings on the surgical wounds were removed.

Wearing a sterile gloves the wound margins were separated with thumb and forefinger of one hand and with the other hand gentle pressure is applied and pus exudates was collected from the depth of the wound using two sterile cotton swabs for aerobic culture, the pus was aspirated in a sterile syringe or whenever possible. Two swabs were taken from the depth of the wound or lesion and aspirates were collected in a sterile disposable syringe and transported to the laboratory within two hours (Ananthanarayan and Paniker, 2009).

The color, consistency and odor of the samples were observed and recorded. The wound sample collected was transported immediately to the laboratory for further processing first swab was substituted to Gram-staining and culture sensitivity and Antimicrobial testing was done from the 2nd swab by Kirby -Bauer disc diffusion method according to CLSI GUIDELINE 2021. Identification of Bacteria was done according to the standard book of the medical Microbiology.

Results and Discussion

In the present study 210 patients with clinically suspected postoperative wound infections were enrolled and samples from these patients were further processed.

Out of 210 clinically diagnosed cases, 15 (7.16%) were males and 19(9.04%) were females of pediatric patients. In Obstetrics & Gynecology patients 176(83.81%) females were infected.

Age wise distribution revealed that out of 210 clinically diagnosed cases, 33(15.71%) were infected in <10 age group, 25(11.90%) infected were cases seen in (10-20) age group, 123 (58.57%)cases in 21-30 age group, 27 (12.85%) were affected in 31-40 age group and 2 (0.95%)in 41-50 age group. Surgical site infection was maximum 58.57% in 21-30 age group.

Among the 210 clinically diagnosed cases, SSI were predominant in those with prolonged pre operative stay. Pre operative stay of 4 days and above showed a significant increase in the rate of SSI.

It also showed a correlation parallel to that of pre operative stay. Day 4 to day 7 and above showed, increased number of cases.

Out of the 127 isolates, 87(68.50%) were Gram positive cocci and 40(31.49%) Gram negative bacilli were isolated in OBG department. Out of the 26 isolates, 18(69.23%) Gram positive cocci and 8(30.76%) Gram negative bacilli were isolated in pediatric department. Infection due to Gram Positive cocci were more common in both departments than Gram negative bacilli.

Out of all 210 clinically diagnosed cases, Elective cases were 95(45.23%) and Emergency cases were 115(54.76%). Superficial cases and Deep cases were 98 and 17 in out of total Emergency cases (115). 83 and 12 were Superficial and Deep cases respectively out of total Elective cases of SSIs. SSIs were more common in Emergency than Elective cases.

In OBG department total 176 surgeries was done (infected cases: LSCS-130, Total abdominal hysterectomy-29, Exploratory laparotomy- 17). Total 34 surgeries were done in pediatric department in which 23 were Hernioplasty and 11 Appendicectomy.

Out of 155 Microorganisms isolated, 107 were Gram positive organisms. Among these, CONS were more common followed by *Staphylococcus aureus*.

Out of 155 organisms isolated, 48 were gram negative organisms and among these *Esch.coli* was the most common organism isolated.

Maximum Gram negative bacilli showed sensitivity to Aztreonam (75%) then Imipenem (72.9%), Piperacillin tazobactum (72.9%) followed by Cefepime (70.8%), Amikacin (66.6%), Gentamicin (66.6%). Lower sensitivity were seen for Ciprofloxacin (35%), Ceftazidime (25%). Maximum resistance were seen for Ceftazidime (75%) among total Gram negative bacilli, after that for Ciprofloxacin(65%), Gentamicin (33.4%), Amikacin (33.4%), Cefepime (29.2%), Piperacillin tazobactum (27.1%), Imipenem (27.1%), Aztreonam (25%).

