

Prevention of Post Operative Infection in Obese Women Undergoing Emergency LSCS: Role of Surgical Bundle and Vaginal Cleaning, A Prospective Randomised Interventional Study

Dr. Shailan P Hanchinal¹, Dr. Veerendra Kumar CM², Dr. Aparna Prakash³, Dr. Vinutha V⁴

¹Postgraduate, Department of Obstetrics and Gynaecology, Ballari Medical College and Research Centre, Ballari

²Professor and HOD, Department of Obstetrics and Gynaecology, Ballari Medical College and Research Centre, Ballari

³Postgraduate, Department of Obstetrics and Gynaecology, Ballari Medical College and Research Centre, Ballari

⁴Postgraduate, Department of Obstetrics and Gynaecology, Ballari Medical College and Research Centre, Ballari

Abstract: ***Background:** Surgical site infections (SSIs) are a common complication following lower segment cesarean section (LSCS), particularly in obese women. This study aimed to evaluate the efficacy of a surgical bundle and vaginal cleaning in reducing post-operative infections in obese women undergoing emergency LSCS. **Objectives:** To assess the role of a surgical bundle with vaginal cleaning, in preventing SSIs in obese women undergoing emergency LSCS. **Method:** A prospective, randomized interventional study conducted at the Department of Obstetrics and Gynaecology, Ballari Institute of Medical Sciences and Research center, Ballari, (formerly VIMS) over a 6 - month period. A total of 100 women undergoing emergency LSCS with a BMI > 30 kg/m² were included. The participants were randomized into two groups: **Intervention Group** (n=50) received the surgical bundle and vaginal cleaning. **Control Group** (n=50) received only surgical bundle without vaginal cleaning. Participants were randomly assigned to either the intervention or control group. Data on demographics, duration of hospital stay, and post - operative wound conditions were collected and analyzed. The primary outcome was the incidence of SSIs, assessed using the Southampton criteria. **Results:** The intervention group had a significantly shorter hospital stay (4.34 days vs.6.40 days, $p = 0.000001$) and fewer post - operative wound complications, including elevated temperature ($p = 0.016$), redness ($p = 0.037$), wound discharge ($p = 0.004$), and wound dehiscence ($p = 0.042$). Edema, Pain and need for analgesia did not differ significantly between the groups. **Conclusion:** The application of a surgical bundle and vaginal cleaning significantly reduced the incidence of SSIs in obese women undergoing emergency LSCS. The interventions also led to a shorter duration of hospital stay, suggesting that these practices should be adopted to improve outcomes in high - risk patients.*

Keywords: Surgical site infections, LSCS, cesarean section, surgical bundle, vaginal cleaning, obesity, post - operative infections

1. Introduction

Cesarean sections (CS) are among the most commonly performed surgical procedures globally, accounting for significant maternal and neonatal outcomes. One of the key risks associated with cesarean deliveries, particularly in obese women, is the development of post - operative infections, specifically surgical site infections (SSIs) [1]. Obesity, defined by a body mass index (BMI) greater than 30 kg/m², is a well - documented risk factor for both surgical and obstetric complications, contributing to prolonged recovery times, extended hospital stays, and higher morbidity and mortality rates [2].

Post - operative infections following cesarean sections can lead to significant complications, including sepsis, wound dehiscence, prolonged hospitalization, and increased healthcare costs. Infections in obese patients are particularly concerning, as the excess adipose tissue is poorly perfused, reducing the delivery of antibiotics and immune cells to the surgical site, thereby increasing the susceptibility to infection [3]. The depth of the incision in obese women may contribute to a higher risk of wound infection, as the larger surface area and deeper tissue layers provide more opportunities for bacterial contamination [4,5].

Several interventions have been proposed to reduce the incidence of SSIs in surgical patients. The concept of surgical care bundles has gained significant attention as an evidence - based approach to minimizing infection rates [6]. For cesarean sections, particularly in obese women, a comprehensive surgical bundle could include preoperative antibiotics, appropriate skin antisepsis, maintenance of normothermia, and sterile surgical techniques [7].

In recent years, the role of vaginal cleaning with antiseptic solutions prior to cesarean delivery has gained attention as a potential strategy for further reducing infection risk, particularly in obese women. Vaginal cleaning, typically performed with povidone - iodine, reduces the bacterial load in the vaginal canal, which can be a source of infection during cesarean delivery [6,7].

