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Effect of Preoperative Vaginal Cleansing to Reduce Post Caesarean Infection

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Abstract: **preoperative vaginal wash with povidone iodine reduced the vaginal bacteria up to 98% which can in turn reduce ascending bacteria from the vagina to the uterus end reduce post cesarean infection . The purpose of the study was to assess effect of preoperative vaginal cleansing to reduce post caesarean infection. Methods: A quasi-experimental design was utilized. Sample: A convenience sample of 162 pregnant women in the full term pregnancy. Setting: The study was carried out at Menoufia University Hospital at Shebin El-Kom and Menouf General Hospital at menouf. Instruments: An interviewing questionnaire, maternal assessment tool, cesarean examination tool, follow up assessment tool. Results: There was a statistically significant reduction in postoperative infection in the study group compared to the control group. Conclusion: preoperative vaginal cleansing with povidion iodine is effective in the reduction of post cesarean infection. Recommendations: Preoperative vaginal preparation with antiseptic solution should be incorporated as an essential part of routine preoperative care before cesarean delivery**

Keywords: **Preoperative, Vaginal Cleansing, Post Cesarean Infection.**

1. INTRODUCTION

Cesarean delivery is currently one of the most common surgical procedures performed by obstetricians. Despite the WHO recommendation that CS rate should not exceed 10%-15% of all deliveries (WHO, 2015), the rate in USA reaches 32.9%, while in Egypt it reaches 51, 8 % of all deliveries (El Zanaty and association, 2015). In fact, cesarean delivery is the most significant risk factor for postpartum infection (Tikkanen et al., 2013). Postpartum infection has been shown to be eight-folds higher after surgical delivery than after normal delivery. The most common post CS maternal infectious morbidity involve any febrile morbidity resulting from a surgical site infection (SSI), endometritis or sepsis (Conroy et al., 2012).

Postpartum surgical site infection (SSI), wound infection and endometritis result in prolonged hospital stays and increased financial burden to the health care system. Surgical site infection complicate a significant number of patients who undergo cesarean delivery 2-7% will experience sound infections and 2-16% will develop endometritis. The most recognized risk factors for developing post caesarean infectious morbidity included repeated vaginal examinations, prolonged rupture of membranes, prolonged labor and failure to use prophylactic antibiotics. Other reported risk factors are nulliparity, younger age, and use of internal monitors in labor, intra partum bacterial vaginosis and presence of immuno-compromised state such as diabetes mellitus, anemia or obesity (Kawakita & Landy, 2017).

Traditionally, povidone iodine (PVP-I) has been the most common antiseptic agent used for skin preparation (Huang, et al., 2018). Vaginal cleansing with povidone iodine is an additional intervention that has been shown to decrease post cesarean endometritis. A Cochrane review and a recent meta-analysis established that the subgroup of patients who benefit from vaginal cleansing are those who have labored or experienced rupture of membranes prior to cesarean, with a decrease in the rate of endometritis from 8.8% to 4.5% (Caissutti et al., 2017).

Significance of the study

Surgical site infection (SSI) is one of the most common complications following cesarean section, and has an incidence of 3%–15% worldwide. It places physical and emotional burdens on the mother herself and a significant financial burden on the health care system. Moreover, SSI is associated with a maternal mortality rate of up to 3% (Zuarez-Easton et al., 2017). In some developing countries found the incidence of Cesarean section -Surgical site infection (CS-SSI) as follows: 12.5 % CS-SSI in Nigeria, 29.38% CS-SSI in Oman, and 9.6% CS-SSI in Egypt (Novelia et al 2017)

Based on reviewing literature, Haas et al., (2018) showed that preoperative vaginal cleansing with antiseptic solution decreases the incidence of post-cesarean endometritis. Few available Egyptian reviews or researches were done to study the effect of vaginal cleansing with antiseptic solution in reduce infection after cesarean section. It is considered a noninvasive nursing technique in the field of midwifery. This study is a trail to find a way to reduce post cesarean& postpartum infection by using the cheap antiseptic solution for vaginal cleaning before cesarean section. The aim of this intervention is to reduce the postoperative infection, reduction of postoperative morbidity that may lead to decrease the cost, economical burden and also decrease the effort of the health care providers. So the researcher tried to fill in such gap of knowledge by conducting this study.

