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Prospective Observational Study Of Surgical Site Infections In Obstetrics And Gynaecological Operations In Teaching Hospital

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Abstract:
Background*: Surgical site infections (SSI) are defined as infections occurring upto 30 days after surgery or (upto one year in patients receiving implants) and affecting either the incision or deep tissue at the operative site. SSIs are potential complications associated with any type of surgical procedure. Even though SSIs are among the most preventable hospital acquired infections, they still symbolize a significant burden in terms of patient's morbidity and mortality leading to prolonged hospital stay and increase the patient susceptibility to other nosocomial infections affecting the financial condition of patients. Risk factors for SSIs are grouped as patient related, preoperative or pre pregnancy, intraoperative or intrapartum, and postoperative. SSI causes a substantial risk to patients and financial loses for health system because the multi-factorial causes achieving a measurable and sustained reduction in SSIs. In this context it becomes important to determine the prevalence of SSI, assess the magnitude of problem and provide a rationale to set priorities in infection control in the hospitals.*
Materials and Methods: *The present prospective observational study was conducted on 200 patients in the Department of Obstetrics and gynaecology, at Dr B R Ambedkar Medical College and Hospital for a period of 12 months. Prior to the initiation of the study, Ethical and Research Committee clearance was obtained from Institutional Ethical Committee.*
Results: *There was a significant statistical difference in the incidence of SSIs basing on the body mass index of subjects (pvalue:<0.001). SSI incidence was high in morbidly obese subjects. There was a highly significant statistical difference in the incidence of SSIs basing on the history of previous surgeries of subjects (p-value: <0.0001). SSI incidence was low in subjects with no history of previous surgeries. There was a highly significant statistical difference in the incidence of SSIs basing on the type of surgery (p-value: 0.48). SSI incidence was high in caesarean and low in tubectomy surgeries. There was a significant no statistical difference in the incidence of SSIs basing on the type of incision (p-value: 0.70). There was a highly significant statistical difference in the incidence of SSIs basing on the methods of skin closure (p-value: 0.002). SSI incidence was high in mattress method of skin closure and low in subcuticular method of skin closure. There was a highly significant statistical difference in the incidence of SSIs basing on the class of wound (p-value: 0.00001). SSI incidence was high in dirty wounds and low in clean wounds of skin closure.*
Conclusion: *Although several preoperative risk factors (e.g., age, morbid obesity, ability to pursue a minimally invasive approach, type of gynaecologic surgery, type of incision, methods of skin closure, class of wound) may not be within the surgeon's control, several evidence based interventions can limit the incidence of SSIs.*
Keywords: *Surgical site infection, Incidence, Risk factors.*

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I. Introduction

Surgical site infection (SSI) are defined as infections occurring upto 30 days after surgery or(upto one year in patients receiving implants) and affecting either the incision or deep tissue at the operative site. SSIs are potential complications associated with any type of surgical procedure. Even though SSIs are among the most preventable hospital acquired infections, they still symbolize a significant burden in terms of patient's morbidity and mortality leading to prolonged hospital stay and increase the patient susceptibility to other nosocomial infections affecting the financial condition of patients. Risk factors for SSIs are grouped as patient related, preoperative or pre pregnancy, intraoperative or intrapartum, and postoperative. SSI causes a substantial risk to patients and financial loses for health system because the multi-factorial causes achieving a measurable and sustained reduction in SSIs. In this context it becomes important to determine the prevalence of SSI, assess the magnitude of problem and provide a rationale to set priorities in infection control in the hospitals

II. Material And Method

The present study is a prospective observational Study was carried out in the Department of obstetrics and gynaecology in Dr B R Ambedkar Medical College and Hospital. The study is conducted on 200 patients.

Study design: Prospective observational Study.

Study location: This was tertiary care teaching hospital based study done in Dr B R Ambedkar Medical College and Hospital, Bangalore.

Study duration: The study is carried out for a period of 12 months, i.e., from 1st June 2022 to 30th June 2023.

Sample size: 200 patients.

Inclusion criteria:

1. Patients undergoing elective surgeries.
2. Patients who stayed for at least 5-7 days in the hospital post operatively.
3. Patients willing to give consent.
4. Patients willing to participate.

