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Study of Antimicrobial Sensitivity and Bacteriologic Patterns in Elective Abdominal Surgery Post-Surgical Wounds

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ABSTRACT

Surgical Site Infection (SSI) is the third most frequently reported nosocomial infection, accounting for 14–16% of all hospital-acquired infections. SSI results from multiple factors, including the bacterial inoculum introduced during surgery, pathogen virulence, wound microenvironment, and the patient's immune response. Both intrinsic patient factors and surgical conditions influence infection rates. This study aimed to analyze the bacteriological profile and antimicrobial sensitivity patterns of post-surgical wounds in elective abdominal surgeries. A prospective observational study was conducted on 130 patients in the Department of General Surgery at Khaja Bandanawaz Teaching and General Hospital, Kalaburagi, over 18 months (December 2019–June 2021). The mean age of the study participants was 34 ± 16.30 years. Among the cases, 76.9% had a positive wound culture, while 23% were culture-negative. Regarding wound classification, 28.4% were clean wounds, 50% were clean-contaminated, and 20.7% were contaminated wounds. The most frequently isolated organisms were *Staphylococcus aureus* (18.4%) and *Escherichia coli* (15.3%). Infection types observed included superficial infections in 76.9% of cases, deep infections in 15.3%, and organ-space infections in 7.6%. The study findings highlight that SSI was more prevalent in middle-aged individuals, with *Staphylococcus aureus* being the most commonly isolated pathogen. The results emphasize the need for stringent infection control measures and targeted antimicrobial therapy to manage post-surgical infections effectively. Understanding bacterial patterns and their antimicrobial sensitivity can aid in formulating appropriate prophylactic and therapeutic strategies to reduce SSI incidence and improve post-surgical outcomes.

Keywords: Surgical Site Infection (SSI), Post-Surgical Wound Infection, Infection Control, Antibiotic Resistance

I. INTRODUCTION

Of all the nosocomial infections, 14–16% are surgical site infections, making them the third most common kind of infection. Surgical site infections may be caused by a wide variety of bacteria, each with its own unique pattern of antibiotic sensitivity. These infections can manifest at any moment, in any hospital, and after any kind of surgery. SSIs are the result of a combination of several variables, including the microenvironment of each wound, the virulence of the contaminants, the inoculum of bacteria introduced into the wound during the surgery, and the patient's host defence mechanism's integrity. The frequency of infection may be influenced by patient-specific factors as well as those associated with the specific kind and conditions of the operation. Additional risk factors for surgical site infections include the length of time spent outside of the hospital, the patient's age and health, the use of drains, the length of operation, the handling of tissues, and the prescription of prophylactic antibiotics.

Surgery has always included the prevention and treatment of infections; nevertheless, the current discipline of surgical infectious illness owes its foundation to the development of germ theory and antisepsis. The latter's incorporation into surgical practice, which occurred at the same time as anesthesia's development, was critical in enabling surgeons to perform more intricate procedures, which had previously been linked to alarmingly high rates of infection-related complications and death. Yet, infection resulting from a surgical incision was more often than not until quite recently. A significant weapon in the arsenal of contemporary surgeons for the treatment of severe, fatal surgical infections was the discovery of efficient antimicrobials in the twentieth century. Surgical site infections (SSIs) persist as a significant issue across all subspecialties of hospital surgery, although improvements in asepsis, antimicrobial medications, sterilisation, and operating procedures. When it comes to reported nosocomial infections, SSIs rank third, according to the National nosocomial infections surveillance report. According to the World Health Organisation (WHO), nosocomial illnesses represent a significant economic burden. In addition to increasing healthcare expenditures, an infected wound may add five to twenty days to a patient's hospital stay. Significant advantages in patient comfort and medical resource utilisation might result from reducing the infection incidence to a low level. The microbiology of surgical site infections (SSIs) is procedure- and site-specific, and it may affect whether or not a hollow viscus or bodily cavity is penetrated during surgery. The frequency of infection may be influenced by patient-specific factors as well as those associated with the specific kind and conditions of the operation.

Surgical site infections may be caused by a wide variety of bacteria, each with its own unique pattern of antibiotic sensitivity. These infections can manifest at any moment, in any hospital, and after any kind of surgery. Routine SSI monitoring and management methods targeting recognised risk factors are necessary to prevent SSI since its aetiology is complex and varied. So, the research is necessary to find out what kinds of bacteriological patterns and antibiotic sensitivity are present in the wounds that heal after elective abdominal surgery.

1.1 OBJECTIVES

1. Determine the most common pathogens responsible for surgical site infections by analysing their bacteriological characteristics.

2. Find out how sensitive elective abdominal surgery wounds are to antibiotics.

3. Analyse the causes of surgical site infections.

4. Find out how often people who had elective abdominal surgery end up with infections at the operative site.

5. Differentiate between clean, clean contaminated, contaminated, and filthy wounds based on their bacteriological profiles.

II. REVIEW OF LITERATURE

In 2016, Darpan Bansal et al. conducted a prospective investigation on the bacteriological profile and antibiotic susceptibility in surgical site infection in elective abdominal operations at the surgery department of Shri Guru Ram Das Institute of Medical Sciences and Research in Punjab, India. A hundred people were included in the study. In 6 out of 100 instances, there was an infection at the surgery site. In three instances, or 50% of the total, E. coli (ESBL) was the causative agent of surgical site infection. Spores of Staphylococcus aureus were detected in 2 instances (33.33%). One instance of surgical site infection (16.66%) was found to be caused by Pseudomonas aeruginosa. Isolates that tested positive for gram-positive bacteria exhibited remarkable resistance to cephalosporins of different generations. Penicillin, ampicillin, amoxicillin clavulanate, cephalosporins, and quinolones were all ineffective against the gram-negative isolates.

Doiwala, Jolly Grant, Dehradun, India's Himalayan Institute of Medical Sciences (HIMS) was the site of a 2013 prospective research by Barnali Kakati et al. There were 685 patients in the research group. Out of 685 participants who were part of the trial, 7.44% had an infection. When it came to emergency surgeries, the SSI rate was greater. A major factor in the occurrence of surgical site infections was the length of time patients spent in the operating room and the number of drains they removed. E. coli and S. aureus were the most frequently isolated bacteria. When it came to infecting humans, Gram-negative bacteria were found to be much more common. Many of the isolates exhibited resistance to medicines used for the prevention of postoperative infections.

A prospective analytical investigation was conducted in 2008 by Maria Roumbelaki et al. Out of a total of 2420 surgeries, 129 SSIs were found (5.3%). Of them, 47.3% manifested themselves after the patient was discharged. Of the SSI isolates, 52.1% were Gram-positive, with Enterococci being the most common. Enterococcus faecium and Acinetobacter baumannii showed concerning resistance trends.

