International Journal of Research and Review
Vol. 9; Issue: 6; June 2022
Website: www.ijrrjournal.com
Original Research Article *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Surgical Site Infections after Cesarean Delivery: Incidence and Assessment of Associated Risk Factors

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DOI: https://doi.org/10.52403/ijrr.20220602

ABSTRACT

Background: Surgical site infection (SSI) after C-section is one of the major concerns of health care providers because it not only increases the overall hospital cost, length of patients' hospital stay but it largely contributes to the mortality and associated morbidity. In this present study, we aimed to expose the associated risk factors of SSI.

Materials and methods: The present study was conducted in the Department of Obstetrics and Gynecology, MMC Kathua, w.e.f September 2019 to August 2020. A total of 394 women patients were included in the study on the basis of laid down inclusion and exclusion criteria. The study was under taken after approval by the institutional Ethical committee.

Results: The incidence of surgical site infection was observed as (11.4%) and average age of studied patients was (31.6±9.38) with most of the patients, accounting for 86.5% were falling in the age interval of (25-35) years followed by 10.7% patients ageing less than 25 years We found that surgical site infection was significantly associated with type of surgery, type of incision and type of suturing.

Conclusion: The present study revealed that surgical site infection is significantly associated with emergency surgery, vertical skin type incision and interrupted suturing. We recommend regular screening and implementation of health education programs to impart knowledge of associated risk factors of SSI that will eventually help the patients to attain optimal health benefits.

Keywords: Caesarean section, surgical site infection, vertical incision, suturing

INTRODUCTION

Surgical site infection after C-section is one of the major concerns of health care providers because it not only increases the overall hospital cost, length of patients' hospital stay but it largely contributes to the mortality and associated morbidity. [1-4] It has been reported that surgical site infection is one of the commonest nosocomial complications following caesarean section, accounting for 38% of overall hospital acquired infections. [5] Cesarean sections have increased drastically worldwide and the associated infectious maternal morbidity has escalated to eight fold rate than normal vaginal deliveries. [6] Depending upon multifarious dimensions like; varying modus of surveillance for the identification of infections, heterogenic women population and in fact the use of prophylaxis antibiotics, the SSI rates post C-section varies from 3 % to 15%. [7-9] It has been reported that expected rate of SSIs range from 6-27% after C-section; however, such rates increase with other risk factors like; gross contamination of the operative site, prolonged and premature rupture of membranes, obstructed labor, prolonged operative time, emergency operations, altered immune status, which are common in resource poor countries. [10] There is no

doubt that cesarean section is carried out in a sterile and hygienic environment but still the likelihood of developing a surgical site infection cannot be ruled out. The occurrence of surgical site infections is not limited to only those patients who have been operated in poor setting hospitals but such post-operative complications can result even in hospitals with sophisticated facilities and standard protocols of preoperative preparation and antibiotic prophylaxis.[11] In order to minimize the plausibility of developing SSI and its associated consequences it is vital to comprehensively understand the factors that vulnerably increase its incidence. Therefore, the present study has been designed to evaluate the magnitude off SSI after cesarean delivery and associated factors among mothers who gave birth through cesarean section.

Statistical Methods

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean±SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar and pie diagrams. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparison of categorical variables. A P-value of less than 0.05 was considered statistically significant.

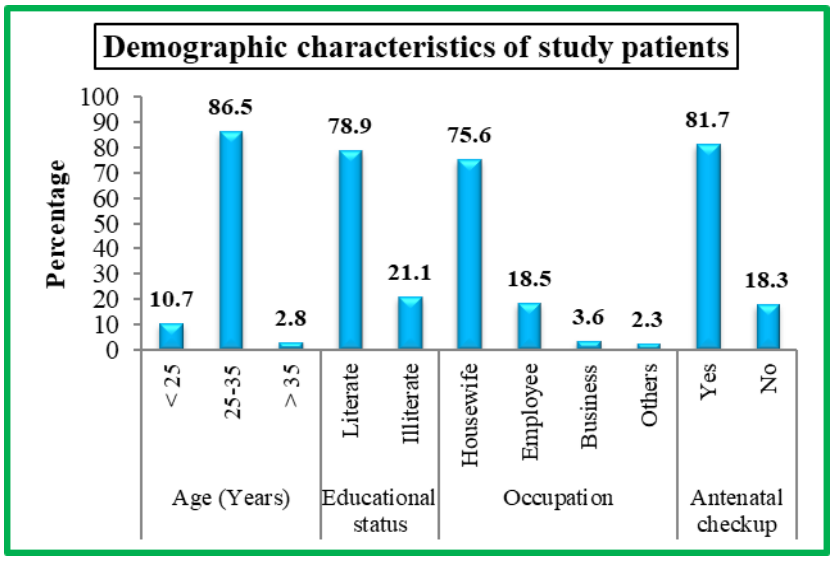
RESULTS

In this section the results of the study will be described in tabular and graphical form