Exclusion criteria:

1. Patients staying in the hospital for less than 24 hours post operatively.
2. Patients referred from other health care facilities for diagnosis of SSI.
3. Patients with infections associated with minor procedures like episiotomy and stitch site infection.
4. Patients who underwent emergency surgeries.
5. Patients who underwent laparoscopic surgeries.
6. Patients with associated medical disorders, like anaemia, gestational diabetes mellitus, obesity

Statistical analysis

The collected data was entered into Microsoft Excel Worksheet-2010 and data was taken into IBM SPSS Statistic for windows, version 24 (IBM Corp., Armonk, N.Y., USA) software for calculation of frequency, percentage, mean, standard deviation and probability value. Qualitative data was represented in the form of frequency and percentage. Association between qualitative variables was assessed by Chi Square test with continuity correction, fisher's exact test for all 2 x 2 tables, where P value of chi square test was not valid due to small counts. Quantitative data was represented using mean and standard deviation. Analysis of quantitative data within the groups was done using paired t test if data passes 'Normality test'.

One Way Analysis (ANOVA) was used to compare more than two groups. A 'P' value of <0.05 was considered statistically significant.

III. Results

The table 1 gives data on distribution of study subjects based on their socio-economic status.

Majority of the subjects were found in Class III of socio-economic status, i.e., 104 subjects (52%): followed by 84 subjects (42%) in Class IV of socio-economic status; and 12 subjects (6%) in Class II of socio-economic status.

Out of 104 Class III subjects, 13 subjects had SSI and 91 subjects did not.

Out of 84 Class IV subjects, 30 subjects had SSI and 54 subjects did not.

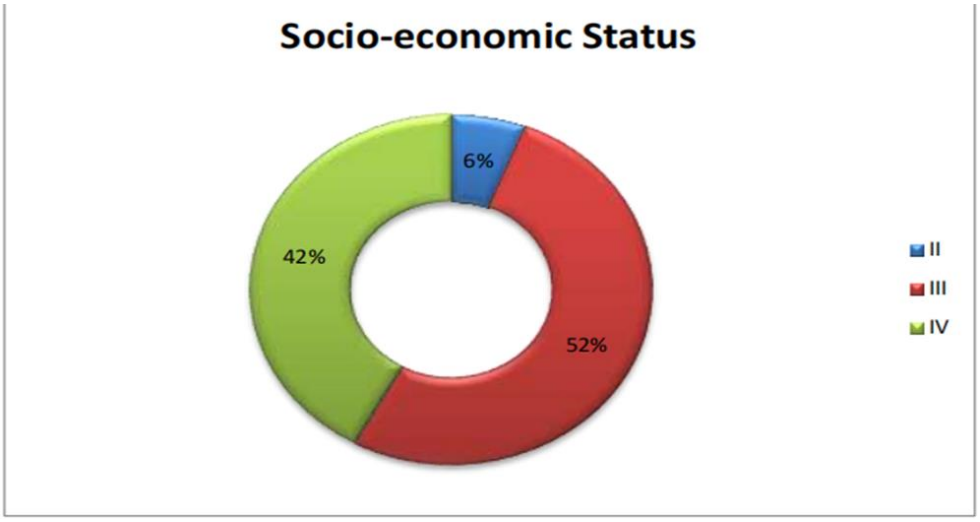
Out of 12 Class II subjects, 9 subjects had SSI and 3 subjects did not.

The p value calculated was <0.0001 indicating a significant statistical difference in the incidence of SSI based on the socio-economic status.

SSI being more common in Class IV socioeconomic than Class II

Table No 01. The following table shows the socio-economic status

SES	Frequency	Percent	SSI present	SSI absent	
II	12	6.0	9	3	
III	104	52.0	13	91	P value- 0.0001
IV	84	42.0	30	54	
Total	200	100.0	52	148	



The table 2 gives data on distribution of study subjects based on their body mass index

Majority of the subjects were found to be Normal in weight, i.e., 96 sujects (48%), followed by 60 overweight sujects (30%); 22 obese subjects (11%); 14 underweight subjects (7%); and 8 morbidly obese subjects (4%).