St. Paul's Hospital Millennium Medical College and Yekatit Hospital Medical College in Addis Ababa, Ethiopia were the sites of a cross-sectional research including 107 SSI patients in 2016, according to Walelign Dessie et al. A total of 104 organisms were recovered from 107 swabs, with 90 (or 84.1% of the total) proving positive in the culture. The number of organisms found varied, with multidrug-resistant Acinetobacter species coming in at number 23 (22.1%) and E. coli coming in at number 24 (23.1%). Over fifty-eight percent of the Gram-negative bacteria shown resistance to at least five different antibiotics. Eight Acinetobacter species (34.8%) and three E. coli species (12.5%) showed signs of pan-antibiotic resistance.

Over the course of six months, Njoku CO, Njoku AN. et al. conducted a prospective study with 600 patients who had a caesarean delivery. The incidence of SSI was 8.5%, or 51 individuals out of 600 participants who had a caesarean section. S. aureus (37.3%), Klebsiella pneumonia (27.1%), and E. coli (22.0%) were the most frequently isolated bacteria. The majority of the isolates exhibited a low level of susceptibility to fluoroquinolones, a moderate level of resistance to amoxicillin, gentamycin, and cephalosporins, and a high level of sensitivity to imipenem and amikacin.

III. ANATOMY OF ABDOMEN

3.1 Abdomen

Abdomen refers to the trunk portion that is between the pelvis and the thorax. Housing a portion of the urogenital system and the majority of the digestive system, it is a malleable and ever-changing organ.

The abdomen consists of:

- Abdominal walls
- Abdominal cavity

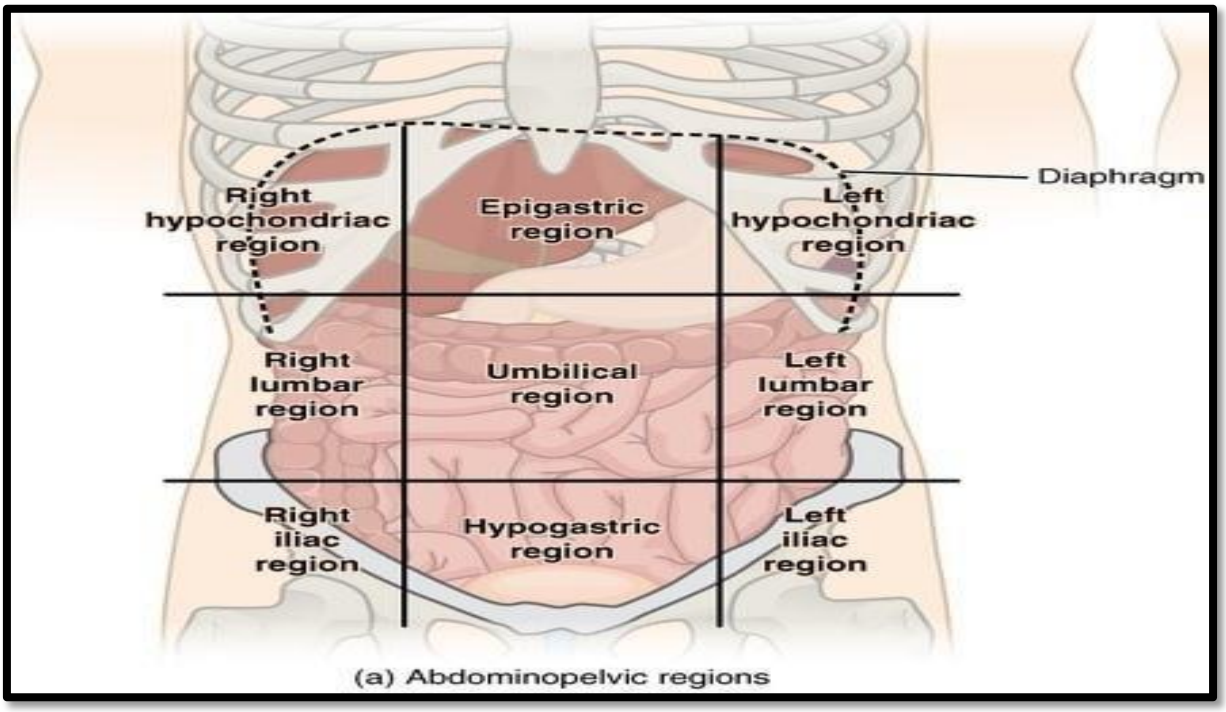


Figure 1 : Anatomy of division of abdominal wall

3.2 Wound Classification

Risk of SSI and wound categorisation A panel from the United States National Research Council created the operational wound categorisation system in 1964. An increased incidence of surgical site infections was associated with four types of wounds: injuries that are clean, clean-contaminated, contaminated, and unclean.

- **Clean wounds**
- **Clean-contaminated wounds**
- **Contaminated wounds**
- **Dirty wounds**

3.3 Epidemiology of SSIs

The heterogeneity of SSIs makes epidemiological studies challenging. Incidence rates vary greatly across operations, institutions, surgeons, and patients.

According to the CDC NNIS system, SSIs account for 14.16% of all nosocomial infections in hospitalised patients and 38.0% in surgical patients, making them the third most often reported nosocomial infections in the US. Also, depending on the method, the criteria for monitoring, and the accuracy of the data collected, the incidence of SSIs might reach 20% according to European statistics.

Minimally invasive (laparoscopic) surgeries are becoming more common, which has led to a decline in surgical site infections (SSIs). Patients having cholecystectomy, for instance, had a 1.1% SSI incidence after laparoscopic surgeries compared to a 4% risk after open procedures. A similar analysis found that SSI rates of 2% with minimally invasive operations and 8% with open procedures were seen in patients with acute appendicitis. Reduced SSI rates may be attributable to a combination of factors, including smaller incisions, faster mobility, less postoperative discomfort, improved immune system function preservation, and less reliance on central venous catheters.

3.4 PATHOGENESIS OF SSIS

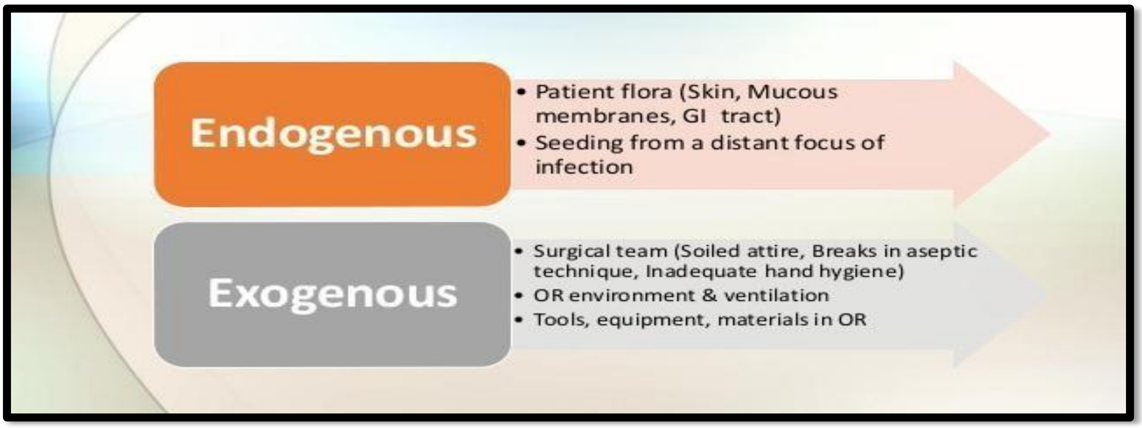


Figure 2: Factors of Pathogenesis of SSI

IV. MATERIALS & METHODS

Duration of the Study: December 2019 to June 2021.

