

# Vaginal Cleansing with Povidone Iodine before Elective Caesarean Section at Benha University Hospitals

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## ABSTRACT

**Background:** With a rate of 51.8%, caesarean section is the most frequent major surgical surgery in Egypt, putting Egypt in the third place with the highest Caesarean Section (CS) rate, world widely.

**Objective:** To assess if using povidone iodine in vaginal cleansing during elective caesarean section affect infectious morbidity.

**Methods:** This prospective case control study was performed on 140 pregnant women scheduled to deliver with elective CS aged 20 -35 years old. Women were split equally into 2 groups; group (I): included pregnant women receiving vaginal cleansing prior to caesarean section and group (II): included pregnant women receiving routine care as a control group (standard care). All included cases were subjected to full history taking, general, abdominal and local examination. All patients received preoperative antibiotic according to our department protocol just before skin incision.

**Results:** Our findings reported that 4 (5.71%) patients in group I and 15 (21.43%) patients in group II had fever, 3 (4.29%) patients in group I and 13 (18.57%) patients in group II had endometritis, and 2 (2.86%) patients in group I and 10 (14.29%) patients in group II had wound infection, revealing significantly higher fever incidence, wound infection and endometritis in group II compared to group I ( $P=0.012$ ,  $0.014$ , and  $0.03$  respectively). Incidence of allergy or irritation was insignificantly different between the studied groups ( $P> 0.097$ ).

**Conclusions:** Using povidone iodine as a vaginal cleansing instantly prior elective CS substantially decreases post-CS endometritis, wound infection and fever rates.

**Keywords:** Vaginal cleansing; Povidone iodine; Elective; Caesarean section; Surgical site infection.

## INTRODUCTION

With a rate of 51.8%, caesarean section is the most frequent major surgical surgery in Egypt, putting Egypt in the third place with the highest CS rate, world widely [1,2]. Although CS may be a crucial and lifesaving procedure, if conducted without medical justifications, it can place mothers and newborns at an undue risk for short- and long-term health concerns [3]. Caesarean section is one of the main abdominal procedures associated with medical dangers to the woman's health, such as bleeding, need for transfusion, damage to other organs, and infections [4,5].

Similar to any other surgical operation, CS is associated with infection-related morbidity, including endometritis and surgical site infection (SSI) [6]. It has been stated that caesarean section is associated with a tenfold greater risk of infection than vaginal birth. In addition, increased infection rates have been seen in women with ruptured membranes and those who get a CS during labour [7].

Infections of this kind impose an extra strain not only on the mother, but also on the infant and her family as a whole. Additionally, it raises the risk of hospital readmissions and the expense to health care systems worldwide [8]. Diverse antiseptics have been used inconsistently for skin preparation and vaginal toileting in an effort to limit the incidence of post-CS infections. It has been established that vaginal pre-treatment with povidone iodine or chlorhexidine solution, as opposed

to washing with saline or without cleansing before to CS, lowers the incidence of post-CS infection [9].

The invention describes a povidone iodine containing the following ingredients: 10 to 50 percent polyvinyl pyrrolidone k30, 2.34 to 11.44 % iodine, 1.17 to 5.72 % potassium iodide, 5 to 45 % n-propanol as a solvent, 0.01 to 10 % of a stability auxiliary agent, and the remainder water. The invention also describes a technique for preparing povidone iodine [10].

There is substantial evidence in the medical literature that preoperative vaginal sterilisation with povidone iodine reduces the incidence of postoperative infection morbidity during CS delivery. However, current data on the efficacy of such a measure on post-care infectious morbidity are inconclusive, since some researchers have found no significant impact [11]. While previous studies have found a considerable decrease in post-caesarean infections with the use of povidone-iodine solution, some other studies did not find such a decrease [12, 13].

The purpose of this study was to evaluate if vaginal cleansing with povidone iodine during elective caesarean section affect infectious morbidity.

## PATIENTS AND METHODS

This prospective case control study was performed on 140 pregnant women scheduled to deliver with elective caesarean section aged 20 -35 years old, at Benha University Hospitals from June 2023 to June 2024. A documented informed consent was received from the patient or the patient's family.

