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Effect of Early Versus Delayed Exposure of Caesarean Section Wound on Surgical Site Infections and Patients' Comfort Level

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Abstract:
This study aimed to evaluate the effect of early versus delayed exposure of caesarean section wound on surgical site infections and patients' comfort level. ***Design:*** *Randomized controlled trial research design was utilized.* ***Setting:*** *The study was carried out at postnatal Unit in Al-Ostoura Obstetrical and Gynecological Private Hospital, Mansoura city, Egypt.* ***Subjects:*** *One hundred twenty eight women undergoing an elective cesarean section delivery achieved the inclusion criteria; were recruited in the study. The participants were randomly assigned equally into the early exposure group (n=64 women) who underwent the early removal of wound dressing at 6-12 hour after C-Section and the delayed exposure group consisted of (n=64 women) underwent delayed wound exposure at 5 days after C-Section.* ***Tools:*** *Data were collected by using four tools (Structured Interviewing schedule, Visual Analogue scale (VAS), Wound assessment Sheet and Comfort assessment sheet).* ***Results:*** *The women in the early exposure group reported a significant lower pain level than those of delayed exposure group (P=0.008), the percentages of wound complications were slightly higher in delayed exposure group than those of early exposure group with no significant difference (P>0.05). In addition, the study showed that women in early exposure group reported a significant higher percentages of all items of comfort scale than those in other study group (p<0.05). Moreover, the results indicates that there was a significant association between comfort and the low pain level as the feeling of comfort and the ability to perform the simple daily tasks were more and easily among women in the early exposure group than those in delayed exposure group.* ***In conclusion:*** *It was evident that early exposure of the wound reduces the incidence of wound complications and SSI with no significance difference. Furthermore, it had a significant effect to lower the pain level and increase the comfort level among women underwent C-section surgery.* ***Recommendations:*** *Integrating the early removal of wound dressing as an evidence based measure to reduce post-cesarean section wound infection in the governmental hospitals.*

Keywords: *Early exposure, Caesarean section, Comfort level, Delayed exposure, Surgical Site infections.*

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I. Introduction:

Caesarean section (CS) is considered one of the furthermost commonly surgeries that performed in obstetrics field worldwide. It was mainly developed as a lifesaving procedure for mother and fetus during the problematic or obstructed delivery **(Das et al., 2018).** The incidence of cesarean section deliveries risen significantly over the last few decades, with an estimated worldwide number of 22.9 million cesarean deliveries in 2012 **(Molina et al., 2015)**. Surgical site infection (SSI) is being one of the widespread common complication may accompanied with cesarean section delivery surgery.

The estimated rate of SSI ranges between 3-15% worldwide **(Zuarez-Easton et al., 2017).** The risk for creating SSI has altogether significantly reduced in the last three decades, basically owing to improvements in prophylactic antibiotic, hygiene conditions, sterile strategies, and other different practices **(Krieger et al., 2017).** Not with standing this decrease, SSI occurrence is anticipated to increase specified the frequent rise in the incidence of cesarean deliveries.

Post-cesarean (SSI) may associated with increase in the maternal morbidity and mortality rate. Furthermore, SSI can be depressed for the woman trying to recover from the surgery and at the same time take care of the newborn likewise; it might prolong maternal hospitalization, rise the expenses of health care, and lead to other socioeconomic and financial ramifications **(Salim et al., 2012)**.

A surgical site infection (SSIs) is classified into two types. One type is known as superficial surgical site infection (SSIs) that involving the skin or subcutaneous tissue surrounding the wound incision and the other type is the deep incision SSI as type of infection happen within one month post-operative procedure, if the

contamination occurs with no implant is left in place to be related to the operative procedure so deep soft tissues of the incision associated with purulent drainage from the deep incision, or fever or tenderness are appear **(Dumville et al., 2016).**