Type of Study: Prospective Observational Study

Place of the study : Department of General surgery , Khaja Bandanawaz Teaching and General Hospital, Kalaburagi
Sample size:130

Sample size calculation for a continuous outcome measure
n = sample size for study group

In the reference study In 2013 Barnali Kakati[118] et al Prevalence rate of overall infection rate was 7.44
P = 7.5 Q = 92.5

L = permissible error was 60% of P was 4.5 Power of study was 80%
Sample size (n) = $Z^2_\alpha PQ/L^2$

$= (1.96)^2 \times 7.4 \times 92.5 / 4.5 \times 4.5$ = 130 samples are taken in the study

Inclusion criteria

- Patients willing to participate
- Patient age 19 years to 60 years
- All patients undergoing elective, clean, clean-contaminated abdominal surgery in Department of General Surgery.

4.1 Methodology:

Data was obtained using the questionnaire/proforma after the requested Informed Consent was taken. The participants in this research were all patients who had recently had elective, clean abdominal operations with SSI while receiving treatment from the General Surgery department at Khaja Bandanawaz Teaching and General Hospital in Kalaburagi.

If you go by NNIS's definition, surgical sites are contaminated. The U.S. National Research Council's wound contamination class system was used to categorise the wounds. The first postoperative day inspection occurred on day three, and after that, it was done regularly. We used a wound swab to send any discharged fluids for culture and sensitivity testing. Two sterile swabs were used for sample collection.

4.2 Case definition

Infection at the surgical site (incisional or organ/space*) was considered to have developed within 30 days after the surgery (or within 1 year in the case of implants) if the patient also had one of the following symptoms:

- Yeast infected discharge from a small cut, with or without medical verification.
- Cultures of fluid or tissue acquired from a shallow incision are aseptically collected and include the organisms.
- Pain or soreness, localised swelling, redness, or heat—at least one of these symptoms might indicate an infection.

There are two types of incisions: superficial, which only affect the skin and subcutaneous tissue, and deep, which penetrate into the deeper layers of soft tissue, such as the fascia and muscles.

The main data used in this research came from Pus samples that were taken on two sterile swabs and then submitted for sensitivity and culture testing.

V. EXAMINATION

5.1 General examination

For Pallor, icterus,cyanosis , koilonychia, lymphadenopathy and edema

5.2 Local examination

On the third postoperative day, while the wounds were still being dressed, or later, after the dressings were wet [until the patient was released from the hospital], the patient was followed up on an outpatient basis to look for anything that may indicate an infection.

5.3 Systemic examination

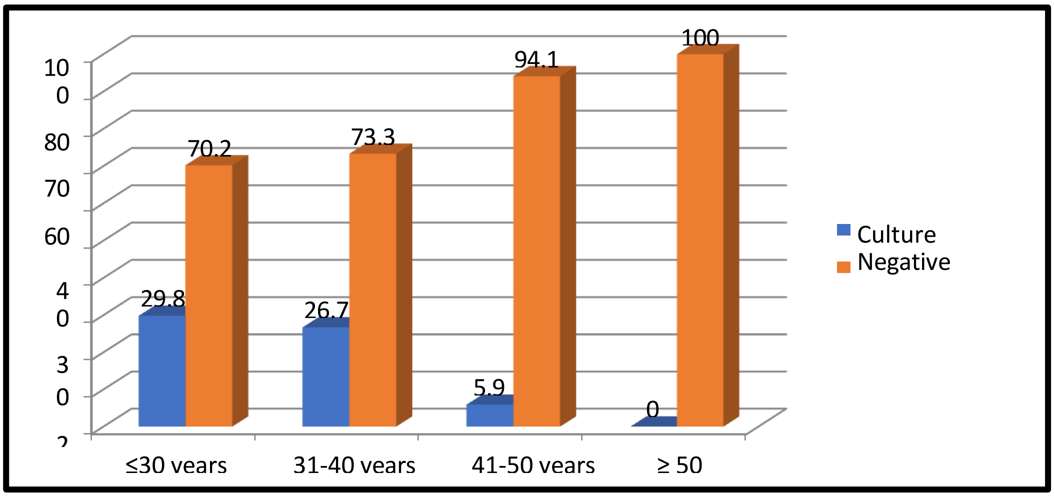
- CVS system -looked for S1 and S2
- Lungs- for wheeze and rhonchi
- Abdomen – for any palpable mass

VI. RESULTS & OBSERVATION

Table-1: Comparison based on age in Culture Negative and Positive patients

Age distribution	Culture Negative n(%)	Culture Positive n(%)	Chi- Square, p-value
≤30 Years	17(29.8)	40(70.2)	Chi square=7.920 P=0.048*
31-40 Years	12(26.7)	33(73.3)	
41-50 Years	1(5.9)	16(94.1)	
≥50 Years	0(0.0)	11(100)	
Total	30(23.1)	100(76.9)	130(100)

There is statistically significant($p<0.05$) difference in the age group and culture positivity. Majority of the patients were culture positive in more than 50 years age group.