Purpose of the Study:

The study purposed to Examine the effect of preoperative vaginal cleansing in the reduction of post caesarean infection

Research Hypotheses:

The women who will undergo vaginal cleansing with antiseptic solution before cesarean section will have less possibility of post cesarean infection than those who don't use it

2. METHODS

Research design:

A quasi-experimental design (case-control group) was used.

Setting:

The study was carried out at the operative room of obstetrics and gynecologic department in Menoufia University hospital and Menouf general hospital. These settings were selected because of the highly flow rate of C.S, high levels of services were provided, and provision of postnatal services for women with various socioeconomic backgrounds. They have high turnover of puerperal women. Also, these settings were governmental hospitals. Mothers remain in hospital for at least 24hrs after C.S in University Hospital and from 2-4 days in Menouf General Hospital. The flow rate of women delivered C.S (primiparas and multiparas) ranged from 8-10 cases/day in University Hospital and from 4-6 cases/day in Menouf General Hospital. The flow rate of primpara ranges from 2-3 cases attending per day (emergency day.)

Sampling:

Convenience sample of one hundred and sixty two pregnant women (72 pregnant women from Menoufia University hospital and90 pregnant women from Menouf general hospital) who attended the both hospitals at Shebin -Elkoom and menouf city and fulfilled the inclusion criteria was enrolled in the current study. The selected women were then randomly assigned into two groups (study and control). Each of the 162 was asked to pick a piece of paper containing a number (1 and 2). Those who selected number 1 was assigned to study group, those who selected number 2 was assigned to control group. This technique was used to avoid sample contamination and bias.

Sample size: The sample size was calculated by using the following formula

N= N = (z2×p × q)/D2

The sample size was calculated for each group according to the following equation and the results of the pilot study. Where N = is the sample size, Z = is the standard normal deviate = 1.96 at confidence interval 95%, D = is the desired confidence interval (99% that the population proportion falls within 10% of the sample proportion). Based on the sample size measured, a total of 162 women (81 for each group) participated in the study.

Instruments:

Instrument I: A structured interview questionnaire: It was developed based on the review of currently related literature. It consisted of three parts: the first part contained questions related to the socio-demographic characteristics, the second part contained data related past medical history, the third part contained data related to previous obstetric history: It includes gravidity, parity, and previous delivery complications.

Instrument II: Maternal assessment tool

It was adopted from (Mohamed, 2014). It was used in this study mainly to collect preoperative data about finding of the general, abdominal, per vaginal examination and laboratory investigation

Part 1: This part is used to record the findings of physical examination\

1-General examination: it is aimed to detect any signs of infection. It included; measurement of vital signs, evidence of tonsillitis and tender breast.

2-Abdominal examination to detect local signs of skin infection

3-Vaginal examination to detect signs of vaginal infection to exclude it from the study .

Part 2: This part used to record the findings of laboratory investigation

Instrument III: A Present caesarian assessment tool: for observation and evaluation of caesarian as (type of incision, using of urinary catheterization, using of abdominal drain) and Post cesarean examination includes measuring vital signs, level of uterine fundus, assessing incision condition (color, odder, edema) at the time of discharge

Validity and reliability

For validity purposes, the researchers conducted an extensive literature review and developed the questionnaire from the previously used instruments and reviewing pertinent studies. Instrument 1 was designed by the researchers and validated by three experts (two Professors in Maternal and Newborn Health Nursing and one expert has doctorate degree in Obstetric Medicine) for content accuracy and internal validity, while instruments II and III were adopted from the previous studies. The interview questionnaire underwent some modifications according to the panel of judgment regarding the clarity of sentences and appropriateness of content. Test-retest reliability was used to estimate reliability.

Administrative Approvals:

An official letter was taken from Dean, Faculty of nursing, Menoufia University and directed to Directors of the study settings. An official permission was obtained to carry out the study from the directors of the above mentioned settings. Also, the approval of the Ethical Committee of the Faculty of Nursing, Monoufia University was obtained.

Ethical Consideration:

An approval of the committee of the research committee in the faculty of nursing, Menoufia University was obtained on 12/7/2017. Approaches to ensuring ethics were considered in the study regarding confidentiality and informed consent. Confidentiality was achieved by the use of closed sheets with the names of the participants replaced by numbers. All participants were informed that the information they provided during the study would be kept confidential and used only for statistical purpose and after finishing the study, the findings would be presented as a group data with no personal participant's information remained.