Table 1: Demographic characteristics of study patients

Parameter		Number	Percentage
Age (Years)	< 25	42	10.7
	25-35	341	86.5
	> 35	11	2.8
Educational status	Literate	311	78.9
	Illiterate	83	21.1
Occupation	Housewife	298	75.6
	Employee	73	18.5
	Business	14	3.6
	Others	9	2.3
Antenatal checkup	Yes	322	81.7
	No	72	18.3

Table 1, displays the demographic characteristic of the studied subjects wherein we observe that most of the patients, accounting for 86.5% were falling in the age interval of (25-35) years followed by 10.7% patients ageing less than 25 years.



Majority of patients (78.9%) were literate and only 21.1% were illiterate. In terms of occupational status, majority of patients were housewives (75.6%), followed by (18.5%) patients with employee occupational status. Among the study subjects, around (81.7%) patients had antenatal checkup and (18.3%) had no antenatal checkup.

Table 2: Incidence of surgical site infection among study subjects

Surgical site infection	Number	Percentage
Yes	45	11.4
No	349	88.6
Total	**394**	**100**

The incidence of surgical site infection was around (11.4%) and around (88.6%) patients had no surgical site Infection

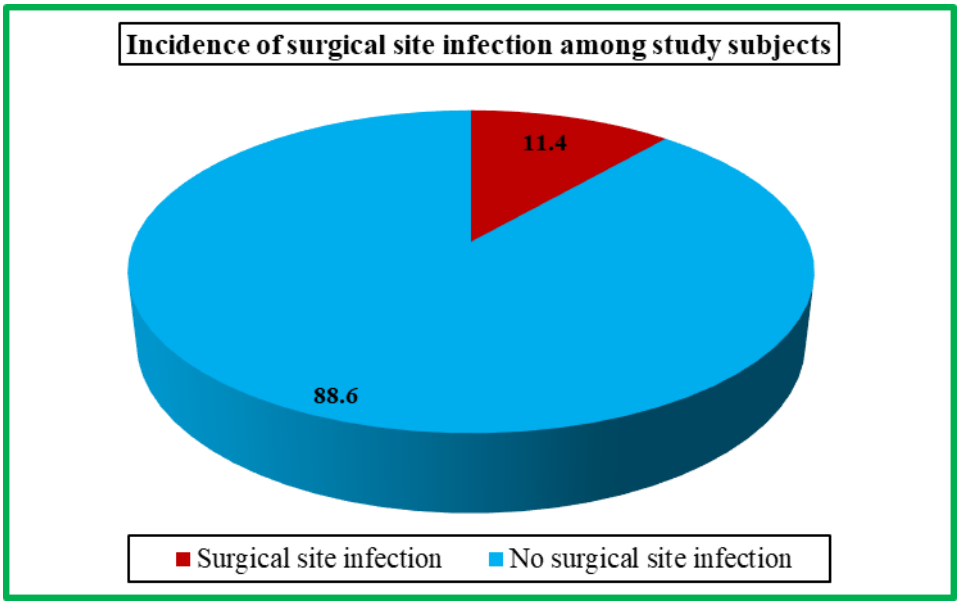
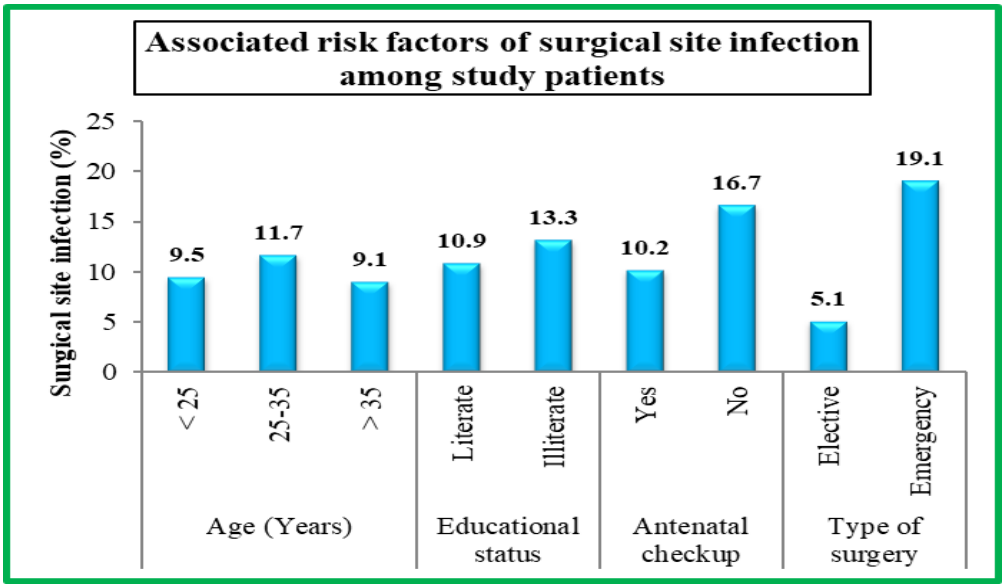