Even though, SSI frequently arises in the operating theatre. The signs and symptoms associated with infection often don't occur till the patients have been discharged from the hospital. SSI including the organ spaces and deeper tissues which is a main prime source of morbidity and mortality. Patients have SSI commonly remains in the hospital an extra seven days, there are other clinical consequence may be associated with infection such as an unsightly appearance of scarring, itching, persistent pain and movement restriction, especially if the wound is located above the joint. SSI reduces the personal satisfaction, life's quality, lateness return to work, and confines local and social activities **(Gould, 2012).**

Numerous surgeries are implemented the world over every year. Primary intention is an evidence for healing the surgical incisions when the wound edges are united and verified. Wound dressings, generally applied after closure of the wound, provide physical help, and absorb exudate and protection from bacterial contamination. (**Dumville et al., 2016)**. Most surgeries include an incision in the skin, enabling the specialist to enter to the site of surgery. Bring to an end of the surgery, primary closure occurs when the incision is closed lead to a closed surgical wound (**Garcia-Gubern, 2010).** To manage the exudate, prevent possible external contamination and deliver wound protection that may cause SSIs and delay the healing process **(Dumville et al., 2016).**

Instantaneous wound coverage is considered one of the keystones of post-operative wound management. Wound dressings are ordinarily placed for (24 to 48 hrs.) after cesarean section surgery to permit sufficient time for re-epithelialization and wound healing. Using surgical dressing for wound healing by primary intention is to soak up exudate, relief pain, control the postoperative bleeding and protect the newly-formed epithelium. The significance of dressings are recognized, however the perfect time that postoperative dressings should be left in place remains ambiguous. Studies have revealed that early removal of dressings 6 hours after surgery markedly decreases the rate of resurfacing, whereas at the same time leaving the bandage more than 48 hours produced no more noteworthy advantage **(National Library of medicine, 2017).**

A meta-analysis trials found that early compared to delayed removal of the wound dressing was stated comparable wound complications that involved disruption, infection and hematoma or Seroma formation and most of the women were pleased and satisfied with early removal **(Toon et al., 2015).**

Maternity Nurses are participated in the care of patients who either develop or at risk for having SSI. Thusly need to identify the consequences; developing approaches to inhibit SSI and encourage women's comfort are necessary for decreasing the morbidity and mortality rate associated with post-cesarean.

Significance of the study:

In Egypt, the total delivery rate by CS has elevated significantly from (27.6% in 2010) to (52% in 2014). These rates are more than other rates estimated from various parts of the world, both in the developing and developed countries **(El-Zanaty& Ann., 2015).** It carries risk for SSI also lead to considerable physical and emotional problems to the mother as well as a considerable financial load on the health care system **(Zuarez et al., 2017).**

The perfect timing for removing the wound dressing in order to prevent the occurrence of SSI is indecipherable topic and the literature concerning it is still limited. A few professional specialists like to keep the wounds exposed and uncovered from the first moment of closing while, others prefer to keep them uncover after a specific timeframe, and even now others remain the wounds covered until removal of the suture (**Chandrasiri & Fernandopullae, 2016**). Some few literatures found an associate between the early wound exposure and increase a risk of infection and SSI especially if the dressing removed for a time less than 48 hours postoperative (**National Collaborating Centre for Women's and Children's Health, 2011**). Nevertheless, other studies have recommended that covering the wound for long time have no advantage (**Dosseh et al., 2008**).

While, several randomized controlled studies have revealed that early exposure of clean surgical incisions have many benefits. The short dressing times not only decrease the cost of dressing materials but also decrease the workload, additionally improved the level of patient's comfort and the observation of the wound become easier even so, it showed no significant difference in wound related complications (**Chandrasiri & Fernandopullae, 2016**). Perceiving the consequences and developing strategies to prevent SSI are essential for reducing post cesarean morbidity and mortality**.** So the researchers decide to carry out this study.

Aim of the study:

The aim of the study was to evaluate the effect of early versus delayed exposure of caesarean section wound on surgical site infections and patients' comfort level.

Study hypothesis:
H1: Early wound exposure within 6-12 hours after C-section surgery decreased the incidence surgical site infection occurrence compared to those who were exposed within 5 days.