In present study, according to age -wise distribution SSI was found to be more (58.5%) in 20-30 age group, comparable to that of Gayathree Naik *et al.,* (2011) who showed high SSIs rate in 20-30 age group and it was due to more no of cases admitted for surgery in this age group. According to gender –wise distribution SSI found that out of 210 cases, 15(7.14%) were males and 195(92.8%) were females. Among 195 females 19 were of pediatric and 176 of OBG. In present study maximum cases were seen in post operative female patients as this study was carried out in tertiary level maternity hospital. Similar results were observed in Vigneswaran *et al.,* (2023) who showed higher cases of SSI in females (54.4%) as compared to males (45.55%). Correlation between SSI and pre-operative stay, it was found that, longer preoperative hospitalization is associated with increased incidence of wound infection i.e., patients who were hospitalized for more than 4 days showed higher infection rate of 30% when compared to those of lesser stay. Similar findings have been observed by Patel *et al.,* (2012). Higher incidence of infection is due to increased colonization of nosocomial strains in the hospital, poor general condition on admission, exposure to broad spectrum antibiotics and co-morbid conditions like Diabetes, UTI and other metabolic disorders and it was found that in our study, infection rate was more after 1 week of surgery which correlates with which correlates with that of Chia (2014) who stated that, infection rate was more after the 5th post-operative day.

Among the 210 cases Emergency cases (54.76%) were having higher infection rate when compared to Elective cases, which showed an infection rate of 45.23%. Higher infection in Emergency surgery is due to combination of various factors such as poor general condition of patients, preparation time for surgery being inadequate and operation done on contaminated sites. Agarwal (1972); Anvikar *et al.,* (2012) also observed increased incidence of SSIs in Emergency cases. Varsha Shahane *et al.,* (1973) noted the profound influence of wound contamination from analysis of wound categories, in which the SSIs rate in Contaminated and Clean contaminated wound was higher when compared to Clean wounds. They noted an infection rate of 12.3% in Contaminated wound, 8% in Clean contaminated wound, 4.6% in Clean wound. Patel *et al.,* (2012) noted a SSI rate of 5.4% in Clean wound, 35.5% in Clean contaminated wound and 77.8% in contaminated wound. Present study showed that infection rate was 27.14 % in Clean cases, increased to 55.71% in Clean contaminated wound and 12.85% in contaminated wound; Thus there was a correlation between wound infection and bacterial contamination.

Possibility of contamination by skin microflora was more in clean wound and endogenous microflora in clean contaminated and contaminated wound. SSIs rate was high in Clean Contaminated wounds (55.71%) in our study, which was significant statistically and well in accordance with other studies. Colonization by human endogenous microflora was the main risk factor causing surgical site infection in Clean contaminated wound (55.71%), because of more number of organisms available from the bowel and hollow visceral organs access the wound site. Also surgical techniques such as duration of surgery, suturing, vascularisation during and after surgery, etc., play a vital role in development of SSIs.

Table.1 Gender and Department wise distribution (n=210)

Department	Male	%	Females	%	Total	%
Pediatric	15	7.14	19	9.04	34	16.19
OBG	0	0	176	83.80	176	83.81
Total	15	7.14	195	92.85	210	100

Table.2 Age wise distribution (n=210)

Age	Infected cases	%
<10	33	15.71
10-20	25	11.90
21-30	123	58.57
31-40	27	12.85
41-50	2	0.95
>50	0	0

Table.3 Correlation between SSI and preoperative stay (n=210)

S.No.	Pre operative stay	Surgical Site Infection	%
1	0	30	14.29
2	1	20	9.52
3	2	35	16.67
4	3	60	28.57
5	4 and above	65	30.95
	Total	210	100

Table.4 SSI in relation to Post operative day of diagnosis (n=210)

S.No	Post operative day	SSI	%
1	1	0	0
2	2	0	0
3	3	15	7.15
4	4	35	16.67
5	5	43	20.47
6	6	52	24.76
7	7 and above	65	30.95
	Total	210	100

Table.5 Correlation between bacterial isolates and infected cases in surgical units (n=210)

Surgical units	Isolates		No bacterial growth
	Gram positive	Gram negative	
OBG (n=176)	89 (50.56)	40(22.72%)	47(26.70%)
Pediatrics (n=34)	18(52.94%)	8(25.80%)	8(25.80%)
Total	107(50.95%)	48(22.85%)	55(26.19%)

Table.6 SSI in relation to various classes of wound (n=210)