Pilot study

A pilot study conducted to test the feasibility, applicability and understandability of the tools. It was conducted on 10%of the total sample (16 women) according to the selection criteria. All women participated in the pilot study excluded from the study sample because the researcher made some modifications of the instruments.

Study field work:

The current study was carried out on four phases:

1) Preparatory phase:

An extensive review related to the study area was done including electronic dissertations, available books, articles and periodicals. A review of literature to formulate knowledge base relevant to the study area was also done. A written permission from the institutional authority of the two hospitals was obtained before conducting the study. The researcher was constructed and prepared of the different data collection tools, measuring tape, in addition to seeking managerial arrangement to carry out the study.

2) Interviewing phase:

The researcher collected the data from the women of the two groups through an interview and assessment.

3) Implementation phase (for study group):

Upon arrival to operating room, all pregnant women were catheterized with Foley's catheter in sterile manner and vaginal cleaning was performed by the researcher after spinal anesthesia is given to the patient and before scrubbing of the abdomen by the nursing staff. The intervention group received vaginal cleaning, in addition to the standard abdominal preparation. Vaginal cleansing was done with 3 gauze pieces soaked with 10% povidone iodine in a sterilized bowl and the scrub was done from the vaginal apex to the introitus with attention to the anterior, posterior and lateral vaginal wall including all fornices. The cleansing agents were applied by the scrubbing nurse by rotating 360_ in the vagina for 30 second. The cesarean delivery was then being performed. **For control group**, The women who were assigned to the control group received the standard abdominal scrub only. All women were receiving the standard antibiotic prophylaxis after the operation.

4) Evaluation phase:

All women received the routine post-operative care as (measuring vital signs, palpation of uterus , inspection of lochia) without other intervention before discharge from hospital, the women estimated for the time of stay in hospital before discharge, the hospital stay for the majority of women was 24 hours. If the time of stay in hospital more than 24 hours, the researcher examined the post cesarean adverse maternal infectious morbidities including fever and wound infection (color, odor of wound incision, presence of edema) at the time of hospital discharge.

According to management strategy patients were discharged after 24 hours and were recommended to re-visit on day 7 after CS for the removal of stitches and that's when our clinical evaluation of surgical wound was performed. On the discharge day all patients received detailed instructions regarding Surgical Site Infections (SSIs) and were informed about the need to report at hospital in case at least one of the following symptoms was observed (fever, suppurative secretion from the surgical site, redness, edema, warmth, pain or tenderness of the surgical site area) and take care which day this symptoms were observed. In cases of SSI suspicion, wound discharge specimens were collected and analyzed by using the gram stain and culture in the hospital laboratory. Antimicrobial susceptibility testing was carried out using a standardized panel. Some cases were readmitted to the hospital for initiation of intravenous antibiotic therapy and wound care.

Statistical Analysis:

Data analysis

The collected data were scored, tabulated and analyzed using (SPSS) version 22. Descriptive as well as nonparametric statistics were utilized to analyze the data pertinent to the study. The level of significance was set at $p < 0.05$. Chi square test, Independent sample t-test, Fischer exact test (FE), Mean and Mann-Whitney test (nonparametric test) were used to analyze the data

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3. RESULTS

Table (1): Socio-demographic Characteristic of the study Participants:

variables	Cases (No=81)		Control (No=81)		Test of sig. p-value
	No	%	No	%	
Age groups					
- **20-24 years**	29	35.8	29	35.8	
- **25-29 years**	29	35.8	20	24.7	X^2= 3.3
- **30-34 years**	21	21.9	28	34.6	P = 0.35(>0.05)
- **35-40 years**	2	2.5	4	4.9	
Marital status					
- **Married**	77	95.1	80	98.8	Fisher's Exact= 1.9
- **Divorced**	4	4.9	1	1.2	P = 0.38(>0.05)
Residence					
- **Rural**	51	63	54	66.7	X^2= 0.24
- **Urban**	30	37	27	33.3	P = 0.62(>0.05)
Level of education					
- **Illiterate**	12	14.8	23	28.4	
- **Read and write**	29	31.9	20	24.9	X^2= 7.2
- **Secondary**	30	37	31	38.3	P = 0.12(>0.05)
- **University**	10	12.3	7	8.6	
Occupation					
- **House wife**	71	87.7	74	91.4	X^2= 0.59
- **Working**	10	12.3	7	8.6	P = 0.44 (>0.05)

Table (1). Shows the socio-demographic characteristics of the study participants. As shown in the table, there was no statistically significant difference (p >0.05) between the study and control groups regarding the general characteristics of both groups.