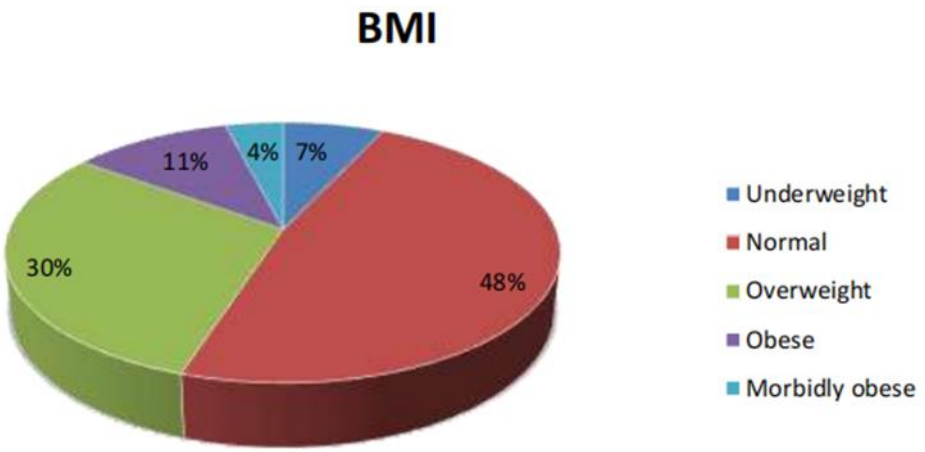
Out of 14 underweight subjects, 6 subjects had SSI and 8 subjects did not.
Out of 96 normal subjects, 16 subjects had SSI and 80 subjects did not.
Out of 60 overweight subjects, 10 subjects had SSI and 50 subjects did not.
Out of 22 obese subjects, 13 subjects had SSI and 9 subjects did not.
Out of 8 morbidly obese subjects, 7 subjects had SSI and 1 subject did not.

The p value calculated was < 0.001indicating a significant statistical difference in the incidence of SSI based on the Body Mass Indices.

SSI incidence was high in Morbidly obese subjects

Table No 02. The following table shows the BMI(kg/m2)

BMI (kg/m2)	Frequency	percent	SSI present	SSI absent	
Underweight	14	7.0	6	8	
Normal	96	48.0	16	80	
Overweight	60	30.0	10	50	Pvalue-0.001
Obese	22	11.0	13	9	
Morbidly obese	8	4.0	7	1	
Total	200	100.0	52	148	



The table 3 gives data on distribution of study subjects based on the history of previous surgeries.

Majority of subjects had history of previous surgeries, i.e., 116 subjects (58%); followed by 84 subjects (42%) who had no previous history of surgery.

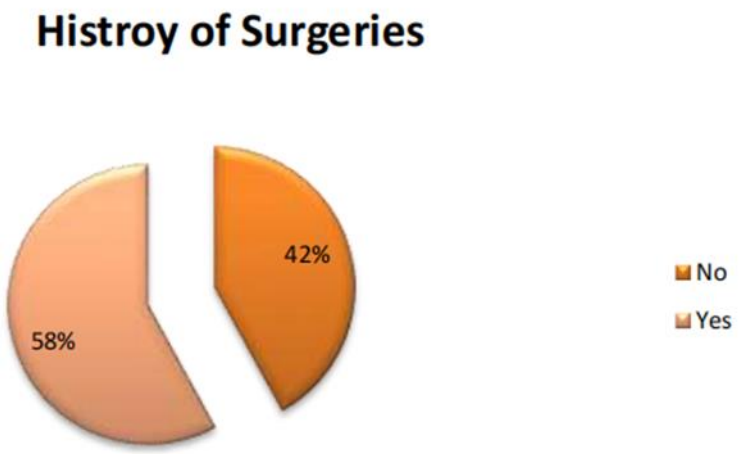
Out of 116 subjects who had previous history of surgery, 46 subjects had SSI and 70 subjects did not.

Out of 84 subjects who did not had previous history of surgery, 6 subjects had SSI and 78 subjects did not.