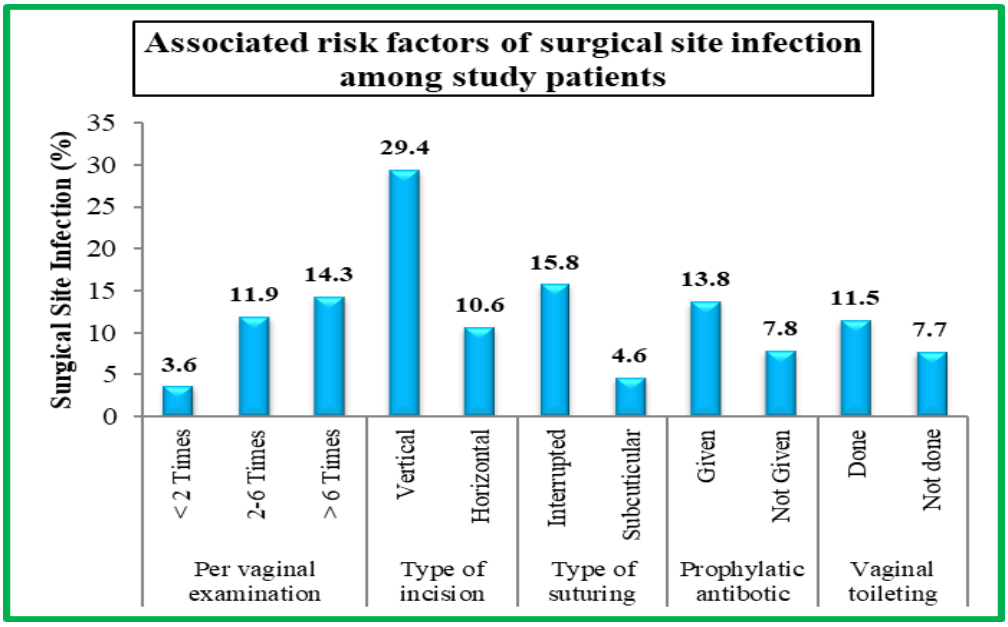
Table 3: Associated risk factors of surgical site infection among study patients

Variable		N	SSI		P-value
			No.	%age	
Age (Years)	< 25	42	4	9.5	0.887
	25-35	341	40	11.7	
	> 35	11	1	9.1	
Educational status	Literate	311	34	10.9	0.554
	Illiterate	83	11	13.3	
Antenatal checkup	Yes	322	33	10.2	0.122
	No	72	12	16.7	
Type of surgery	Elective	216	11	5.1	<0.001*
	Emergency	178	34	19.1	
Per vaginal examination	< 2 Times	28	1	3.6	0.439
	2-6 Times	345	41	11.9	
	> 6 Times	21	3	14.3	
Type of incision	Vertical	17	5	29.4	0.017*
	Horizontal	377	40	10.6	
Type of suturing	Interrupted	241	38	15.8	<0.001*
	Subcuticular	153	7	4.6	
Prophylactic antibiotic	Given	240	33	13.8	0.069
	Not Given	154	12	7.8	
Vaginal toileting	Done	355	41	11.5	0.467
	Not done	39	3	7.7	

*Statistically Significant Difference (P-value<0.05)

We analyzed the association of surgical site infection with possible risk factors like; age, educational status, antenatal checkup etc. We observe that surgical site infection was significantly associated with type of surgery, type of incision and type of suturing. However, we did not find any association of surgical site infection with age, education status, antenatal checkup, per vaginal examination, prophylactic antibiotic and vaginal toileting