S.No.	Wound class	No. of cases (n= 210)	%
1	Clean wound	57	27.14
2	Clean contaminated	117	55.71
3	Contaminated	27	12.85
4	Dirty infected	9	4.28

Table.7 SSIs in relation to type of surgery (n=210)

Type of Surgery	Wound Type (n=210)	
	Superficial	Deep
Emergency (n=115)	98	17
Elective (n=95)	83	12
Total	181	29

Table.8 Various surgical procedures & SSI rate (n=210)

S.No.	Surgical procedure	No. of cases	%
1	LSCS	130	61.90
2	Total abdominal hysterectomy	29	13.81
3	Exploratory laparotomy	17	8.10
4	Hernioplasty	23	10.95
5	Appendicectomy	11	5.24
	Total	210	100

Table.9 Total culture positive cases among bacterial isolates (n=210)

Culture Growth	No. of cases	%
Positive	155	73.80
Negative	55	26.20
Total cases	210	100

Table.10 Distribution of Gram positive isolates (n=107)

Gram positive isolates	Total No.	%
CONS	50	46.72
Staphylococcus aureus	42	39.25
GPB	9	8.41
Group B *streptococci*	4	3.74
***Enterococcus*spp.**	2	1.87
Total	107	100

Table.11 Distribution of Gram Negative isolates (n=48)

Gram negative isolates	Total No.	%
Esch.coli	22	45.83
***Acinetobacter* spp.**	9	18.75
***Klebsiella* spp.**	9	18.75
***Pseudomonas* spp.**	5	10.42
***Citrobacter* spp.**	3	6.25
Total	48	100

Table.12 Table showing Antibiotic sensitivity pattern of gram positive cocci isolates in SSI

Antibiotics	CONS(50)	*Staphylococcus aureus*	*Enterococcus*(2)	*Streptococcus*(4)	Total
Linezolid	40 (80%)	34 (80.9%)	2(100%)	3(75%)	79(80.6%)
Vancomycin	38 (76%)	35 (83.3%)	2(100%)	3(75%)	78(79.5%)
Ofloxacin	30(60%)	6 (14.2%)	1(50%)	1(50%)	38(38.7%)
Amoxyclav	25 (50%)	15 (35.7%)	1(50%)	3(75%)	44(44.8%)
Amikacin	48 (96%)	32(76.1%)	1(50%)	4(100%)	85(86.7%)
Cefazolin	50(100%)	20 (47.6%)	0	4(100%)	74(75.5%)
Gentamicin	50(100%)	31 (73.8%)	0	4(100%)	85(86.7%)
Cefoxitin	44 (88%)	21(50%)	2(100%)	4(100%)	71(72.4%)
Piperacillin tazobactum	50(100%)	31(73.8%)	2(100%)	1(50%)	84(85.7%)

Table.13 Table showing Antibiotic sensitivity pattern of gram negative bacilli isolates in SSI

Antibiotics	Esch.coli (22)	Klebsiella (9)	Acinetobacter(9)	Pseudomonas (5)	Citrobacter(3)	Total
Gentamicin	15(68.1%)	5(55.5%)	6(66.6%)	5(100%)	1(33.3%)	32(66.6%)
Piperacillin tazobactum	17(77.2%)	6(66.6%)	5(55.5%)	4(80%)	3(100%)	35(72.9%)
Imipenem	16(72.7%)	6(66.6%)	8(88.8%)	4(80%)	1(33.3%)	35(72.9%)
Aztreonam	14(63.6%)	6(66.6%)	9(100%)	4(80%)	3(100%)	36(75%)
Cefepime	13(59%)	8(88.8%)	6(66.6%)	4(80%)	3(100%)	34(70.8%)
Ceftazidime	4(18.1%)	1(11.1%)	3(33.3%)	1(20%)	3(100%)	12(25%)
Amikacin	16(72.7%)	6(66.6%)	4(44.4%)	4(80%)	2(66.6%)	32(66.6%)
Ciprofloxacin	9(40.9%)	2(22.2%)	4(44.4%)	1(20%)	1(33.3%)	17(35%)

Table.14 Table show MRSA, VRE among Gram positive bacteria.