Exclusion criteria were emergency caesarean section, premature rupture of membranes, morbidly obese women and those with pre-existing medical conditions,

including diabetes, hypertension, anaemia, and cardiac disease.

#### **Grouping:**

*Women were divided equally into 2 groups:*

**Group (I):** 70 pregnant women were given an antiseptic povidone iodine solution 10 percent 30 seconds before skin incision with sponge sticks prior to caesarean section, using a sponge 5\*5 cm soaked with povidone iodine to cleanse the vagina from upward at the cervix to the external genitalia for 1 minute including vaginal fornices in addition to the traditional care.

**Group (II):** consisted of 70 pregnant women in control group receiving routine care (standard care) apart from cleansing vagina with povidone iodine according to the hospital protocol.

All included cases were subjected to full history taking to exclude any medical disorder or any exclusion criteria (maternal demographic details were recorded along with the indication of caesarean section). Also, general, abdominal, and local examination were recorded. All patients received preoperative antibiotic according to our department protocol just before skin incision.

#### **The traditional preoperative care for the study group:**

The typical preoperative treatment included a scrape of the abdomen skin, which consisted of the following steps: After anaesthetizing the pregnant patient and placing the Foley's catheter, the scrubbed surgeon performed an abdominal scrub consisting of a vigorous massage of the abdominal incision region with sterile gauze soaked in a povidone iodine 10 percent solution. To ensure the region was free of dirt, perspiration, and skin bacteria. Another sterile gauze was used to massage the disinfected skin for one to two minutes. A prophylactic intravenous antibiotic was administered prior to the incision of the skin. Normal dosage is 1 gramme of cefotaxime. After that, the caesarean section was performed as a lower portion incision with no intervention beyond the standard care.

#### **Outcomes:**

Primary outcome: Endometritis is often characterised by fever, uterine fundal pain, or purulent lochia necessitating antibiotic treatment.

Secondary outcome: Postpartum fever was classified as a temperature higher than 38 degrees Celsius. We exclude moms suffering from fever owing to other causes, such as pregnancy complications (mastitis, breast engorgement and phlebitis) [14]. Wound infection was characterised as erythema, pain, and purulent discharge from the incision site, with or without fever, necessitating the administration of antibiotics [15]. Side effects of drug used as allergy or irritation were recorded.

#### **Sample size calculations:**

The sample size was determined using version 3.1.9.2 of the G\*power programme based on a research by **Guzman et al.** [16], who revealed post-caesarean endometritis of 2.5% and 16.3% in the vaginal preparation and control groups, respectively. The total sample size was 140 females (70 in each group). Alpha error and power were adjusted at 0.05 and 0.8, respectively.

#### **Ethical consideration:**

**This study received ethical approval from the Institutional Review Board, Faculty of Medicine, Benha University (Approval code: Rc 6-8-2023). All participants provided written informed consents. The study followed the ethical principles set in the Declaration of Helsinki by the World Medical Association for research involving human beings.**

#### **Statistical analysis**

Statistical analysis was performed using SPSS v26 (IBM Inc., Armonk, NY, USA). Quantitative parameters were expressed as mean  $\pm$  standard deviation (SD) along with the range, and a comparison between the two groups was conducted using an unpaired Student's t-test and Mann-Whitney test. Categorical variables were illustrated as frequencies and percentages (%) and were assessed using the Chi-square test or Fisher's exact test as suitable. A significance level of less than 0.05, in a two-tailed context, was deemed statistically significant.

#### **RESULTS**

Regarding sociodemographic characteristics, our findings reported no substantial difference in age, sex, height, weight, BMI, residence, education, and occupation between the studied groups (Table 1).