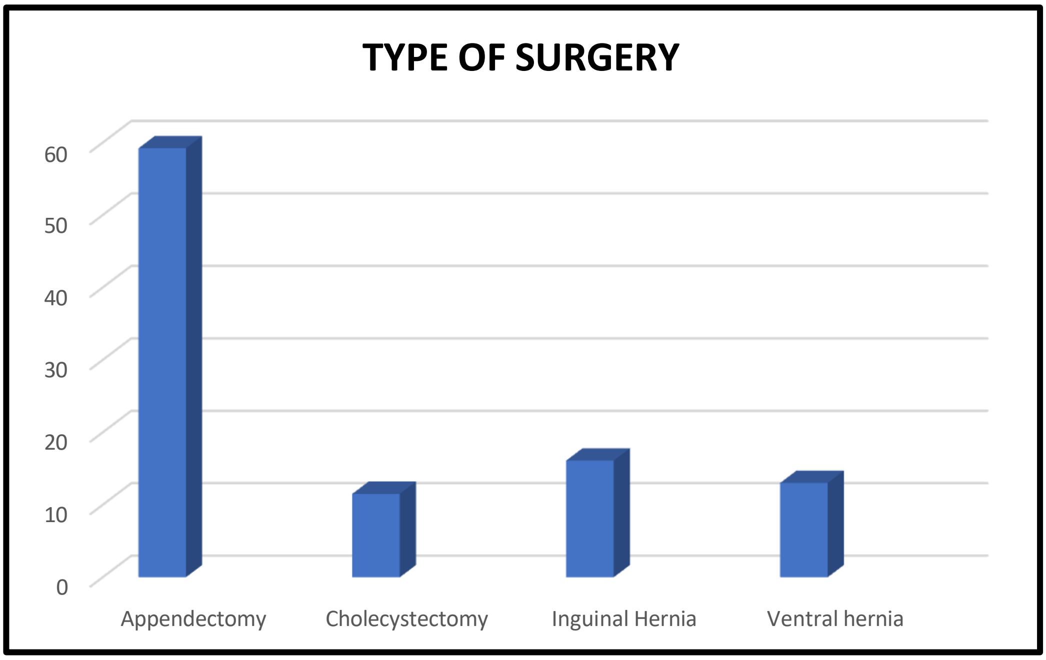


Graph 1 : Comparison based on age in Culture Negative and Positive patients

Table 2: DISTRIBUTION OF CASES BY TYPE OF SURGERY

Type of surgery	No. of cases	Percent age
Appendectomy	77	59.2
Cholecystectomy	15	11.5
Inguinal Hernia	21	16.1
Ventral hernia	17	13.0
Total	130	99.8

In the present study majority of the cases operated were of Appendectomy (77/130) constituting 59.2% . Cholecystectomy occupied 11.5%(15/130), Inguinal Hernia constituted 16.1%(21/130) and ventral Hernia was about 13%(17/130) .

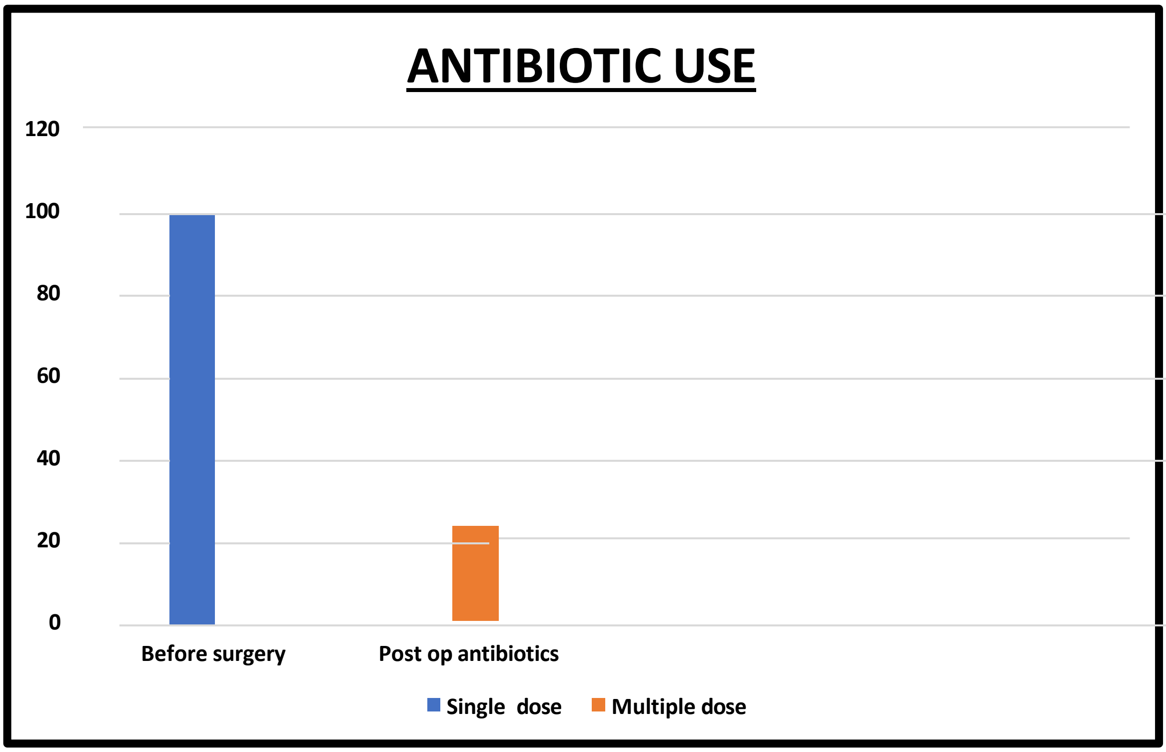


Graph 2: Bar diagram showing distribution of Type of surgery

Table 3 : Distribution on antibiotic use

antibiotic use	Single dose	Multiple dose
Before surgery	130(100%)	Nil
Post op antibiotics	100 (76.9%)	30(23%)

In the present study all 130(100%) cases who were undergoing surgery were given single dose of antibiotics preoperatively