Bacterial isolates	Number	Bacterial isolates(n) %
Enterococcus	2	VRE (0) 0
Staphylococcus aureus	42	MRSA (18) 42.8% MSSA (24) 57.1%

Table.15 Table shows ESBL in Gram negative bacteria

Bacterial isolates	ESBL no.	%
1 ***E.coli*(22)**	15	55.55%
2 ***Klebsiella*(9)**	6	22.22%
3 ***Pseudomonas*(5)**	2	7.41%
4 ***Acinetobacter*(9)**	4	14.81%
Total	27	100%

Figure.1 Correlation between SSI and preoperative stay

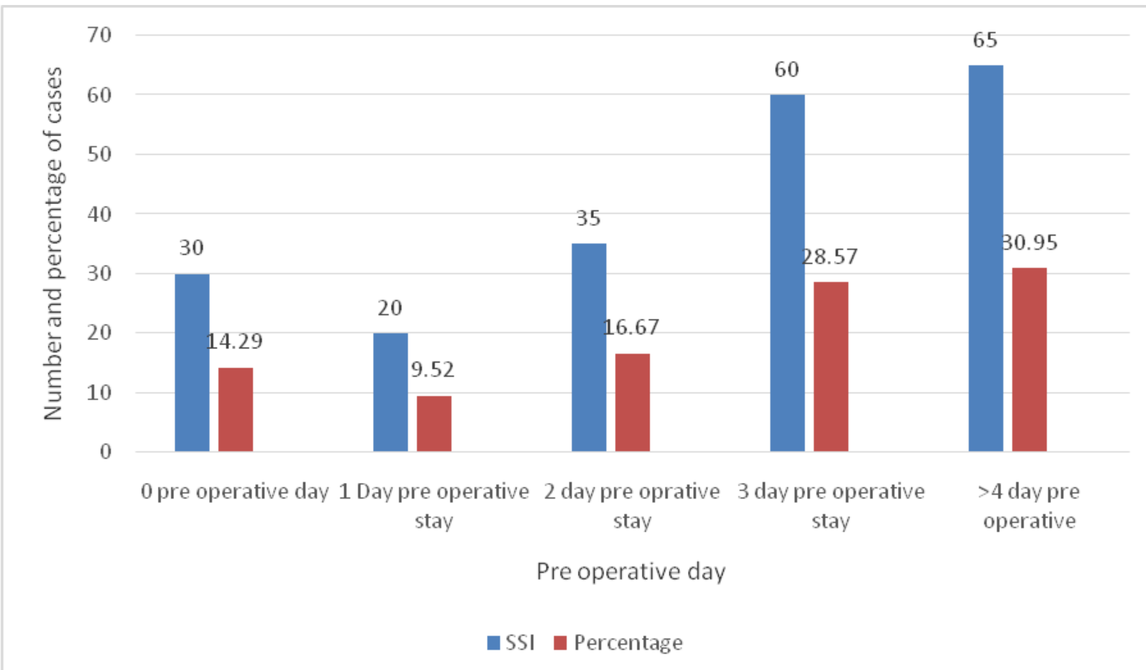


Figure.2

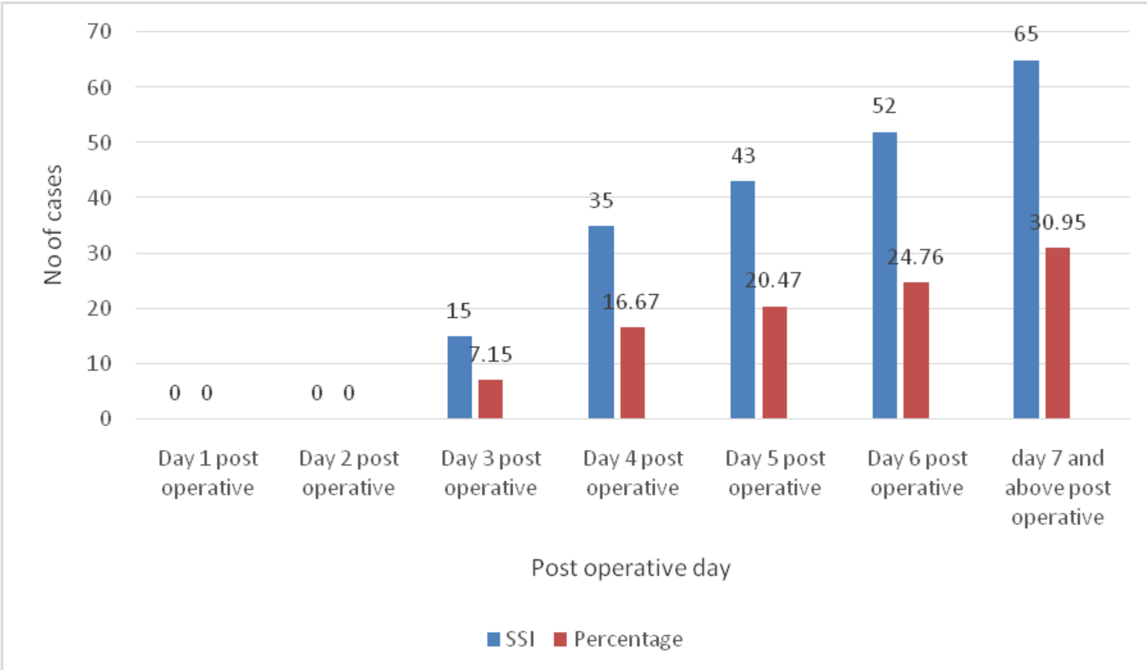


Figure.3 SSI in relation to various classes of wound

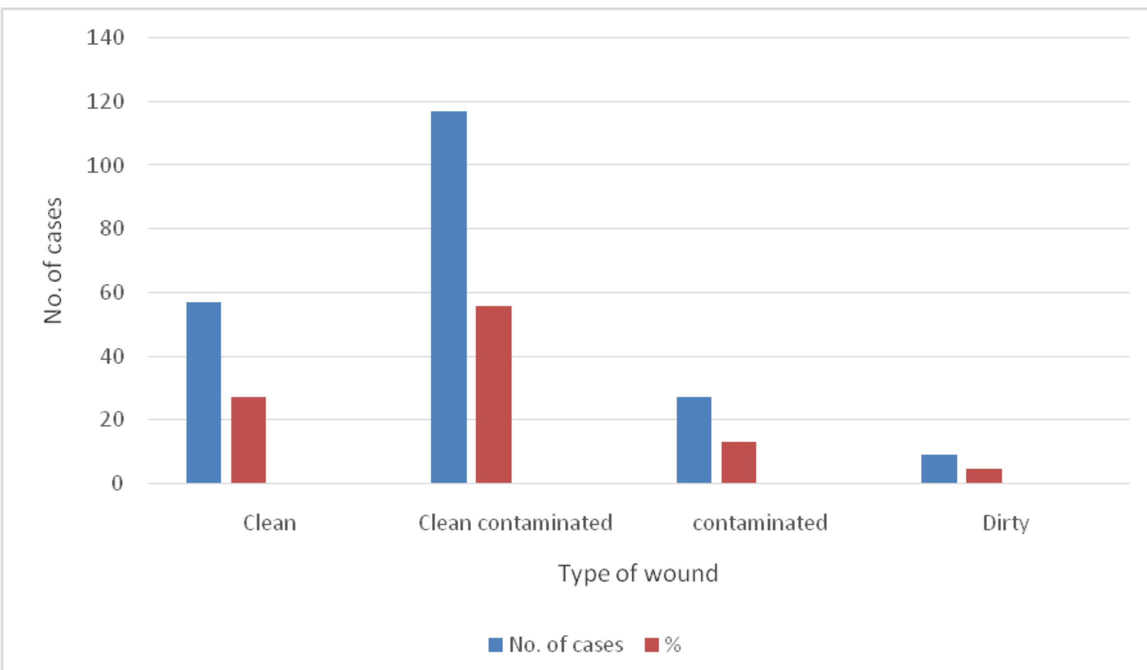
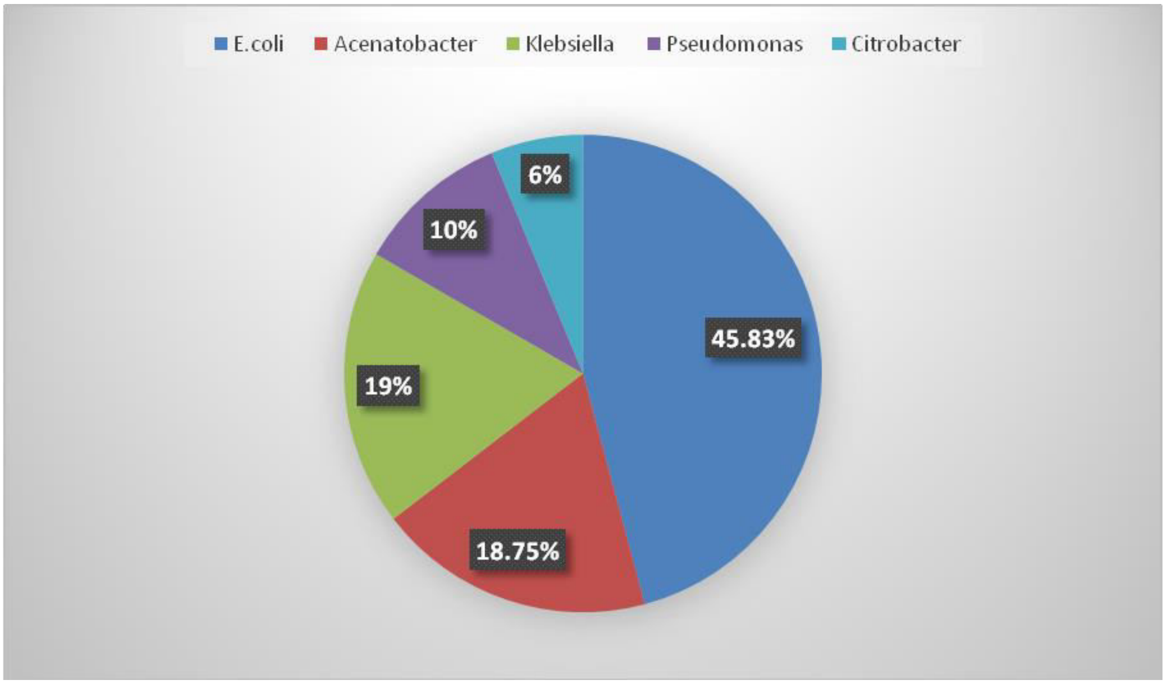