**Table 1: Comparison of sociodemographic characteristics of women between the study groups**

		Group I (n = 70)	Group II (n = 70)	P value
Age (years)	Mean ± SD	27.5 ± 4.92	27.9 ± 4.36	0.599
	Range	20 - 35	21 - 35	
Height (m)	Mean ± SD	1.6 ± 0.07	1.6 ± 0.07	0.574
	Range	1.5 - 1.72	1.5 - 1.72	
Weight (Kg)	Mean ± SD	65.2 ± 5.56	65.6 ± 5.82	0.668
	Range	55 - 75	55 - 75	
BMI (Kg/m <sup>2</sup> )	Mean ± SD	25.2 ± 3.03	25.2 ± 3.05	1.000
	Range	19.61 - 33.33	19.94 - 32	
Residence	Urban	41 (58.57%)	39 (55.71%)	0.733
	Rural	29 (41.43%)	31 (44.29%)	
Education	Illiterate	18 (25.71%)	11 (15.71%)	0.270
	Primary school	19 (27.14%)	29 (41.43%)	
	Secondary school	20 (28.57%)	18 (25.71%)	
	University	13 (18.57%)	12 (17.14%)	
Occupation	Working	25 (35.71%)	29 (41.43%)	0.487
	Not working	45 (64.29%)	41 (58.57%)	

Data are presented as mean ± SD, and range or frequency (%). BMI: Body mass index.

Regarding obstetric history, our findings reported no significant difference in parity, gravidity, and gestational age between the studied groups (Table 2).

**Table 2: Comparison of the obstetric history of women between the study groups**

		Group I (n = 70)	Group II (n = 70)	P value
Parity	1	17 (24.29%)	24 (34.29%)	0.327
	2	27 (38.57%)	20 (28.57%)	
	3	26 (37.14%)	26 (37.14%)	
	Mean ± SD	2.1 ± 0.78	2 ± 0.85	0.469
Gravidity	Range	1 - 3	1 - 3	0.418
	Mean ± SD	2.2 ± 0.8	2.1 ± 0.87	
	Range	1 - 3	1 - 3	
Gestational age (weeks)	Mean ± SD	38.5 ± 1.03	38.4 ± 1.2	0.763
	Range	37 - 40	37 - 40	

Data are presented as mean ± SD, and range or frequency (%).

Regarding caesarean section duration and hospital stay duration, our findings reported no substantial change among the studied groups (Table 3).

**Table 3: Comparison of caesarean section duration and hospital stay duration between the study groups**

		Group I (n = 70)	Group II (n = 70)	P value
CS duration (min)	Mean ± SD	37.8 ± 4.06	37.6 ± 4.38	0.704
	Range	30 - 45	30 - 45	
Hospital stay (Days)	Mean ± SD	1.4 ± 0.5	1.5 ± 0.5	0.240
	Range	1 - 2	1 - 2	

Data are presented as mean ± SD, and range.

Regarding post-caesarean section outcomes, our findings reported significantly higher fever, endometritis, and wound infection incidence in group II compared to group I. Incidence of allergy or irritation was insignificantly different among the studied groups (Table 4).

**Table 4: Comparison of post-caesarean section outcomes between the study groups**

		Group I (n = 70)	Group II (n = 70)	P value
Fever	Yes	4 (5.71%)	15 (21.43%)	0.012*
	No	66 (94.29%)	55 (78.57%)	
Endometritis	Yes	3 (4.29%)	13 (18.57%)	0.015*
	No	67 (95.71%)	57 (81.43%)	
Wound infection	Yes	2 (2.86%)	10 (14.29%)	0.03*
	No	68 (97.14%)	60 (85.71%)	
allergy or irritation	Yes	2 (2.86%)	8 (11.43%)	0.097
	No	68 (97.14%)	62 (88.57%)	

Data are presented as frequency (%). \*: statistically significant

## DISCUSSION

Postpartum morbidities such wound infection and endometritis further complicate the caesarean section procedure. Such morbidities result in pain and distress, as well as a delay in resuming normal function [17]. Endometritis is often caused by cervicovaginal microorganisms climbing from the upper genital canal [18]. These microorganisms are responsible for antibiotic prophylaxis failure after caesarean births. In addition, certain preventive antibiotic regimens are ineffective, and following surgical prophylaxis, resistant organisms may colonise the vagina [19].

The practice of employing preoperative vaginal cleansing is not a recent development; it dates back to the early 1970s when it was routinely utilized before procedures such as caesarean sections and abdominal hysterectomies. This approach has been demonstrated to be linked with reduced postoperative infection rates. Moreover, studies have confirmed a significant reduction, by at least 98%, in vaginal bacterial counts through the use of povidone iodine solution [20].