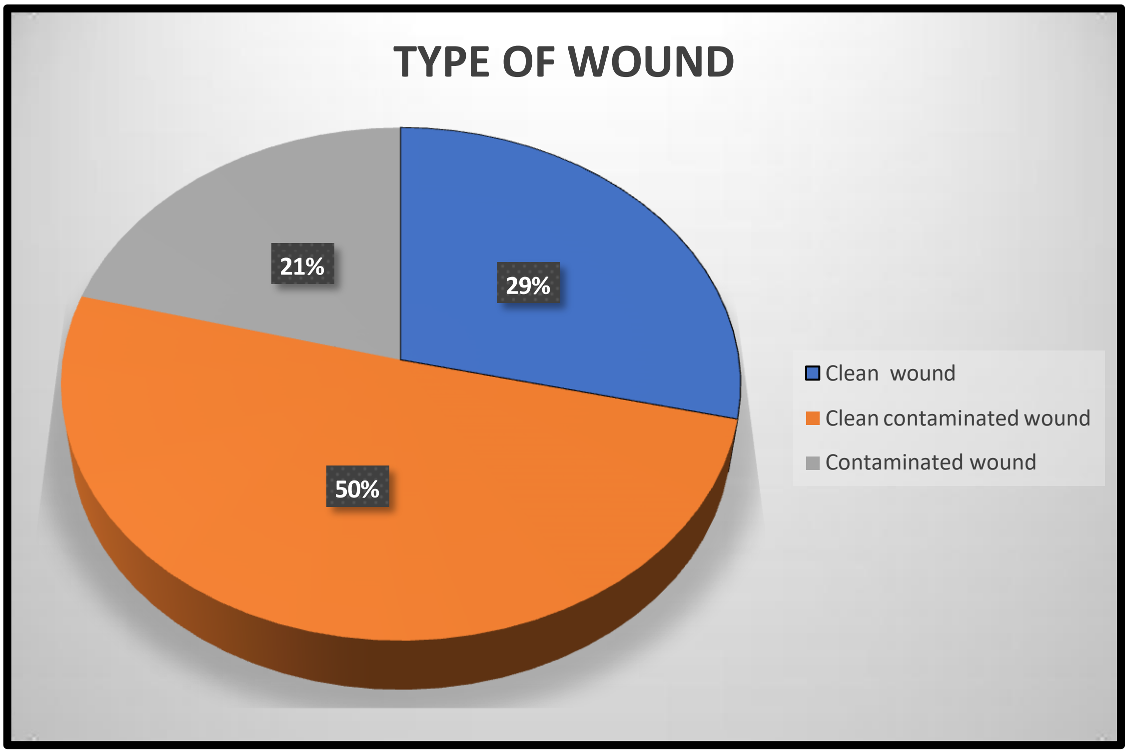


Graph 3: Bar diagram showing distribution of antibiotic use

Table 4: Distribution of type of wound

Type of wound	**No. of cases**	**Percentage**
Clean wound	37	28.4
Clean contaminated wound	65	50
Contaminated wound	27	20.7
Total	130	99.9

In the present study 28.4% (37/130) were clean wounds 50% (65/130) were clean Contaminated wounds ,20.7% (27/130) were contaminated wounds .

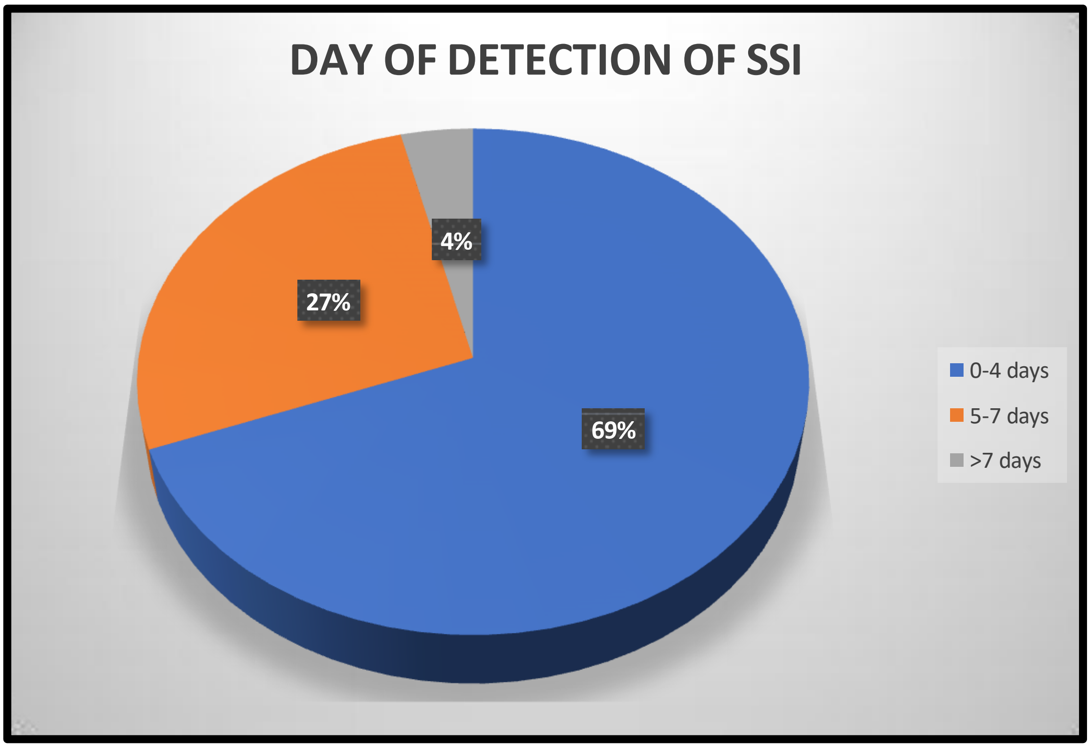


Graph 4 : Distribution of type of wound

Table 5: Distribution of day of detection OF SSI

Detection of SSI	No. of cases	Percentage
0-4 days	35	69.2
5-7 days	20	26.9
>7 days	75	3.8
Total	130	99.9

In the present study surgical site infection was noted within 4 days in 69.2% (90/130) cases 26.9% (35/130) cases noticed infection at 5 to 7 days Ans 3.8% (5/130) cases noticed on more than 7 days .



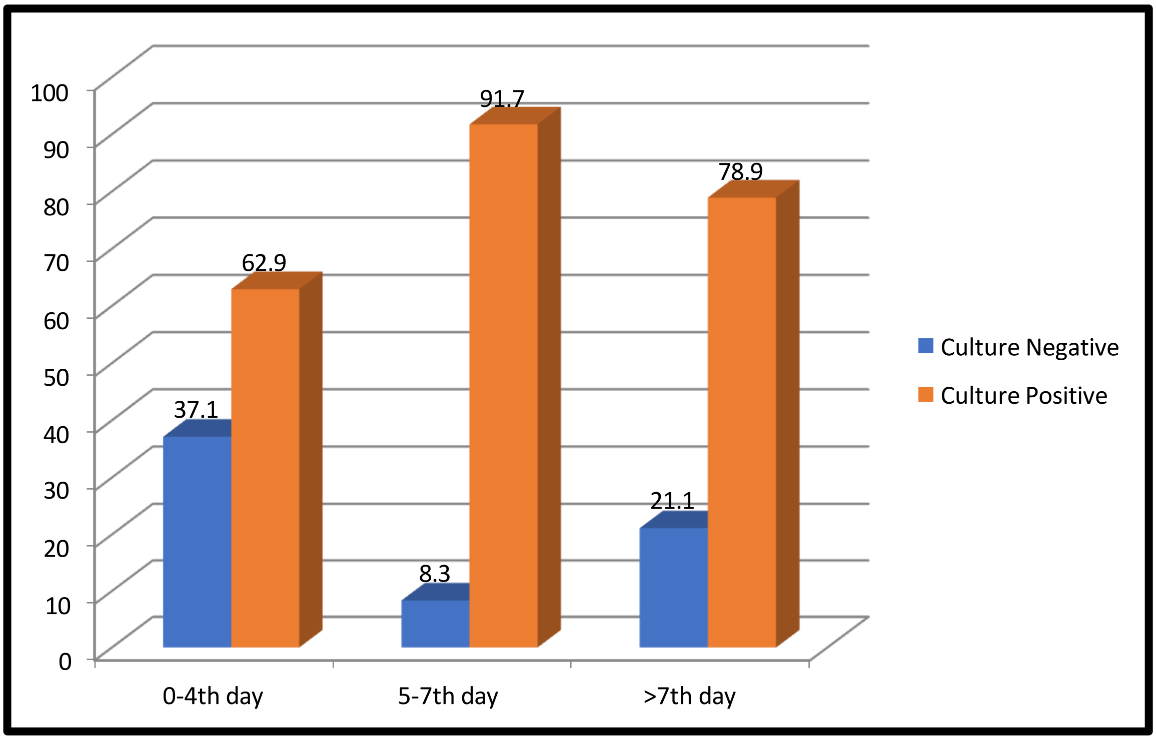
Graph 5: Pie diagram showing Detection of SSI