Figure.4 Distribution of Gram negative isolates



The culture results of our study showed that, Out of 210 cases 155(73.80%) were culture positive and 55(26.20%) were culture negative which correlates with that of Lilani *et al.,* (2005) study, in which out of 17 cases, 14 (82.36%) were culture positive. In the study of Gayathree Naik *et al.,* (2011) out of 300 samples 216 (72%) were culture positive. Culture negativity may be due to prior treatment with antibiotics or the presence of fastidious organisms which do not grow on ordinary culture media. Mixed infection involving aerobic and anaerobic organisms were more frequent after operative procedure excluding clean surgical procedure and also in emergency cases of traumatic etiology. But in present study only aerobic pyogenic culture was done, anerobic culture was not done. Of the 155 culture positive cases, the commonest organism was CONS (Coagulase negative staphylococcus) 50 (46.72%), followed by *Staphylococcus aureus* 42 (39.25%), *Escherichia coli* 22 (45.83%), Acinetobacter 9 (18.75%), Klebsiella 9 (18.75%), GPB 9(18.75%) Pseudomonas 5(10.42%), Group B Streptococci 4(3.74%), Citrobacter 3(6.25%), Enterococcus 2(1.87). In the present study, predominance of CONS and *Staphylococcus aureus* in SSIs is consistent with report from other studies. Lilani *et al.,* (2005) and Chia (2014) reported that *Staphylococcus aureus* was the common organism isolated from post operative wound infection. Giacometti *et al.,* (2000) also reported similar findings. In the study conducted by Anvikar *et al.,* (2012) *Esch.coli* (26.8%) and *Staphylococcus aureus* (25 %) were the two most common organisms isolated which is in accordance with our study. Klebsiella spp (80%) and *Escherichia coli* (64.3%) being the common organisms isolated from Obs & Gynecology cases is consistent with the study conducted by Brian Mawalla *et al.,* (2011). This could be due to laparotomy surgery done for most of the cases and possible source could be colonization of Enterobacteriacea in the Uterus and Cervix. In the Obstetric and Gynaecology Clinically diagnosed cases were 127(78%) and Emergency LSCS were done for most of the cases. *Staphylococcus aureus* being the common organism (40%) isolated, which correlates with the study of Anand saxena *et al.,* (2013). In present study *Staphylococcus aureus* (42) was 83.3% sensitive to Vancomycin, 80.9% to Linezolid and 78.5% to Ciprofloxacin, 76.1% to Amikacin, 73.8% to piperacillin-tazobactam, 73.8% to Gentamicin, 50 % to Cefoxitin, 47.6% to Cefazolin, 35.7% to Amoxyclav and 14.2% sensitive to Ofloxacin this correlated with the study of Kamat *et al.,* (2008), in which majority of patients showed maximum sensitivity to Vancomycin (80%) and Linezolid (81.3%). CONS (50) was 100 % sensitive to Cefazolin, Gentamicin, piperacillin-tazobactam. 96% sensitive to Amikacin, 92% to Ciprofloxacin, 88% to Cefoxitin, 80% to Linezolid, 76% to Vancomycin, 60% to Ofloxacin and 50% to Amoxyclav. Enterococcus was