1) Study Design

This was a prospective, randomized interventional study, conducted in the Department of Obstetrics and Gynaecology at Ballari Institute of Medical Sciences and research center, Ballari, (formerly VIMS) which is a tertiary care center over a six - month period, from 01/08/2023 to 31/01/2024 with sample size of 100 participants. Eligible participants were recruited based on random sampling. Women were assigned

to either the intervention or control group through block randomization,

2) Participants - Inclusion and Exclusion Criteria

Participants included women undergoing emergency LSCS with a BMI greater than 30 kg/m². Women with a history of allergies to antimicrobial agents, pre-existing infections (e.g., chorioamnionitis), or requiring dose adjustments of antibiotics due to chronic renal or liver disease were excluded. Additionally, any patients who had undergone a prior surgical procedure within a month were not eligible for inclusion.

3) Study Groups

The participants were divided into two groups: Group A (Intervention Group), which received both the surgical bundle and vaginal cleaning, and Group B (Control Group), which followed surgical bundle without vaginal cleaning. The surgical bundle included preoperative antibiotics, maintaining normothermia, skin antisepsis, and use of sterile drapes and instruments, which is also the standard preoperative care in the institution.

4) Study Parameters and data collection

The occurrence of SSIs post-operatively was the primary outcome, categorized by the Southampton criteria to measure infection severity. Data were collected from patient records and clinical observations. Infection rates, both superficial and deep, were documented according to the Southampton criteria

5) Study Procedure

In Group A, patients received the surgical bundle along with vaginal cleaning using antiseptic solution, performed immediately before the cesarean section. Group B followed surgical bundle without additional vaginal cleaning. Follow-up was conducted during hospital stay and at post-operative visits to assess infection rates, wound healing, and any

related complications. Demographic data and relevant clinical details were also recorded.

6) Data Analysis

The collected data were entered into SPSS version 21.0 software for statistical analysis. The chi-square test was used to assess differences in infection rates between the intervention and control groups, with a p-value of less than 0.05 considered statistically significant. Descriptive statistics were used to summarize demographic and clinical characteristics.

7) Ethical Considerations

Ethical approval for the study was obtained from the institutional ethics committee at Ballari Institute of Medical Sciences and Research center. Written informed consent was acquired from all participants before their inclusion in the study. The privacy and confidentiality of the participants were maintained throughout the research, and no harm was posed by the interventions used.

2. Data Analysis

Demographic Profile of the Respondent (Age, Height, Weight, BMI)

The demographic profile shows the comparison of age, height, weight, and BMI between the intervention and control groups. The mean age in the intervention group was 26.38 years compared to 25.66 years in the control group, with no statistically significant difference (p = 0.704). Similarly, the mean height and weight of the two groups showed no significant difference (p = 0.495 and p = 0.242, respectively). The BMI of both groups was almost identical, with no significant difference (p = 0.205). These results indicate that the demographic characteristics of both groups were comparable.

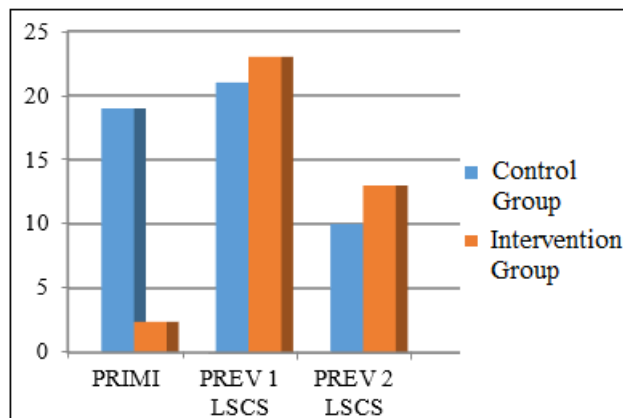
Demographic Profile of Respondents

	GROUP	N	Mean	Std. Deviation	F	Sig.
Age (Years)	Intervention group	50	26.38	2.329	0.145	0.704
	Control Group	50	25.66	2.144		
BMI KG/M2	Intervention group	50	33.3726	3.07007	1.625	0.205
	Control Group	50	33.5428	3.58290		

Gravida Status of Participants

The gravida status of the participants was compared between the control and intervention groups. The most common category was Multigravida with prev 1 LSCS, accounting for 44% of the total participants, while categories such as Primigravida (33%) and Multigravida with prev 2 LSCS (23%) were also common. The Pearson chi-square test showed no statistically significant difference between the groups (p = 0.589), indicating that both groups had a similar distribution of gravida status.