Table 6: Comparison based detection of SSI in Culture Negative and Positive patients

	Culture Negative n(%)	Culture Positive n(%)	Chi- Square, p-value
0-4th day	13(37.1)	22(62.9)	Chi square=6.99 P=0.030*
5-7th day	2(8.3)	22(91.7)	
>7th day	15(21.1)	56(78.9)	
Total	30(23.1)	100(76.9)	130(100)

*significant

There is statistically significant association ($p<0.05$) between detection of SSI and culture positivity.

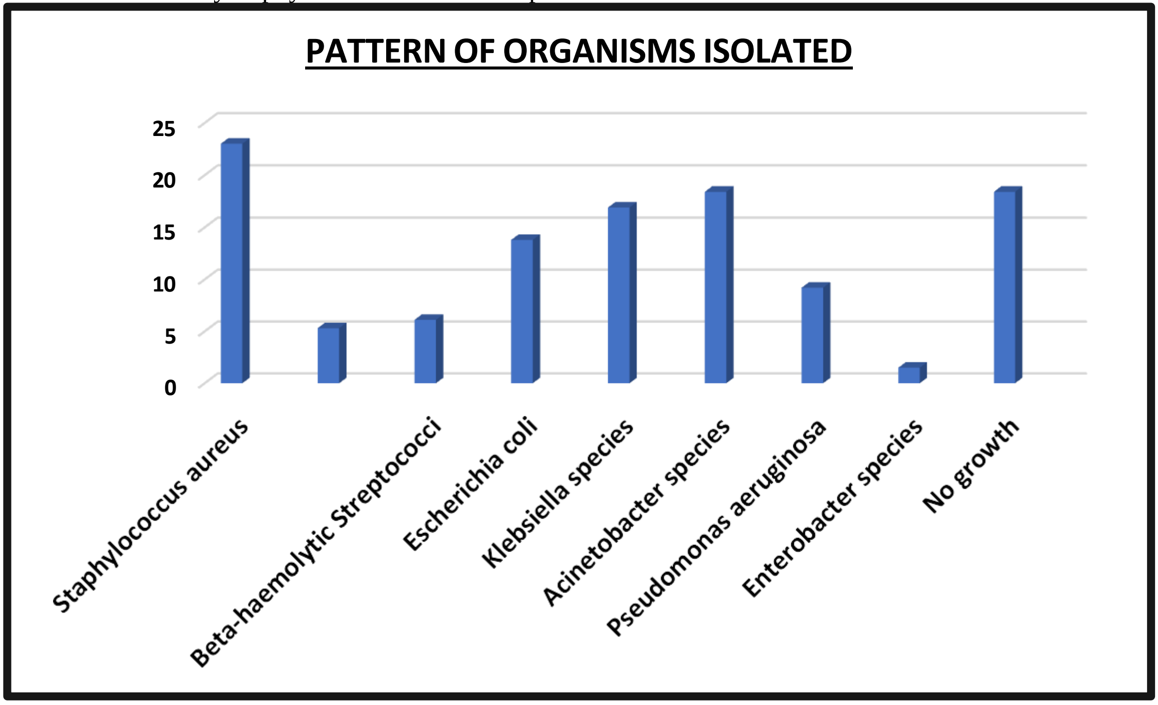


Graph 6: Bar diagram showing detection of SSI and culture positivity.

Table 7: Distribution of pattern of organisms isolated

Pattern of organisms	No. of cases	Percentage
Staphylococcus aureus	24	18.4
Coagulase-negative Staphylococcus	07	5.3
Beta-haemolytic Streptococci	08	6.1
Escherichia coli	20	15.3
Klebsiella species	21	16.1
Acinetobacter species	07	5.3
Pseudomonas aeruginosa	12	9.2
Enterobacter species	02	1.5
No growth	29	22.3
Total	130	99.8%

In our study staphylococcus aureus occupied 18.4% and E .coli note din 15.3% cases



Graph 7: Bar diagram showing pattern of organism isolated

VI. DISCUSSION

6.1 Comparative studies related to Age distribution

The current study's age distribution ranges from 19 to 60 years. The majority of the cases (43.8%) were found in the 19–30 age group. At 34.6%, those aged 31–40 made up the second most common age group. The participants in the research had an average age of 34±16.30 years, with a standard deviation of 16.30 years. Overall, 76.9% of patients had SSI. Patients in the study by Amit Agrawal et al. 130 had an average age of 43.3. Ages ranged from 10 for the youngest patient to 76 for the oldest. A total of 59.5% of the patients were men. A total of 15.7% of cases included SSI. With a linear connection, SSI rose as people became older. The corresponding figures for the age groups of 0–30 and >60 were 10.9% and 43.8%, respectively. Patients' average ages ranged from 46.7 to 50.7 in the study of Seyd Mansour Razavi et al. The mean age was 45 years, and the age group 41-60 years had the highest number of cases (51%) in Darpan Bansal 117et al. With a standard deviation of ±11.15, the mean age is 58.29 years. The age of the patients in the study by Reiye Esayas Mengeshas et al. 127 varied from 15 to 79 years old, with an average of 35.95 ± 19.01 years. A total of 123 bacterial isolates were obtained from 96 out of 128 patients, which is 25% of the total. Out of one hundred patients who had abdominal surgery, fourteen developed an infection, according to Hemanth et al. 132. So, fourteen percent. Infected men make up 18.2% of the population, while infected females make 5,9%. SSI occurs at a rate of 28.6% more often in individuals aged 0–61 years.

6.2 Comparative studies related to Gender distribution

The current research had a male to female ratio of 2:1, with 67.6% being male (88/130) and 32.3% being female (42/130). Culture positive was found to be greater in men than in females, according to the research, however the difference was not statistically significant (p>0.05). Study 127 by Reiye Esayas Mengeshas et al. found similar results in 98 men and 30 women who had clinical signs of postoperative wound infections. When looking at SSI, Amit Agrawal et al. found no evidence that gender had a major role. A ratio of 1.2 males to 1 female was noted by Darpan Bansal et al. There were 144 men and 123 females (57.3% and 42.7%, respectively) in the study by Aroub Alkaaki et al.