The p value calculated was < 0.0001 indicating significant difference in the incidence of SSI in subjects with history of previous surgery

Table No 03. The following table shows the history of previous surgeries

History of previous surgeries	Frequency	percent	SSI present	SSI absent	
No	84	42.0	6	78	
Yes	116	58.0	46	70	P value-0.0001
total	200	100.0	52	148	



The table 4 gives data on distribution of study subjects based on the type of surgery.

Majority of subjects had Cesarean section. i.e., 94 subjects (47%); followed by 48 subjects (24%) with hysterectomy; 19 subjects (9.5%) with tubectomy; 16 subjects (8%) with myomectomy; 12 subjects (6%) with laprotomy; 11 subjects (5.5%) with cystectomy .

Out of 94 subjects with cesarean section , 26 subjects had SSI and 68 subjects did not.

Out of 11 subjects with cystectomy, 4 subjects had SSI and 7 subjects did not.

Out of 48 subjects with hysterectomy , 17 subjects had SSI and 31subjects did not.

Out of 12 subjects with laprotomy , 2 subjects had SSI and 10 subjects did not.

Out of 16 subjects with myomectomy , 2 subjects had SSI and 14 subjects did not.

Out of 19 subjects with tubectomy , 1 subject had SSI and 18 subjects did not.

The p value calculated was < 0.489 indicating significant difference in the incidence of SSI based on the type of surgery.

SSI incidence was high in cesarean section and low in tubectomy

Table No 04. The following table shows the type of surgery

Type of surgery	frequency	Percent	SSI present	SSI absent	
Cesarean	94	47.0	26	68	
cystectomy	11	5.5	4	7	
hysterectomy	48	24.0	17	31	
Laparotomy	12	6.0	2	10	P value- 0.048
myomectomy	16	8.0	2	14	
Tubectomy	19	9.5	1	18	
Total	200	100.0	52	148	

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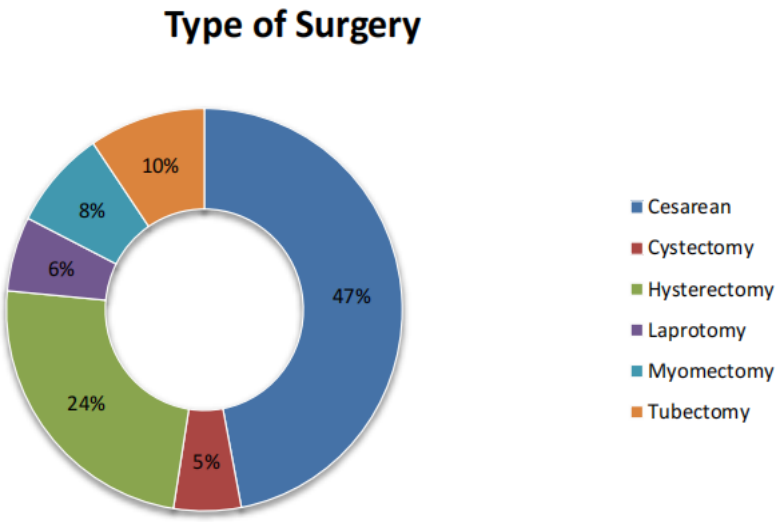