GRAVIDA	GROUP		Total
	Control Group	Intervention group	
PRIMI	19	14	33
MULTI (PREV 1 LSCS)	21	23	44
MULTI (PREV 2 LSCS)	10	13	23
TOTAL	50	50	100

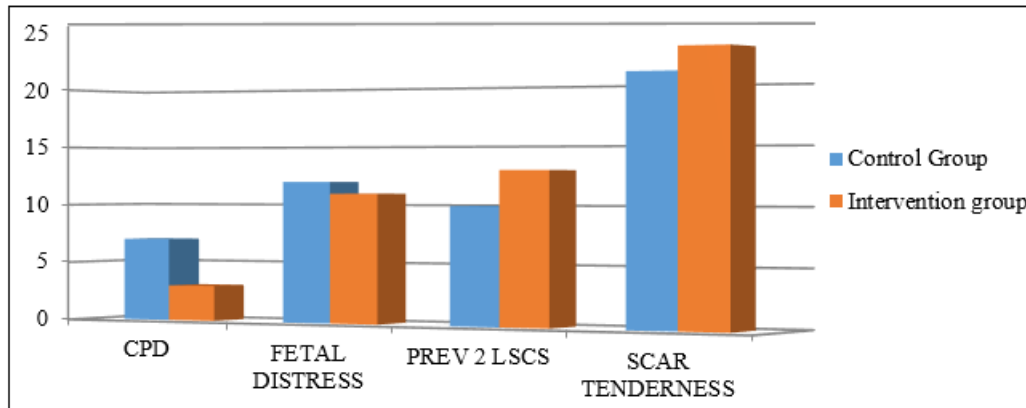


Indications for Cesarean Section

The comparison of indications for cesarean section, including CPD, fetal distress, previous two LSCS, and scar tenderness, revealed no significant difference between the

intervention and control groups ($p = 0.547$). Scar tenderness was the most common indication, representing 44% of cases, followed by fetal distress (23%) and previous two LSCS (23%). The even distribution of indications ensures that both groups had similar clinical backgrounds for undergoing LSCS.

Indication	GROUP		Total
	Control Group	Intervention group	
CPD	7	3	10
FETAL DISTRESS	12	11	23
PREV 2 LSCS	10	13	23
SCAR TENDERNESS	21	23	44
Total	50	50	100
Pearson chi - square = 2.126, p - value = 0.547			



Duration of Hospital Stay

The duration of hospital stay was significantly shorter in the intervention group (4.34 days) compared to the control

group (6.40 days, $p = 0.000001$), suggesting that the intervention may have contributed to faster recovery.

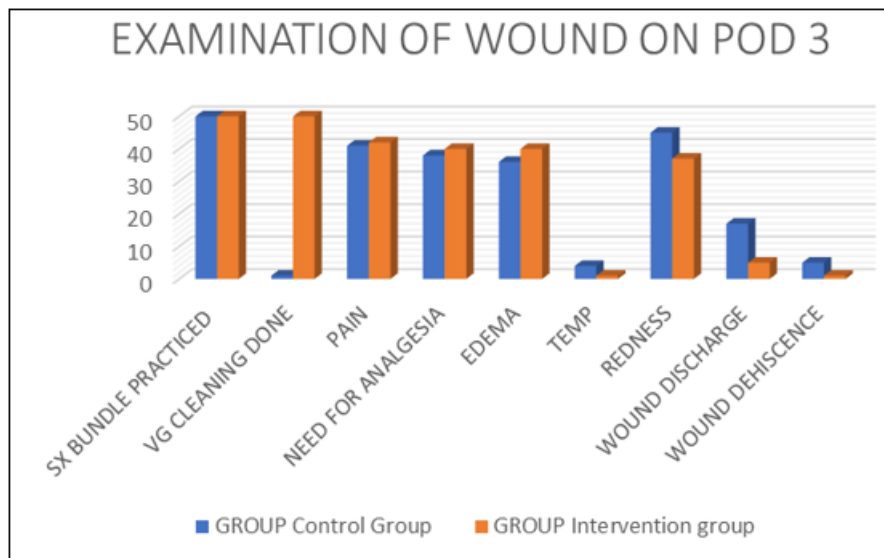
	Group	N	Mean	Std. Deviation	F	Sig.
Duration of hospital stay	Intervention group	50	4.34	1.319	15.924	0.000001
	Control Group	50	6.40	2.893		