6.3 Comparative studies related to surgical site infection

Deep infection was detected in 15.35% (9 instances out of 130) in this investigation. Out of all the patients, 76.9% (100/130) had a superficial infection, whereas only 7.6% (10/130) had an organ space infection. Out of 100 cases studied by Darpan Bansal et al., two cases (33.33% of the total) involved cholecystectomy performed via a right subcostal incision, one case (16.66%) involved prostatectomy via a pfanniestiel incision, one case (16.66%) involved hernioplasty performed through a midline incision, one case (16.66%) involved appendicectomy, and one case (16.66%) involved pyeloplasty. In situations where the operating duration was more than two hours, the SSI was approximately twice as high as in cases where the operating time was 70% and quinolones were 70%. The combination of cefo-sulbactam was sensitive to 42% of the isolates.

Table 8: Comparative studies related to wound distribution

Type of Wound	Seyd Mansour Razavi et al 127	Amit Agrawal et al [130]	Aroub Alkaaki et al 1[23]	Darpan et al 117	Present study
Clean wound	109 (13.6%);	36.%	56(5.4)	41(41%)	37(28.4%)
Clean contaminated wound	214 (26.7%);	10.7%	257 (14.8)	51(51%)	65(50 %)

Contaminated wound	307 (45.8%);	20.3%	24 (58.3)	21(21%)	27(20.8%)
Dirty wounds	112 (14%).	-	--	15(15%)	- -

Of the 130 wounds examined in this research, 37 had no contamination, 50 had some contamination but no contamination at all, and 20.7% had contamination.

When the results were compared to those of other research, they similarly revealed that most instances included clean infected wounds.

6.4 Comparative studies related to risk factors distribution

Among the 130 participants in this research, 10% had a history of hypertension. Among the 130 patients, 3.07% (or 4/130) had a transfusion history. As for chronic kidney disease, 83.8% (109 out of 130) had no prior medical history. Diabetes, hypertension, kidney or liver failure, cancer, febrile condition, heart disease, thyroid disease, blood disease, COPD, convulsion, hyperlipidaemia, immunological disorders, or prior surgery were present in more than half of the patients (403 cases) in the study by Seyd Mansour Razavi et al. 127.

6.5 Comparative studies related to Type of infection

Deep infection was detected in 15.35% (9 instances out of 130) in this investigation. Furthermore, out of 130 patients, 100 had superficial infection and 10 had organ space infection, for a total of 76.9%. The kind of infection is significantly associated with culture positive instances (p<0.01).

Based on their research, Aroub Alkaaki et al. 123 There were 55 individuals diagnosed with SSI; 25 (45%) had superficial infections, 9 (9%), and 25 (45%) had a mix of the two. There was a significant difference in the infection rate between open surgeries (34.8%) and laparoscopic procedures (3.5%) (p < 0.001). Statistically significant with a p-value of less than 0.001, Amit Agrawal et al. found that individuals with a pre-existing distant site infection were more likely to have 130 SSIs (36.4% vs. 13.7% in those without it). An overall ratio of 2.2 was found for superficial to deep SSI in the study by Seyd Mansour Razavi et al. (1). While deep SSI were more prevalent in the dirtier class (50 percent deep and 29.3 percent superficial), superficial SSI were more common in the cleaner class (12.2% superficial SSI and 0 deep SSI in the clean class).

6.6 Comparative studies related to appearance of infection

In this research, 69.2% (90/130) of the patients had an infection at the surgical site within 4 days, whereas 26.9% (35/130) had an infection between 5 and 7 days after surgery. On more than seven days, 3.8% (5/130) of the cases were seen. The detection of SSI and culture positive are significantly associated (p<0.05). Staphylococcus aureus accounted for 18.4% of cases and E. coli for 15.3%. On average, SSI showed up 5.2 days after the first diagnosis in the study by Amit Agrawal et al. The onset of SSI occurred in 14.3% of patients within 1 day after surgery, whereas in 25% it took more than 5 days. When cultures were taken from peritoneal fluid, E. coli was the most often found bacterium at 63.8%. The remaining percentages are as follows: mixed infection 2.1%, Klebsiella 2.1%, Methicillin Resistant Staphylococcus Aureus (MRSA) 4.3%, and sterile culture 27.7%.

6.7 Comparative studies related to growth of the Organisms

The most prevalent organisms found in our investigation were staphylococcus aureus (18.4%), E. coli (15.3%), and coagulase-negative Acinetobacter species 5.3%, Staphylococcus aureus 5.3%, Beta-hemolytic streptococci 6.1%, Klebsiella species 16.1%. In 9.2% of cases, Pseudomonas aeruginosa was found, whereas 1.5% of cases were caused by Enterobacter species. Amit Agrawal et al. 130 found that E. coli was the most frequently isolated bacterium from pus cultures (57.6%). Out of the remaining organisms, 22% were methicillin-resistant Staphylococcus aureus, 3.4% were klebsiella, 1.7% were non-hemolytic staphylococcus, 3.4% were pseudomonas sp., and 6.8% had sterile cultures. The pathogens most frequently implicated in the study by Aroub Alkaaki et al. 123 were gram-negative bacteria, specifically Escherichia coli (26 patients, or 52% of the total), with 16 patients having extended-spectrum β-lactamase producing E. coli. Gram-positive bacteria, with 19 patients, or 38% of the total, and a large number of Acinetobacter baumannii and Pseudomonas were subsequent. Curiously, the percentage of cultivated bacteria that showed sensitivity to the preoperative antibiotic that was administered was just 23%. Of the 127 isolates studied by Reiye Esayas Mengeshas et al., 127 were Gramme negative (52.8% of the total) and 58 were Gramme positive (47.2%). The most common types of bacteria found were 44 (35.77%) S. aureus and 29 (22.76%) Klebsiella species. Out of 96 individuals, 73 (or 76.05%), had a single bacterial isolate, whereas 23 (23.95%) had multiple infections. The most prevalent relationship, with seven instances, was between S. aureus and Proteus species. In addition, there were 6 instances of S. aureus and 5 cases of Klebsiella species associated with C. nasalis (CNS), 2 cases of C. aureus and 2 cases of E. coli, and 1 case of Klebsiella species associated with C. nasalis (CNS). For pre-operative prophylaxis, 41.2% of patients were given cloxacilline, 48.87 percent were given ceftriazone, and 36.12% were given both medications together.

6.7 Comparative studies related to Antibiogram sensitivity

Staphylococcus aureus isolates tested in our research were 91% sensitive to Linezolid and 83% sensitive to vancomycin. Neither Nitrofurantoin nor Norfloxacin worked on them. The antibiotics azithromycin, norfloxacin, and nitrofurantoin did not work on them. Results indicated that meropenem and imipenem were effective against 88% of the 18 Escherichia coli strains tested. gentamycin and amikacin both received 77%. Azithromycin and amoxicillin/clavulanic acid did not work on them.