100% sensitive to Linezolid, Vancomycin, Cefoxitin, piperacillin-tazobactam. 50% sensitive to Ofloxacin, Amoxyclav and Amikacin, Crichton *et al.,* (2008) also reported the smiliar findings where Enterococcus showed 100% sensitivity to Linezolid, Vancomycin. In our Gram positive isolates amongst *S. aureus*, 45% were MRSA and 55% MSSA.

In Enterococcus no VRE were detected. Klebsiella species (9) was 88.88 % sensitive to Cefepime, 66% to Piperazillin tazobactam, Imepenem, Aztreonam and Amikacin. 55.55% to Gentamycin, 22.2% to Ciprofloxacin and 11.1% to Ceftazidime. *Escherichia coli* (22) was 77.2% sensitive to Piperazillin tazobactam, 72.7% to Imipenem and Amikacin, 68.1% to Gentamycin, 63.6% sensitive to Aztreonam, 59% to Cefepime, 40.9% to Ciprofloxacin and 18.1% to Ceftazidime.

Pseudomonas aeruginosa (5) was 100% sensitive to Gentamicin, 80% to Imipenem, Piperazillin tazobactam, Amikacin, Aztreonam, Cefepime. 20% to Ceftazidime and Ciprofloxacin. Acinetobacter (9) was 100% sensitive to Aztreonam, 88.8 to Imipenem, 66.6% to Gentamicin and Cefepime. 55.5% to Piperazillin tazobactam, 44.4% to Amikacin and Ciprofloxacin, 33.3% to Ceftazidime. Citrobacter (3) was 100% sensitive to Piperazillin tazobactam, Aztreonam, Ceftazidime, Cefepime and 66.6 % sensitive to Amikacin, 33.3% to Gentamicin, Imipenem and Ciprofloxacin. Amongst Gram negative isolates total ESBL were detected in 56.2% of cases, in which 55.55% were *Esch.coli*, 22.2% Klebsiella, 14.8% Acinetobacter and 7.4% Pseudomonas, whereas in Gram positive isolates, 45% were MRSA, 55% MSSA and no VRE detected. Thus Gram positive organisms are highly sensitive to Amikacin, Gentamicin, piperacillin tazobactam and Gram negative organisms to Aztreonam, Imipenem, Cefepime.

Appropriate preoperative, intra-operative and post operative patient care, proper infection control, sterilization protocols in OT and Post operative ICUs and juidicious use of antibiotic can decrease the risk of Surgical Site Infection and cost of treatment.