H2: The women were more comfortable and able to perform simple daily tasks after early exposure compared to delayed exposure.

Operational Definitions:

Early exposure: Removal of the wound dressing within 6-12 hour after C-Section surgery.
Delayed exposure: Removal of the wound dressing within 5 days after C-Section surgery**.**
Surgical Site Infection (SSI): Present of purulent drainage, pain or tenderness, localized swelling, erythema and fever.
Womens' comfort: The ability of a woman to sit-up easily, can get off bed easily, can walk easily and can squat easily.

II. Subjects and Method:

Research Design: Randomized controlled trial research design was utilized.

Study Setting: The study was carried out at the post-natal unit in Al-ostoura obstetrical and gynecological private hospital, Mansoura city, Egypt.

Study Subjects: Out of 332 women, one hundred twenty eight women undergoing an elective cesarean surgery were recruited in the study, according to the following criteria:

Inclusion criteria:
- Women undergoing their first caesarean section.
- Not had complications during pregnancy.

Exclusion criteria: Women had the following criteria were excluded:
- Previous surgical site skin infection (SSI).
- Pyrexia before surgical procedure.
- Body mass index (BMI) of 35 kg/ m^2 or more.
- History of Elastoplast hypersensitivity.

Sample Size: Calculating sample size using the Dss.research.com web site as percentage of purulent discharge was 6.0% in the intervention group and 1.0% in the control group (**Chandrasiri & Frenandopullae, 2016**) and at confidence 95.0% and power of study 80.0%; the calculated sample size is 64 subjects in each group.

Groups' Allocation: Women undergoing an elective cesarean section at the study setting were involved in the study until the sample size was completed. The participants were randomly assigned into two groups. From the prepared list of caesarean sections deliveries, the odd numbers were recruited as the early exposure group while the even numbers were recruited as the delayed exposure group.

Tools of data collection:
Tool I: A Structured Interview Schedule: It was designed by the researchers after reviewing related literatures; to be filled from each woman. It comprised of two sections: **Section 1:** This section covers the data related to general characteristics as age, education, occupation, residence and body mass index. **Section 2:** This section includes obstetric variable as gestational age, the number of gravida, Para, abortion, and curettage.

Tool II: Visual Analogue scale (VAS): It is a self-reported scale adopted from **Crichton, (2001)**. It was used to assess the severity of pain, included ten cm straight line which represents the pain intensity, (0 represent no pain), (1-3 mild pain levels), (4-7 moderate pain levels), and (8-10 severe pain levels).

Tool III: Wound Assessment Sheet: It was adopted from Chandrasiri & Fernandopullae, (2016). It includes signs and symptoms of surgical site infection as purulent drainage, erythema, localized swelling, pain or tenderness and fever.

Tool IV: Comfort assessment sheet: It was adopted from Chandrasiri & Fernandopullae (2016). It included questions to assess a woman's ability to perform certain tasks based on a visual analogue scale such as can sit-up, get off bed, walk and squat easily.

Validity and reliability of research tools:

Tools were revised by a jury of five professors specialized in woman's health and midwifery nursing field to test the validity of the content to ensure the that the tools were conveying the intentional meaning and the recommended adjustments and modulation were considered according to their remarks and comments. Reliability of tools was tested by using Cronbach's alpha. Visual Analogue scale reliability= (0.90), Wound assessment sheet reliability= (0.71), Comfort assessment sheet reliability= (0.87). Therefore the tools were reliable.

Pilot Study:

Thirteen mothers included in the pilot study. It was conducted to examine and check the feasibility, the clarity of the designed questionnaire and relevance of the tools as well as to evaluate the time needed to collect the data. Consequently, the essential modulation and modifications were carried out, and these women weren't included in the study sample.

Ethical Considerations:

The study was approved by head of woman's health and midwifery department at Nursing Faculty. As well as an informed consent was obtained from the women who participated in the study. The participants were ensured about the privacy and the information's confidentiality. They also informed about their rights to refuse or withdraw at any time from the study and the study maneuvers couldn't entail any harm to the participants.