DISCUSSION

Surgical site infection is the commonly faced problem among pregnant women post cesarean section. The present study was objectively conducted to expose the associated risk factors of SSIs. We thoroughly analyzed patient's data on the basis of socio-demographic characteristics, clinical aspects, histological and radiological features, type of surgery, type of incision, type of suturing, per vaginal examination and etc. We observed that the average age of studied patients was (31.6±9.38) years with majority of the patients, accounting for 86.5% were falling in the age interval of (25-35) years, followed by 10.7% patients aging less than 25 years of age. In a likewise study by Zenjnullahu et al and Dada et al, the mean age of such type of patients was respectively reported as 31 years and 31.36 years, both are in consonance with our results. [12, 13]However, Ketema et al. reported the mean age of patients who underwent for CS as 27.4 years which is slightly smaller to what we observed.[14] The commonest age group of CS patients reported by Ismail et and Gelaw et al was (20-34) years which is comparable with our study.[15,16] In the present study, majority of patients (78.9%) were literate and only 21.1% were illiterate. And in terms of occupational status,

majority of patients were housewives (75.6%), followed by (18.5%) patients with employee as occupational status. Among the study subjects, around (81.7%) patients had antenatal checkup and (18.3%) had no antenatal checkup. Contemporary to our results, Shrestha et al reported 92% literacy rate and 8% were illiteracy rate among likewise patients, they reported higher proportion of patients with antenatal attendance (97.7% vs. 81.7%). [17] In the present study, the incidence of surgical site infection was around (11.4%) while as (88.6%) patients had no surgical site Infection. The incidence of SSI has been reported varyingly in the literature, ranging from 3% to 15%. For instance, Shreshtha et al, Onuzo et al, and Johnson et al reported the incidence of SSI post cesarean section as 12.8%, 12.6% and 11.2% respectively; these results are comparable with our results. [17-19] However, Ezechi reported the incidence of SSI following CS as (9.3%), and even much lower incidences were reported from Oman, Brazil and Israel ranging from (1.4–3.7%).[20-23] In the present study, we assessed the association of surgical site infection with possible risk factors like; age, educational status, antenatal checkup etc. After rigorous statistical examination, we found that surgical site infection is significantly associated with type of surgery, type of incision and type of suturing. However, we did not find any association of surgical site infection with age, education status, antenatal checkup, per vaginal examination, prophylactic antibiotic and vaginal toileting. We observed that the risk of developing SSI after C-section was significantly influenced by type of surgery; patients who underwent emergency surgery had higher likelihood of developing SSI compared to patients who had elective surgery (19.1% vs 5.1%). We found that patients with vertical type of incision had higher risk of developing SSI compared to patients who had horizontal incision (29.4% vs 10.6%). And patients who had interrupted type of suturing had larger propensity of developing SSI compared to patients with subcuticular type of suturing. The associated risk factors of SSI observed in the present study are in conformity with the risk factors reported by Shrestha et al who document in their study that emergency surgery, vertical skin incision and interrupted skin suturing are significantly associated with the development of SSI.[17] However, unlike to our study, they reported that membrane rupture before surgery is also significantly associated with SSI.[17] Similar to our results, De et al and Mpogoro et al also reported in their study that vertical type of incision increases the plausibility of developing SSI by 3.6 folds in comparison to those patients who had horizontal incision.[24, 25] Shrestha et al reported in their study that SSI is commonly observed among patients employed with interrupted suturing compared to intracutaneous suturing (78% vs 22%).[17] In a comprehensive comparative hospital report in UK, it was reported that the incidence of SSI was lowest among patients who had continuous suture which is consistent with our study.[26] The proportion of patients with subcuticular suture was significantly lower compared to patients who had interrupted suture (4.6% vs. 15.8%). Likewise to our study, subcuticular sutures have been reported to be ascribed with lower incidence of SSI. We assessed the role of prophylactic antibiotics and found that 33 patients out of 240 (13.8%) developed SSI who received antibiotic prophylaxis for CS compared to 12/154 (7.8%) patients, however, the association was statistically insignificant with a p-value of 0.069 which is comparable with the study of Zejnullahu et al.[12] The administration of prophylaxis antibiotic for more than 24 hrs after surgery did not revealed any significant protection, hence prolonged use of antibiotics should not be encouraged as it could lead to microbial resistance without yielding any substantial effect on the reduction of the incidence of SSIs

CONCLUSION

Surgical site infection post cesarean section is the commonest problem among

women seen in tertiary care hospitals. The present study revealed that surgical site infection is significantly associated with emergency surgery, vertical skin type incision and interrupted suturing. We recommend regular screening and implementation of health education programs to impart knowledge of associated risk factors of SSI that will eventually help the patients to attain optimal health benefits.

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

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How to cite this article: Shilpa Gupta, Nishu Priya, Harish Gupta. Surgical site infections after cesarean delivery: incidence and assessment of associated risk factors. *International Journal of Research and Review*. 2022; 9(6): 11-17.
DOI: *https://doi.org/10.52403/ijrr.20220602*

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