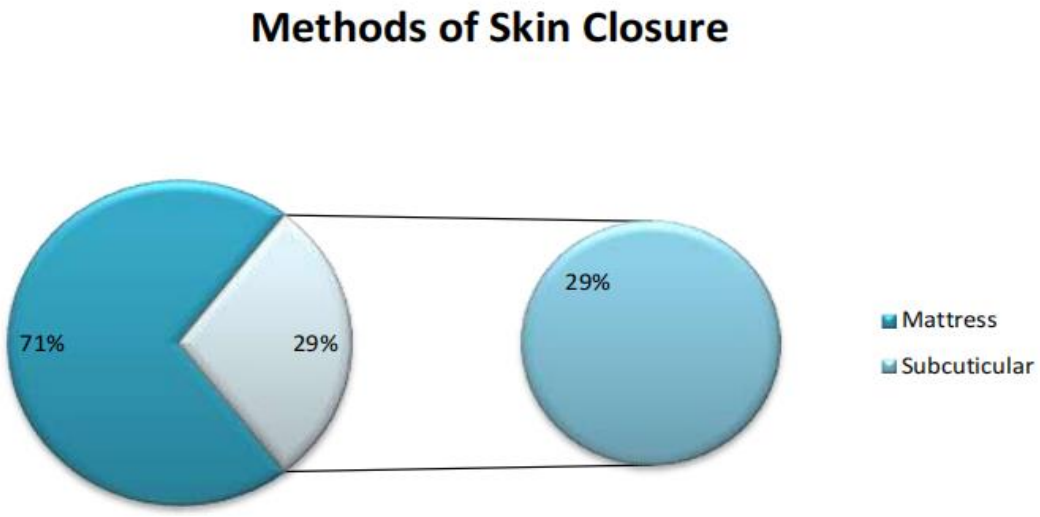
The table 5 gives data on distribution of study subjects based on the methods of skin closure.

Majority of subjects had mattress method of skin closure, i.e., 142 subjects (71%); followed by 58 subjects (29%) had subcuticular closure.

The p value was calculated <0.0002 , showing significant statistical difference in the incidence of SSI based on the method of closure. SSI incidence was high in mattress method of skin closure compared to subcuticular method of closure.

Table No 05. The following table shows the methods of skin closure

Methods of skin closure	Frequency	Percent	SSI Present	SSI absent	
Mattress	142	71.0	25	117	
Subcuticular	58	29.0	27	31	P value-0.0002
total	200	100.0	51	148	



The table 6 gives data on distribution of study subjects based on the class of wound.

Majority of subjects had clean wound i.e., 131 subjects (65.5%); followed by 62 subjects (31%) with clean contaminated wound; 5 subjects (2.5%) with contaminated wound; 2 subjects (1%) with dirty wound.

Out of 2 subjects with dirty wound, 2subjects had SSI

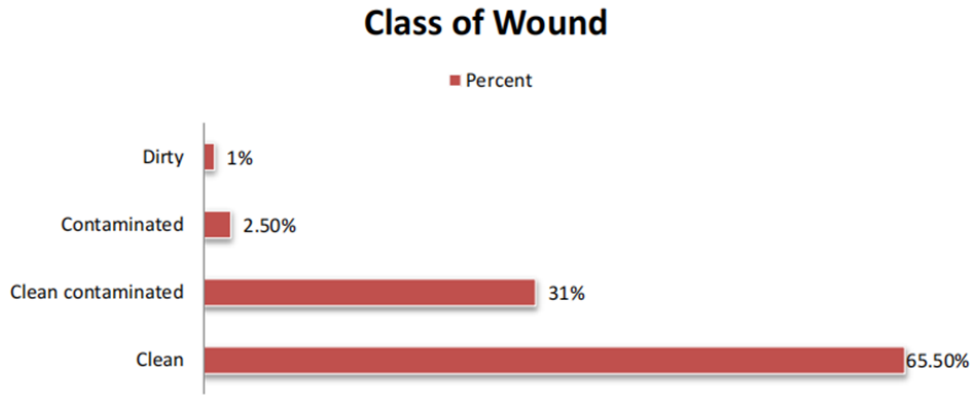
Out of 5 subjects with contaminated wound, 2 subjects had SSI and 3 subjects did not.

Out of 62 subjects with clean contaminated wound, 17 subjects had SSI and 45 subjects did not.
Out of 131 subjects with clean wound, 31 subjects had SSI and 100 subjects did not.

The p value calculated was <0.00001 indicating a high significant statistical difference in the incidence of SSIs based on class of wound. Incidence was high in Dirt wound.