Examination of Wound on POD 3

On the third postoperative day, wound examination results showed significant differences between the groups. There was a significant reduction in local rise of temperature ($p = 0.016$), redness ($p = 0.037$), wound discharge ($p = 0.004$), and wound dehiscence ($p = 0.042$) in the intervention group.

Pain and the need for analgesia and edema were similar between the two groups. These findings suggest that the surgical bundle, combined with vaginal cleaning, contributed to a significant reduction in wound complications.

Examination of Wound on POD 3	Group		Total	P value
	Control Group	Intervention group		
SX BUNDLE PRACTICED	50	50	100	
VG CLEANING DONE	00	50	50	0.000
PAIN	41	42	83	0.790
NEED FOR ANALGESIA	38	40	78	0.629
EDEMA	36	40	76	0.513
TEMP	4	1	5	0.016
REDNESS	45	37	82	0.037
WOUND DISCHARGE	17	5	22	0.004
WOUND DEHISCENCE	5	1	6	0.042



3. Discussion

The present study aimed to evaluate the efficacy of a surgical bundle and vaginal cleaning in reducing post-operative infections in obese women undergoing emergency lower segment cesarean section (LSCS). Obesity is a well-known risk factor for surgical site infections (SSIs), and cesarean sections are associated with a higher incidence of post-operative complications. The results of this prospective randomized interventional study provide valuable insights into the benefits of applying a standardized surgical bundle and preoperative vaginal cleaning in reducing infection rates and improving patient outcomes.

Demographic Characteristics

The demographic data of the participants showed no statistically significant differences between the intervention and control groups. The mean age in the intervention group was 26.38 years, while the control group had a mean age of 25.66 years, with a p -value of 0.704, indicating comparability between the groups. Similarly, BMI, a critical factor for assessing obesity, was also similar between the two groups (33.37 kg/m² in the intervention group vs. 33.54 kg/m² in the control group, $p = 0.205$). These results demonstrate that both groups were well-matched in terms of demographic characteristics, ensuring that differences in outcomes could be attributed to the intervention rather than underlying disparities in patient profiles.

Gravida and Indication for Cesarean Section

The gravida status of the participants was comparable between the two groups, as indicated by the Pearson chi-square test ($p = 0.589$). The most common gravida status in both groups was G2P1L1, accounting for 44% of the participants. Additionally, the indications for cesarean section, including cephalopelvic disproportion (CPD), fetal distress, previous two LSCS, and scar tenderness, were evenly distributed between the groups ($p = 0.547$). Scar tenderness was the most common indication for LSCS, observed in 44% of cases. These findings suggest that both groups had similar clinical indications for undergoing LSCS, ensuring the validity of comparisons between the intervention and control groups.

Duration of Hospital Stay

One of the most significant findings of this study was the difference in the duration of hospital stay between the two groups. The mean duration of hospital stay in the intervention group was 4.34 days, compared to 6.40 days in the control group ($p = 0.00001$). This substantial reduction in hospital stay indicates that the surgical bundle and vaginal cleaning contributed to faster recovery and fewer complications. The shorter hospital stay also suggests a lower burden of post-operative infections and other complications, supporting the efficacy of the interventions.

Post - Operative Wound Examination on Post - Operative Day (POD) 3

The wound examination on POD 3 revealed several important differences between the intervention and control groups. The most notable difference was in the practice of vaginal cleaning, which was performed in 50 participants in the intervention group ($p = 0.000$). This significant disparity highlights the effectiveness of vaginal cleaning as part of the surgical bundle in preventing infections.