III. Method:

- The data were collected for a six months, starting from May 2019 until end of October 2019.
- An official letter was obtained from director of Al-ostoura Obstetrical and gynecological private hospital in Mansoura city, Egypt After clarification of the title and aim of the study.
- Firstly, the researchers were assessed the women and revised their medical records as specified by the inclusion and exclusion criteria, demographic and obstetric details of women were recorded and the written consent was obtained from the suitable women for participating in the study.
- By random assignment and from the prepared caesarean sections list, the odd numbers were enrolled in the early exposure group and the even numbers were enrolled in the delayed exposure group.
- The early exposure group consists of 64 women who underwent an early removal of wound dressing at 6-12 hrs. after C-section and the delayed exposure group consists of 64 women underwent delayed removal of wound dressing at 5 days after C-section
- At operating room, all women were adhered by a standard surgical technique. A standard gauze dressing covered with Elastoplast was applied for covering the surgical incision to all the women. Also, similar antibiotic and analgesic regimen were administered to them as per unit policy.
- After that, the researchers assessed the comfort level of women on the 1st postoperative day in both groups. A comfort assessment sheet was documented for evaluating the women ability to perform the daily routine tasks included (setting up, getting off the bed, walking and squatting).
- All women were assessed on three occasions and periods, they were assessed on the 1st, 5th day postoperative and after 2 weeks at the postnatal clinic to identify the occurrence of SSI. In case that there any complications were observed, the suitable medical and nursing care was provided irrespective of the study group.
- Women who have at least one of the following of infection: tenderness, pain heat, redness, or localized swelling identifies as SSI. In addition to presence of purulent drainage from the superficial incision or organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
- The raw data were coded, analyzed, and the results were interpreted. Then, the comparison and difference between two groups were identified.

Statistical analysis:

The statistical analysis were done for the collected raw data after it was coded, computed by using SPSS Inc**.** version 21. Data were presented as frequency and percentages (qualitative variables) and mean ± SD (quantitative continuous variables). Chi square ($\chi 2$) was used for comparison of categorical variables, and was replaced by Fisher exact test (FET) if the expected value of any cell was less than 5. The difference was considered significant at $P \leq 0.05$.