Table (2) Intraoperative Characteristic of the study Participants:

Variables	Cases (No=81)		Control (No=81)		Test of sig. p-value
	No	%	No	%	
Operative details					
Vaginal cleaning before cesearan					
– **Yes**	81	100	0	0	Fisher's Exact = 1.01 P =
– **No**	0	0	81	100	0.99(>0.05)
Tubal ligation					
– **Yes**	2	2.5	0	0	Fisher's Exact = 2.03 P =
– **No**	79	97.5	81	100	0.16(>0.05)
Abdominal drain					
– **Yes**	8	9.9	10	12.3	X^2= 0.25
– **No**	73	90.1	71	87.7	P =0.62(>0.05)
Length of operation in minutes					
– **Mean ± SD**	46.8±10.3		44.1±7.6		Mann Whitney test= 1.8 P
– **Min- max**	35-90		35-75		=0.07(>0.05)
Hospital stay in days					
– **Mean ± SD**	1.3±0.71		1.5±1.01		Mann Whitney test= 1.7
– **Min-Max**	1-4		1-5		P =0.09(>0.05)

Table (2). Shows the intraoperative characteristic of the study participants. The table clearly shows that, there were no statistically significant difference (p >0.05) in all aspects of operative variables between the study and control groups

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Table (3): Assessment of Surgical Site at the Time of Discharge among the study Participants:

Variables	Cases (No=81)		Control (No=81)		Test of sig. p-value
	No	%	No	%	
Wound examination					
Color of skin					
- **Normal**	78	96.3	74	91.4	X^2= 1.7
- **Reddish**	3	3.7	7	8.6	P = 0.19(>0.05)
Odor					
- **Offensive**	1	2.9	2	5.7	Likelihood Ratio 0.348
- **Odorless**	34	97.1	33	94.3	P = 0.555
Edema					
- **Yes**	5	6.2	2	2.5	Fisher's Exact = 1.3
- **No**	76	93.6	79	97.5	P = 0.43(>0.05)

Table (3). Shows the assessment of wound site at the time of discharge which revealed that the majority of participants did not have any abnormal condition as reddish color of skin, bad odor and edema. There was no statistically significant difference observed between the study and the control groups (p>0.05).

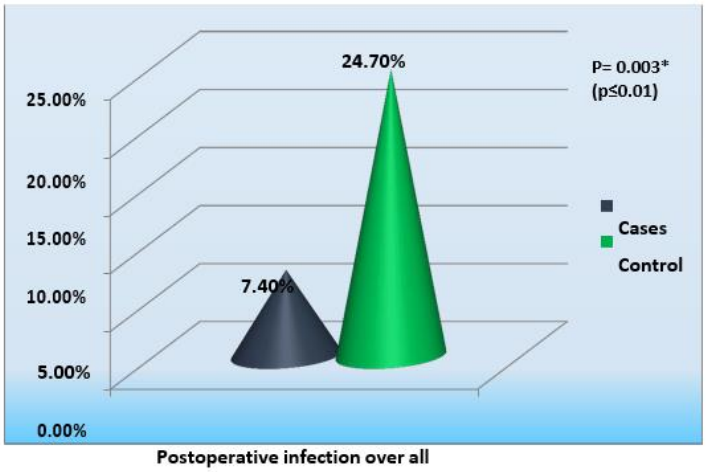

Figure (1): Postoperative infection over all among the study participants

Figure (1) shows the postoperative infection over all among the study participants. This figure shows that there was statistically significant reduction in postoperative infection in study group compared to control group (p= 0.003*)

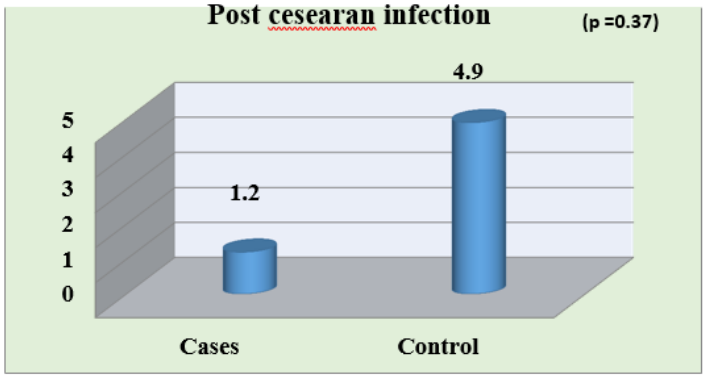

Figure (2): Comparison of Postoperative Wound Infection among the study Participants.