There are several ways to reduce the risk of infection. These include antiseptic vaginal douching on the morning before operation, antiseptic wipes, sponges, etc. with any form of antiseptic solution (povidone iodine, chlorhexidine, etc.). Vaginal cleaning is a simple, risk-free, and flawless technique that may be performed before to abdominal scrub [21].

We purposed to assess povidone iodine efficacy in vaginal cleansing during elective caesarean section against infectious morbidity.

We discovered that washing the vagina with an antiseptic povidone-iodine solution before a caesarean section lowered the incidence of postpartum morbidity, such as fever, wound infection, and endometritis. This result validated the study's hypothesis that women who receive vaginal preparation with an antiseptic solution (povidone-iodine) prior to caesarean section would have decreased postpartum morbidity [22].

The findings of a prior research indicated that the general characteristics of the study participants, such as age, pregnancy status, and parity, did not vary significantly between the control and study groups [23]. This minor difference between the two groups' general and obstetric features data was consistent with earlier research [24,25].

Regarding postoperative fever, there was a statistically substantial change among the study groups.

These results were in accordance with **Hayat et al.** [24] who studied vaginal cleaning impact prior caesarean delivery to decrease postpartum infection and post caesarean section and discovered that the control group show a statistically significant rise in temperature compared to the study group, and that vaginal cleaning with povidone iodine solution reduced the probability of post-caesarean endometritis from 8.3% in control

groups to 4.3% in cleansing groups. Moreover, **Tewfik, et al.** [26], who studied preoperative vaginal preparation with povidone iodine vs chlorhexidine solutions for endometritis prophylaxis in elective caesarean section. They found there was a statistically substantial change among the study groups.

Additionally, **Marzouk et al.** [27] reported that endometritis rate was considerably lower in the study group compared to the usual care group (2.2% vs. 10.1%, respectively;  $2 = 4.75$ ,  $p = 0.029$ ), although the decrease in febrile morbidity and surgical site infection rates was not statistically significant. This result corroborated **Soliman et al.** hypothesis [23], that women who receive vaginal preparation with an antiseptic solution (povidone-iodine) prior to caesarean delivery will have less postpartum infections.

**Ahmed et al.** [28] research results demonstrated that, the use of povidone-iodine before to caesarean section was associated with a statistically significant decrease in post-CS fever, endometritis, and wound infection compared to the control group ( $p < 0.05$ ). These results may be attributable to the fact that vaginal cleaning reduces several kinds of vaginal bacteria, which rise from the vagina and first populate the deepest layer of the endometrial cavity, resulting in post-CS infections. Consistent with these results, a study by **Aref** [11] examining the impact of povidone iodine used in preoperative vaginal washing on post-CS infectious morbidity, found that endometritis incidence was significantly reduced in the intervention group.

In the same line, **Kanza** [29] has reported that before CS, vaginal cleansing with povidone-iodine dramatically decreased postoperative fever. In contrast, the results of this research were inconsistent with those of **Bağlı et al.** [30], who studied the impact of 10 percent povidone-iodine vaginal disinfection on the incidence of endometritis in pregnant women receiving elective CS. They have found that vaginal cleaning with povidone-iodine prior to elective CS does not lower endometritis rates after CS appreciably.

In the contralateral side of the river, a study by **Barat et al.** [31] was performed to detect preoperative vaginal preparation impact with povidone-iodine on post-CS infections. They discovered that there were no substantial changes in postoperative wound infection, fever and endometritis among the study groups. The discrepancies in post-CS infection rates between their research and other studies may be attributable to a variety of variables, such as the method of vaginal washing or the quantity of antiseptic solution used, wound closure procedures, and the kind and dosage of post-CS antibiotics [32]. In addition, variances in sanitary practises and vaginal colonisation by a range of bacteria in various cultures and groups may have contributed to these disparities. These variables may affect the risk of post-CS infections in women [33-35].

## CONCLUSIONS

Using povidone iodine as a vaginal cleansing instantly prior elective CS substantially decreases post-CS endometritis, wound infection and fever rates.