Ipenem was effective against 81% of Klebsiella species, whereas meropenem was effective against 77%. Azithromycin and amoxicillin/clavulanic acid did not work on them. The sensitivity of Acinetobacter species to imipenem is 85% and to meropenem it is 77%. Azithromycin and amoxicillin/clavulanic acid did not work on them. Ciprofloxacin and ofloxacin were shown to be 83% sensitive against Pseudomonas aeruginosa. imipenem and meropenem were 75% effective. Azithromycin and amoxicillin/clavulanic acid did not work on them. The majority of the gram-negative bacteria (96.2%), as well as all of the gram-negative bacteria (100%) identified in the investigation by Darpan Bansal et al., were susceptible to polymyxin B. Meropenem and azteonam, two relatively new antibiotics, were successful against 50-53% of the isolates tested. A smaller percentage of gram-negative bacteria were sensitive to gentamycin (26%), while over half of all gram-negative bacteria were sensitive to aminoglycoside medicines such amikacin, kanamycin, tobramycin, and nitimycin. Mengeshas, Reiye Esayas, et al. (2013) The Gentamicin sensitivity of the isolated Citrobacter species was 100%, whereas the Ampicillin resistance was 100% (Table 2). The percentage of S. aureus bacteria resistant to tetracycline, ceftriazone, and ampicillin was 90%, whereas the percentage resistant to cloxacilline was 85%. Vancomycin showed sensitivity to all forty (100%) S. aureus isolates. The rate of resistance for CoNS was found to be high for Amoxicillin (88.9%), Amoxicillin-clavulanic acid (77.8%), Ampicillin (77.8%), and Tetracycline (77.8%). Nevertheless, vancomycin was effective against all 18 isolates of COVID-19. The antibiotics amoxicillin, tetracycline, and ceftriazone were all completely ineffective against the various Klebseilla species tested. All of the P. aeruginosa isolates were negative for tetracycline, amoxicillin, ceftriazone, and amoxicillin clavulanate. On the other hand, Gentamicin was effective against every single P. aeruginosa isolate. While 12 out of 15 (80%) Proteusspecies were susceptible to Gentamicin, all fifteen (100%) were resistant to Amoxicillin and Tetracycline. While all six of the isolated E. coli bacteria were susceptible to Gentamicin, they were completely resistant to Amoxicillin-clavulanate, Tetracycline, and Ampicillin.

6.8 Comparative studies related to Type of surgery

The appendectomy constituted 59.2% of the total surgical procedures performed in this research (77 out of 130 patients). Out of 130 cases, 15.5% were cholecystectomy, 16.1% were inguinal hernias, and 17.5% were ventral hernias. There is a very statistically significant difference between the groups in terms of infection rates among individuals who had appendicectomy compared to those who had hernia or cholecystectomy. Elective surgery was performed by 257 individuals (or 76.3% of the total) in the study by Aroub Alkaaki et al. There were 111 laparoscopic cholecystectomy operations (or 32.9% of all surgeries), 67 hernia repairs (or 19.9% of all surgeries), and 56 bariatric surgeries (or 16.6% of all surgeries). Citation: 133 Nicola Petrosillo et al. The incidences of surgical site infections were highest in patients undergoing appendectomy (8.6%), gastric bypass (13.6%), and colon surgery (18.9%). A total of seventeen different abdominal surgical procedures were conducted in the present study by Satyanarayan et al. Of these, appendicectomy, abdominal hysterectomy, caesarean section, and herniorraphy made up 61.2% of the total.

VII. LIMITATIONS OF THE STUDY

Our research had a drawback in that the wound swabs taken from surgical site infections were not cultured for fungal infections or anaerobic bacterial profiles because the necessary resources were not available.

VIII. CONLCUSION

Our hospital's rate of surgical site infections, as well as the bacteriological profile and antibiotic sensitivity pattern of the organisms responsible for these infections, have been better understood thanks to this research.

The data strongly suggested that contamination and clean contamination both increased the risk of surgical site infections compared to clean procedures.

Because SSIs occur at a higher rate in Contaminated operations, proper planning is essential in these situations. Of all the germs found in wounds, Staphylococcus aureus was the most often isolated. The majority of surgical site infections caused by Gram-negative bacilli were caused by Escherichia coli.

IX. SUMMARY

The participants' ages vary from nineteen to sixty-five in this research. Among the 130 cases, 43.8% were found in the 19–30 age group. Next in terms of frequency, the age bracket of 31–40 years old accounted for 34.6% (45 out of 130). The participants in the research had an average age of 34±16.30 years, with a standard deviation of 16.30 years. Of the 130 participants, 67.6% were men and 32.3% were female. Gender ratio: 2 men to 1 woman Of the wounds examined, 76.9% tested positive for bacteria and 23 percent tested negative.

Appendectomy accounted for 77 out of 130 cases, or 59.2% of the total. The following procedures accounted for 11.5% (15/130): cholecystectomy, 16.1% (21/130): inguinal hernia, and roughly 13% (17/130): ventral hernia. Only 38 out of 130 wounds were considered clean, accounting for 28.4 percent. Sixty-five percent (65/130) were free of contaminants. Out of 130 wounds, 27 (20.7%) were found to be infected. With a history of hypertension, 10% (13 out of 130) Among the 130 patients, 3.07% (or 4/130) had a transfusion history. And CKD. Out of 130 participants, 109 (83.8%) reported no previous medical history.

Edible purulent discharge is seen in the vast majority of cases (77%). In 18.4% of instances, Staphylococcus aureus was found, whereas in 15.3%, E. coli was detected. negative for coagulase The following bacteria were found: Staphylococcus, Beta-haemolytic Streptococci, Klebsiella species, Acinetobacter species, and 5.3% other bacteria. Bacteria such as Pseudomonas aeruginosa 9.2% and Enterobacter species 1.5% Linezolid was 91% effective against Staphylococcus aureus while vancomycin was 83% effective against the same strain.

negative for coagulase Linezolid, vancomycin, and cefoxitin had an 85% sensitivity rate against Staphylococcus. The sensitivity rate of beta-haemolytic streptococci to ciprofloxacin was 87%. As much as 75% to Amoxicillin and Clavulanic Acid Results indicated that meropenem and imipenem were effective against 88% of the 18 Escherichia coli strains tested. gentamycin and amikacin both received 77%. Ipenem was effective against 81% of Klebsiella species, whereas meropenem was effective against 77%.

The sensitivity of Acinetobacter species to imipenem is 85% and to meropenem it is 77%. Ciprofloxacin and ofloxacin were shown to be 83% sensitive against Pseudomonas aeruginosa. Ipenem and meropenem were 75% effective.

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