Author Contributions

Anjali Beelwal: Investigation, formal analysis, writing—original draft. Ekta Gupta: Validation, methodology, writing—reviewing. Eshank Gupta:—Formal analysis, writing—review and editing. Vishakha Ashopa: Investigation, writing—reviewing. Richa Agarwal: Resources, investigation writing—reviewing. Prabhu Prakash: Validation, formal analysis, writing—reviewing.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests.

References

Agarwal S L; Study of prospective wound infections; Indian Journal of Surg 1972;34 : 314-20

Anand Saxena, Mahendra Pratap Singh, Swagata Brahmchari, Malay Banerjee. Surgical site infection among postoperative patients of tertiary care centre in Central India - A prospective study, Asian J of biomedical and Pharmaceutical sciences 2013.

Ananthanarayan R, Paniker C K J, editors. In: Textbook of microbiology. 12th ed. Hyderabad: Universities press; 2009.

Anvikar A R, Deshmukh A B, Karyakarte R P, Damie A S, Patwardhan N S, Malik A K, *et al.,* A one year prospective study of 3280 surgical wounds. Indian J Med Microbiol 2012;17(3):129-32

Brian Mawalla, Stephen E Mshana, Phillipo L Chalya, Can Imirzalloglu and William Mahalu. Predictors of Surgical site infections among patients undergoing major surgery at Bugando medical centre in Northwestern Tanzania.BMC Surgery 2011,11:21 https://doi.org/10.1186/1471-2482-11-21

Chia J Y H, Tan K W, Tay L. A survey of postoperative wound infections in obstetrics and gynaecology-The Kandang Kerbau hospital experience. Singapore Med J 2014;34:221-4.

Collee J G, Fraser A G, Marmion B P, Simmons A. Mackie & McCartney. Practical Medical Microbiology 14th edition 2019;4(5):66-7

Crichton P B. Enterobacteriaceae: Escherichia, Klebsiella, Proteus and other genera. In: Collee J G, Fraser A G, Marmion B P, Simmons A, editors. Mackie and McCartney, practical medical microbiology. 14th ed. New Delhi: Elsevier; 2008. p. 361-84.

Gayathree Naik, Srinivas R, Deshpande, (2011) Study on surgical site infection caused by *Staphylococcus aureus* with special search for Methicillin resistance isolates.

Giacometti A, Cirioni O, Schimizzi A M, Del Prete M S, Barchiesi F, D'Errico M M, *et al.,* Epidemiology and microbiology of surgical wound infections. J Clin Microbiol 2000;38(2):918-22 https://doi.org/10.1128/JCM.38.2.918-922.2000

Kamat U S, Fereirra A M A, Kulkarni M S, Motghare D D. A prospective study of surgical site infections in a teaching hospital in Goa. Indian J Surg 2008;70:120–4. https://doi.org/10.1007/s12262-008-0031-y

Lilani S P, Jangale N, Chowdhary A, Daver G B. Surgical site infection in clean and clean-contaminated cases. Indian J Med Microbiol 2005;23(4):249-52. https://doi.org/10.1016/S0255-0857(21)02530-5

Mangram A J, Horan T C, Pearson M L, Silver L C, Jarvis W R, Hospital Infection Control Practices Advisory Committee. Guideline for prevention of surgical site infection, 2016. Infection Control & Hospital Epidemiology. 2016Apr;20(4):247-80.

Norman S. Williams, Christopher J. K. Bulstrode & Ronan O'Connell. Bailley & Love's Short Practice of Surgery: 2018; Part 1: 4. 32-5.

Patel Sachin M, Patel Mitesh H, Patel Sangeeta, Soni Sumeeta T, Kinari wala Dipa M, Vegad Mahendra M, Surgical site infections: Incidence and risk factors in a tertiary care hospital, Western India. National journal of community medicine Vol 3:2 April-June 2012

Varsha Shahane *et al.,* Surgical Site Infections, A One Year Prospective Study in Tertiary Care Center, Arch Surg 1973;107:206-9.

Vigneswaran, *et al.,* (2023). Evaluation of Prescription Pattern of Antibiotic for Surgical Prophylaxis: Indian Journal of Pharmacy Practice, Vol 16, Issue 1, Jan-Mar, 2023 https://doi.org/10.5530/097483261355

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