Figure (2). Shows the postoperative wound infection among the study participants. This figure shows reduction in the incidence of postoperative infection in study group more than the control groups, but this reduction was insignificant. (p =0.37)**(**

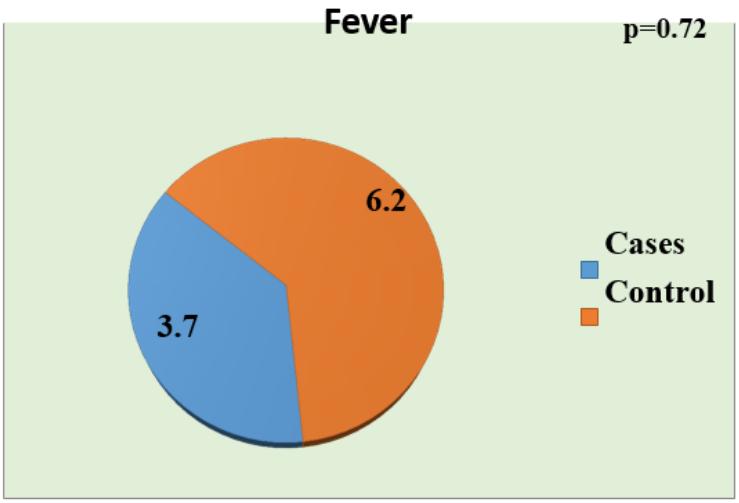

Figure (3): Comparison of Postoperative Fever among the study Participants

Figure (3) Represent postoperative fever among the study participants. It also shows that there was no statistically significant difference among the study and the control groups regarding fever, although there was obvious reduction in the incidence of fever in both groups (p =0.72).

4. DISCUSSION

The findings of the current study revealed that the research hypothesis was supported. The findings are discussed in the following sequence: 1- findings related to "socio-demographic characteristics" 2-findings related to Intraoperative Characteristic of the study Participants 3- findings related to Assessment of Surgical Site at the Time of Discharge 4- Findings related to postoperative infection over all. 5- Findings related to Postoperative Wound Infection. 6-finding related to postoperative fever.

The majority of the study participants' ages ranged between twenty to thirty five years old because that age is mid fertility years in which women are more likely to become pregnant. These findings are supported by Tewfik, (2015) who studied "Preoperative vaginal preparation using povidone iodine versus chlorhexidine solutions in prevention of endometritis in elective cesarean section". Tewfik reported similar sample age group (20 – 35) years old.

Regarding education, the current finding highlighted that the majority of women in the sample were secondary educated. This may be due to that the majority of the study participants lived in rural areas which low education levels are common. The findings of this study are in consistent with Mohamed et al., (2014) who investigated "Vaginal cleaning before cesarean delivery to reduce post cesarean section &postpartum infection". They revealed that the majority of study participants had diploma and they were similar in the education level. This is also ascertained by Barat, (2016) who investigated the "Impact of preoperative vaginal preparation with povidone iodine on post cesarean infection". He reported that the majority of study participants had high school (secondary) education.

Regarding the intra operative characteristics, the study and control groups were similar with respect to that characteristic that may increase the risk of postpartum endometritis, including the number of vaginal exams, cervical dilatation, the incidence of ruptured membranes and the time since membrane rupture.

This study finding is in agreement with the finding of the study conducted by Yildirim et al., (2012) who invwstigated "Does vaginal preparation with povidone–iodine prior to caesarean delivery reduce the risk of endometritis? A randomized controlled trial". They stated that both groups were similar with respect to the number of digital

examinations, length of labor after admission, status of membranes on admission, duration since membrane rupture, and meconium fluid characteristics. In the same line Felder et al., (2018) who investigated the "Implementation of vaginal cleansing prior to cesarean delivery to decrease endometritis rates" They stated that there was no statistical difference between patients for the majority of Preoperative and intraoperative characteristics.