Pain, need for analgesia and edema were similar between the two groups, with no statistically significant differences ($p = 0.790$, $p = 0.629$ and $p = 0.513$, respectively). However, there were significant reductions in other post-operative complications in the intervention group. For example, the intervention group had significantly fewer cases of elevated temperature (1 vs. 4, $p = 0.016$), redness (37 vs. 45, $p = 0.037$), wound discharge (5 vs. 17, $p = 0.004$), and wound dehiscence (1 vs. 5, $p = 0.042$) compared to the control group. These findings strongly suggest that the surgical bundle, particularly when combined with vaginal cleaning, effectively reduces the incidence of post-operative wound complications.

Overall Effectiveness of the Surgical Bundle and Vaginal Cleaning

The results of this study demonstrate that the application of a surgical bundle, combined with vaginal cleaning, significantly reduced the incidence of SSIs and other post-operative complications in obese women undergoing emergency LSCS. The significant reduction in hospital stay, along with the lower incidence of wound-related

complications such as wound discharge and wound dehiscence, highlights the potential benefits of implementing these interventions as part of routine clinical practice. Obesity is a known risk factor for surgical complications, and the results of this study underscore the importance of targeted interventions to reduce these risks in obese women undergoing emergency cesarean sections. The findings align with previous studies, such as those by Nagori et al. (2021) and Al - Kharabsheh et al. (2021), which have demonstrated the efficacy of similar interventions in reducing infection rates and improving post - operative outcomes.

4. Conclusion

In conclusion, the surgical bundle and vaginal cleaning significantly improved post - operative outcomes in obese women undergoing emergency LSCS. The interventions led to a reduction in SSIs, shorter hospital stays, and fewer wound complications, all of which are critical to improving patient outcomes and reducing healthcare costs. These findings support the broader implementation of such interventions in clinical practice, particularly for high - risk populations such as obese patients. Further research may explore the long - term benefits and cost - effectiveness of these interventions, as well as their applicability to other surgical procedures.

References

- [1] Nagori A, Khanam D, Shaheen S, Rizvi M. Prevention of post - operative infections in emergency cesarean sections: Role of surgical bundle and vaginal cleaning. *PARIPEX Indian Journal of Research*.2021. doi: 10.36106/PARIPEX/4200167
 - [2] Kawakita T, Landy H. Surgical site infections after cesarean delivery: epidemiology, prevention and treatment. *Maternal Health, Neonatology and Perinatology*.2017; 3. doi: 10.1186/s40748 - 017 - 0051 - 3
 - [3] Pellegrini J, Toledo P, Soper D, Bradford W, Cruz D, Levy B, et al. Consensus Bundle on Prevention of Surgical Site Infections After Major Gynecologic Surgery. *Obstetrics &Gynecology*.2017. doi: 10.1097/AOG.0000000000001751
 - [4] Nguyen J, Sadeghi M, Gien L, Covens A, Kupets R, Nathens A, et al. Impact of a preventive bundle to reduce surgical site infections in gynecologic oncology. *Gynecologic Oncology*.2019; 152: 480 - 5. doi: 10.1016/j. ygyno.2018.09.008
 - [5] Saeed K, Corcoran P, O'Riordan M, Greene R. Risk factors for surgical site infection after cesarean delivery: A case-control study. *AJIC (American Journal of Infection Control)*.2019; 47: 164 - 9. doi: 10.1016/j. ajic.2018.07.023
 - [6] Duff P. Prevention of infection after cesarean delivery. *Clinical Obstetrics and Gynecology*.2019; 62: 758 - 70. doi: 10.1097/GRF.0000000000000460
 - [7] Chouhan A. Surgical site infections in obstetrics and gynaecology. *The Indian Practitioner*.2019; 72: 21 - 7.
 - [8] Verma P, Chawla D, Khatri R. Incidence of post - operative (cesarean section) infectious morbidities in cleansing and non - cleansing group after povidone iodine vaginal cleaning. *International Journal of*
- Reproduction, Contraception, Obstetrics and Gynecology.2021. doi: 10.18203/2320 - 1770. ijrcog20213457
- [9] Ugadu I, Egede J, Nwigboji W. Pre - operative vs. post - operative vaginal cleansing with povidone - iodine and post - caesarean infectious morbidity. *Journal of the West African College of Surgeons*.2022; 12: 64 - 74. doi: 10.4103/jwas. jwas_159_22