A simple, cost-effective preoperative vaginal washing approach should be used by nurses before to elective CS, and it should be included into normal hospital treatment to lower the incidence of post-CS infections. There is a need for bigger, multicentre trials with higher sample sizes.

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- **Conflict of Interest:** Nil

## REFERENCES

1. **Al Rifai R (2017):** Trend of caesarean deliveries in Egypt and its associated factors: evidence from national surveys, 2005-2014. *BMC Pregnancy Childbirth*, 17:417-23.
2. **Jadoon B, Assar T, Nucier A et al. (2020):** Analysis of the caesarean section rate using the 10-Group Robson classification at Benha University Hospital, Egypt. *Women Birth*, 33:105-10.
3. **Sandall J, Tribe R, Avery L et al. (2018):** Short-term and long-term effects of caesarean section on the health of women and children. *Lancet*, 392:1349-57.
4. **Akhter H, Sen S, Talukder R et al. (2020):** Assessment of indications and complications of caesarean section in a private medical college hospital of Bangladesh. *Mymensingh Med J.*, 29:756-63.
5. **Larsson C, Djuvfelt E, Lindam A et al. (2021):** Surgical complications after caesarean section: A population-based cohort study. *PLoS One*, 16:258-63.
6. **Zejnnullahu V, Isjanovska R, Sejfiija Z et al. (2019):** Surgical site infections after caesarean sections at the University Clinical Center of Kosovo: rates, microbiological profile and risk factors. *BMC Infect Dis.*, 19:752-8.
7. **Farid-Mojtahedi M, Sepidarkish M, Almkhtar M et al. (2023):** Global incidence of surgical site infections following caesarean section: a systematic review and meta-analysis. *J Hosp Infect.*, 139:82-92.
8. **Carshon-Marsh R, Squire J, Kamara K et al. (2022):** Incidence of surgical site infection and use of antibiotics among patients who underwent caesarean section and herniorrhaphy at a regional referral hospital, Sierra Leone. *Int J Environ Res Public Health*, 19:50-6.
9. **Trivedi M, Robinson M, Islam M (2022):** Effect of vaginal antiseptic prior to caesarean section on the rate of post-caesarean complications: a blinded randomised controlled trial. *Trials*, 23:231-9.
10. **Barreto R, Barrois B, Lambert J et al. (2020):** Addressing the challenges in antisepsis: focus on povidone iodine. *Int J Antimicrob Agents*, 56:106-13.
11. **Aref N (2019):** Vaginal cleansing prior to caesarian section: To do or not to do?: A randomized trial. *J Gynecol Obstet Hum Reprod.*, 48:65-8.
12. **Haas D, Morgan S, Contreras K et al. (2020):** Vaginal preparation with antiseptic solution before caesarean section for preventing postoperative infections. *Cochrane Database Syst Rev.*, 4:78-83.
13. **Liu G, Liang J, Bai L et al. (2023):** Different methods of vaginal preparation before caesarean delivery to prevent postoperative infection: a systematic review and network meta-analysis. *Am J Obstet Gynecol MFM.*, 5:100-9.
14. **Ngunyi Y, Halle-Ekane G, Tendongfor N et al. (2020):** Determinants and aetiologies of postpartum pyrexia; a retrospective analysis in a tertiary health facility in the Littoral Region of Cameroon. *BMC Pregnancy Childbirth*, 20:167-75.
15. **Zuarez-Easton S, Zafran N, Garmi G et al. (2017):** Postcaesarean wound infection: prevalence, impact, prevention, and management challenges. *Int J Womens Health*, 9:81-8.
16. **Guzman A, Prien D, Blann W (2002):** Post-caesarean related infection and vaginal preparation with povidone-iodine revisited. *Prim Care Update Ob Gyns.*, 9:206-9.
17. **Kuhr K, Axelsson P, Andersen B et al. (2022):** Postoperative infections after non-elective caesarean section - a retrospective cohort study of prevalence and risk factors at a single center in Denmark administering prophylactic antibiotics after cord clamping. *BMC Pregnancy Childbirth*, 22:945-53.
18. **Rouse C, Eckert L, Muñoz F et al. (2019):** Postpartum endometritis and infection following incomplete or complete abortion: Case definition & guidelines for data collection, analysis, and presentation of maternal immunization safety data. *Vaccine*, 37:7585-95.
19. **Williams M, Do Valle C, Gyte G (2021):** Different classes of antibiotics given to women routinely for preventing infection at caesarean section. doi: 10.1002/14651858.CD008726.
20. **Haas D, Morgan S, Contreras K et al. (2018):** Vaginal preparation with antiseptic solution before caesarean section for preventing postoperative infections. <https://pubmed.ncbi.nlm.nih.gov/20238357>
21. **Kumari A, Suri J, Bharti R et al. (2023):** Preoperative vaginal cleansing with chlorhexidine and cetrimide solution for reduction of postoperative infectious morbidity at a tertiary care center in North India: A prospective cohort study. *Int J Gynaecol Obstet.*, 70:6.
22. **El Sharkawy S, Amin M, Mansy A (2022):** A study of the effect of preoperative vaginal antiseptic on occurrence of postoperative infection in caesarean section. *EBWHJ.*, 12:278-83.
23. **Mohamed S, Faheem A, Ali H (2021):** Effect of vaginal cleansing with povidone iodine solution before caesarean section on postoperative endometritis infection. *Egypt J Health Care*, 12:630-43.
24. **Hayat M, Inas A, Mohamed E et al. (2014):** Vaginal cleaning before caesarean delivery to reduce post caesarean section & postpartum infection. *Egyptian J Nurs.*, 35:75-80.
25. **Mohamed H, Hassan S, Hemida R (2015):** Vaginal preparation with antiseptic solution before caesarean section for reducing post partum morbidity. *OSR-JNHS.*, 4:75-80.
26. **Tewfik H, Ibrahim A, Hanafi S et al. (2015):** Preoperative vaginal preparation using povidone iodine versus chlorhexidine solutions in prevention of endometritis in elective caesarean section. *Int J Curr Microbiol App Sci.*, 4:486-92.
27. **Marzouk T, Emarah H, Zaitoun M (2019):** Effect of preoperative vaginal cleansing using chlorhexidine antiseptic on post-caesarean section infectious morbidity. *Clin Nurs Stud.*, 7:107-14.