As for operative time and hospital stay after surgery, the present study showed that operative time and Postoperative length of hospital stay was similar in the two groups. There was no statistically significant difference between the study and control groups. The present study finding was inconsistent with Göymen et al., (2017), Ahmed et al., (2017) they reported that there were no significant differences between groups in the duration of operation. Also, there were no significant differences between the groups with respect to hospital stay. All the patients were discharged with full recovery on postoperative day 2.

In contrast with Khedr, & Fadel, (2016) whose study finding indicates that the postoperative hospital length of stay for the control group was different more significantly than the intervention groups. (4.7±2.4 versus 2.4±0.9 days, P1<0.001). This might be because of different population or different selection criteria. Also, Asghania, (2011) reported that the mean number of vaginal examinations; the mean duration of surgical time (min); the mean duration of labor (h) and the mean duration of membrane rupture (h) in the vaginal preparation group were significantly greater than those in the control group. This significances was due to lack of randomization as a researcher explained

Regarding post CS infectious morbidity overall, the present study showed that there was statistically significant reduction from 24.7% in control group to 7.4% in study group. The present finding is supported by Aref, (2019) who reported that that preoperative vaginal cleansing with 10% Povidone iodine solution immediately prior to CS is effective in reducing overall post-CS infectious morbidity. In accordance to this result**,** Memon et al., (2011) in Pakistan. Madny et al**.,** (2011) in Egypt reported that the rate of post cesarean infectious morbidity reduced with preoperative vaginal cleansing with povidone iodine. These findings are not in agreement with Hass et al., (2010) who did not find a statistically significant difference in post cesarean infectious morbidities.

Regarding Postoperative fever, the present study finding showed that there was a reduction in postoperative fever in the study group compared with the control group, but it was not statistically significant. These findings were in agreement with Barat, (2016) who investigated the "impact of preoperative vaginal preparation with povidone iodine on post cesarean infection" Barat reported that there was no significant difference between the two groups regarding the incidence of post-operative fever

On the same line Haas et al., 2014; Memon, 2011; Aref, 2019) showed no significant difference in the rate of postoperative fever with the intervention, however associated risk factors have already been discussed and reported to have a role in the development of fever. On the contrary, these findings were not in accordance with Mohamed et al., (2014) who reported that there was a statistically significant increase in the temperature of control group in comparison to the study group immediately postoperative and in all measurements until discharge. Such differences could be attributed to the researcher in this study demonstrated temperature of study participants immediately postoperative until discharge (36h) while febrile morbidity defined as Postoperative fever (38C or greater) on 2 or more calendar days, excluding the day of surgery. So the researcher must exclude the day of surgery from the result

In relation to wound infection, the current findings revealed that the rate of wound infection was lower in the intervention group than the control group, but this reduction was not significant. This finding is supported by some studies conducted by Mohamed et al., (2015) who investigated "Vaginal preparation with antiseptic solution before cesarean section for reducing postpartum morbidity" in Egypt and Yavuz et al., (2016) Who investigated "Vaginal preparation with povidone iodine and post cesarean infectious morbidity: A Retrospective Trial" in Turkey. It is also supported by Kiani, (2018), Asad et al., (2017) who investigated "Vaginal cleansing prior to cesarean section and post-operative infectious morbidity" in Pakistan. They revealed that the frequency of wound infection among women who had received vaginal antiseptic application was lower than those who had not, but not significant. The current study findings are in contrast with Mohamed et al., (2014) who reported that there was statistically significant increase of wound complications in the control group when compared to the study group

5. CONCLUSION

According to the findings of the present study, it can be concluded that there was a statistically significant difference after using antiseptic solution before cesarean section on the reduction postoperative infection in terms of, wound infection and fever more than those who use routine care. This supported the study hypothesis. Based on the present findings; the study hypothesis was accepted.

6. RECOMMENDATIONS

In light of the study findings, the following recommendations are proposed:

Preoperative vaginal preparation with antiseptic solution should be incorporated as an essential part of routine preoperative care before cesarean delivery.

Suggestions for future studies:-

- Replication of the study to further settings using a larger sample is needed to confirm the present observations.
- Designing subsequent studies to compare between the different antiseptics to find the most effective antiseptic for reducing post-operative infection.

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