Table No 06. The following table shows the class of wound

Class of wound	frequency	Percent	SSI Present	SSI Absent	
Clean	131		31	100	
Clean contaminated	62		17	45	
Contaminated	5		2	3	P value- 0.00001
Dirty	2		2	0	
total	200		52	148	

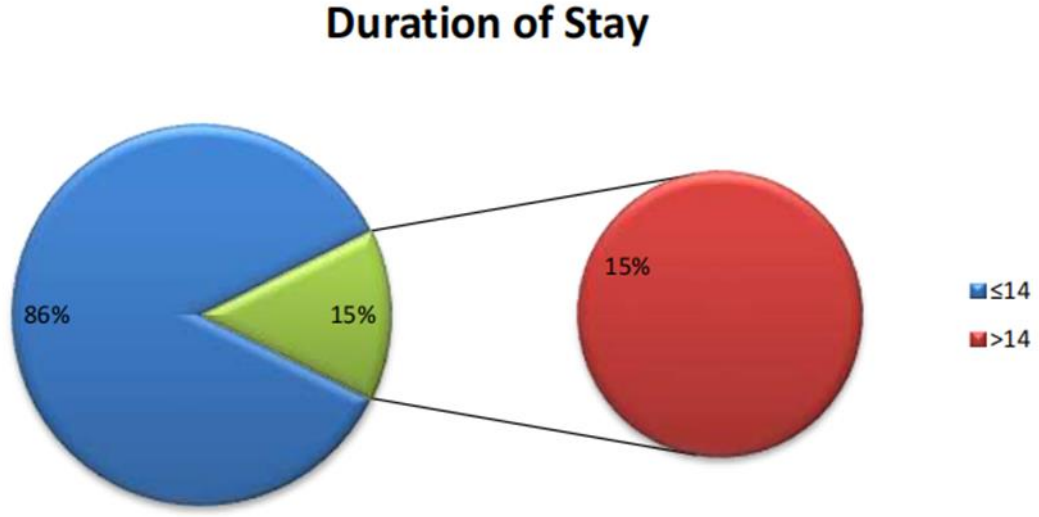


The table 7 gives data on distribution of study subjects based on the duration of stay in hospital.

The p value calculated was < 0.00015, showed significance difference in incidence of SSI in subjects with longer duration of stay.

Table No 07. The following table shows the duration of stay

Duration of stay	frequency	Percent	SSI Present	SSI absent	
</=14	171	85.5	35	136	
>/=14	29	14.5	17	12	P value- 0.00015
total	200	100.0	52	148	



IV. Discussion

The present study summarizes the following points:

· There was no significant statistical difference in the incidence of SSIs basing on the age of subjects (p-value: 0.16).

· There was a significant statistical difference in the incidence of SSIs basing on the socio economic status (p value - <0.0001). SSI incidence was high in Class IV of socioeconomic and incidence was low in Class II.

· There was a significant statistical difference in the incidence of SSIs basing on the body mass index of subjects (p-value: <0.001). SSI incidence was high in morbidly obese subjects.

· There was a highly significant statistical difference in the incidence of SSIs basing on the history of previous surgeries of subjects (p-value: <0.0001). SSI incidence was low in subjects with no history of previous surgeries.

· There was a highly significant statistical difference in the incidence of SSIs basing on the type of surgery of surgeries (p-value: <0.48). SSI incidence was high in cesarean sections and low in tubectomy surgeries.

· There was no significant statistical difference in the incidence of SSIs basing on the duration of surgery.

· There was no significant statistical difference in the incidence of SSIs basing on the type anesthesia. (p-value: <0.89).

· There was no significant statistical difference in the incidence of SSIs basing on the type of incision (p-value: <0.70).85

· There was a highly significant statistical difference in the incidence of SSIs basing on the methods of skin closure (p-value: <0.0002). SSI incidence was high in mattress method of skin closure and low in subcuticular method of skin closure.

· The most common organism isolated is E. coli.

· The most common postop complication observed was gaping.

· There was a highly significant statistical difference in the incidence of SSIs basing on the class of wound (p-value: <0.00001). SSI incidence was high in dirty wounds and low in clean wounds.

· There was significant increase in incidence of SSI with longer duration of stay**.**

V. Conclusion

Research on SSI bundles also indicates that implementation of several evidence-based strategies is likely to have a larger impact than pursuing any single intervention. Interventions clearly supported by the literature include the timely administration of appropriately selected prophylactic antibiotics, use of a chlorhexidine alcohol based prep, use of suture for skin closure, and maintenance of glycemic control in the postoperative period.

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