28. **Ahmed A, El-Kurdy R, M Dwedar L (2022):** Effect of pre-elective caesarean section vaginal cleansing using povidone-iodine versus chlorhexidine on the incidence of post-caesarean infections. *Egypt J Health Care*, 13:864-74.
29. **Kanza D (2021):** The effect of vaginal cleansing performed with normal saline solution or povidone-iodine before elective caesarean section on postoperative maternal morbidity and infection; A prospective randomized controlled study. *Marmara Med J.*, 34:33-9.
30. **Bağlı İ, Ege S, Bademkiran H et al. (2021):** The effect of vaginal disinfection on reducing post-caesarean endometritis: A prospective, randomised controlled trial. *J Gynecol Obstet Hum Reprod.*, 50:101-8.
31. **Barat S, Bouzari Z, Ghanbarpour A et al. (2016):** Impact of preoperative vaginal preparation with povidone iodine on post caesarean infection. *Caspian J Reprod Med.*, 2:1-7.
32. **Li L, Cui H (2021):** The risk factors and care measures of surgical site infection after caesarean section in China: a retrospective analysis. *BMC Surg.*, 21:248-56.
33. **Gadeer R, Baatiah N, Alageel N et al. (2020):** Incidence and risk factors of wound infection in women who underwent caesarean section in 2014 at King Abdulaziz Medical City, Jeddah. *Cureus*, 12:121-9.
34. **Bizuayew H, Abebe H, Mulu G et al. (2021):** Post-caesarean section surgical site infection and associated factors in East Gojjam zone primary hospitals, Amhara region, North West Ethiopia, 2020. *PLoS One*, 16:261-9.
35. **Regmi A, Ojha N, Singh M et al. (2022):** Risk factors associated with surgical site infection following caesarean section in tertiary care hospital, Nepal. *Int J Reprod Med.*, 2022:44-56.