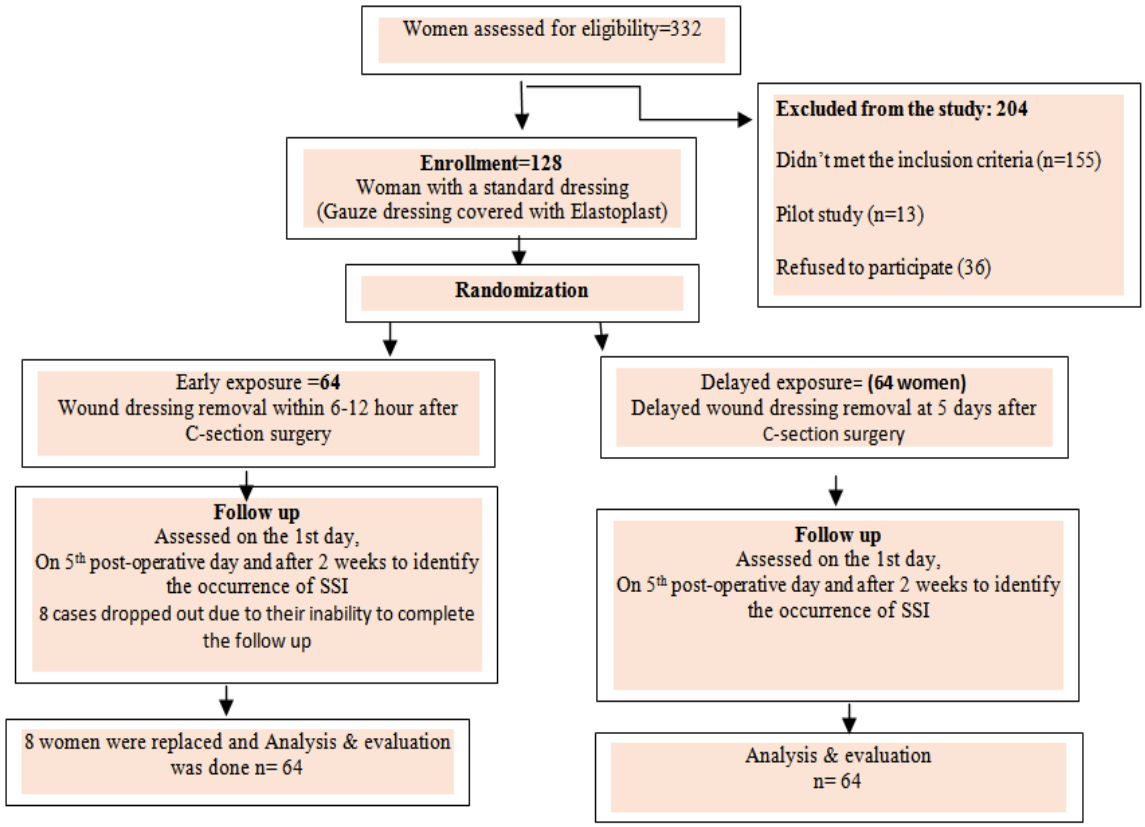


Figure 1. Flowchart of the research process

IV. Results:

Table (1): Frequency distribution among the studied groups according to their demographic data.

Characters	Items	Early exposure (64)		Delayed exposure (64)		Significance test
		No	%	No	%	
Age (years)	18 – 23 24 – 29 30 - 35	24 35 5	37.5 54.7 7.8	21 41 2	32.8 64.1 3.1	χ^2 = 1.959, MEP 0.372
Education	Read/write Basic Secondary University	3 6 39 16	4.7 9.4 60.9 25.0	0 4 46 14	00.0 6.2 71.9 21.9	χ^2 = 4.111, MEP 0.282
Occupation	Working Not working	30 34	46.9 53.1	29 35	45.3 54.7	χ^2 = 0.031, P 0.859
Residence	Rural Urban	29 35	45.3 54.7	31 33	48.4 51.6	χ^2 = 0.125, P 0.723

Table (1) shows that women in both groups had no significant difference as regard age, education, occupation and residence, this means that both groups are matched as regard their general characteristics.

Table (2): Frequency distribution among the studied groups according to their obstetric history

Obstetric history	Items	Early exposure (64)		Delayed exposure (64)		Significance test
		No	%	No	%	
Gravidity	Gravida1 Gravida2 Gravida3	49 13 2	76.6 20.3 3.1	52 10 2	81.2 15.6 3.1	χ^2 = 0.480, MEP 0.862
Parity	Para1 Para2	51 13	79.7 20.3	55 9	85.9 14.1	χ^2 = 0.878, P 0.349
Abortion	None Once	60 4	93.8 6.2	59 5	92.2 7.8	FET, P 0.500
Number of curettage	None Once	60 4	93.8 6.2	59 5	92.2 7.8	FET, P 0.500
Gestational age (weeks)	38 39 40	4 56 4	6.2 87.5 6.2	2 59 3	3.1 92.2 4.7	χ^2 = 0.888, P 0.688

Table (2) shows that the percentages of different gravidities, parities, abortions, number of curettage and gestational ages of current pregnancy are nearly close in both groups. This means that both groups are matched as regard their obstetric history.

Table (3): Visual analogue scale of pain among the studied groups.

Visual analogue scale of pain	Degree	Early exposure (64)		Delayed exposure (64)		Significance test
		No	%	No	%	
Mild	1-3	43	67.2	28	43.8	χ^2 = 7.116,
Moderate	4-7	21	32.8	36	56.2	P 0.008
Severe	8-10	0	00.0	0	00.0	

Table (3) shows that the women in early exposure group who removed the wound dressing early had reported a significant lower pain level than those were in delayed exposure group (P=0.008).

Table (4): Frequency distribution among the studied groups according to wound complications assessment.

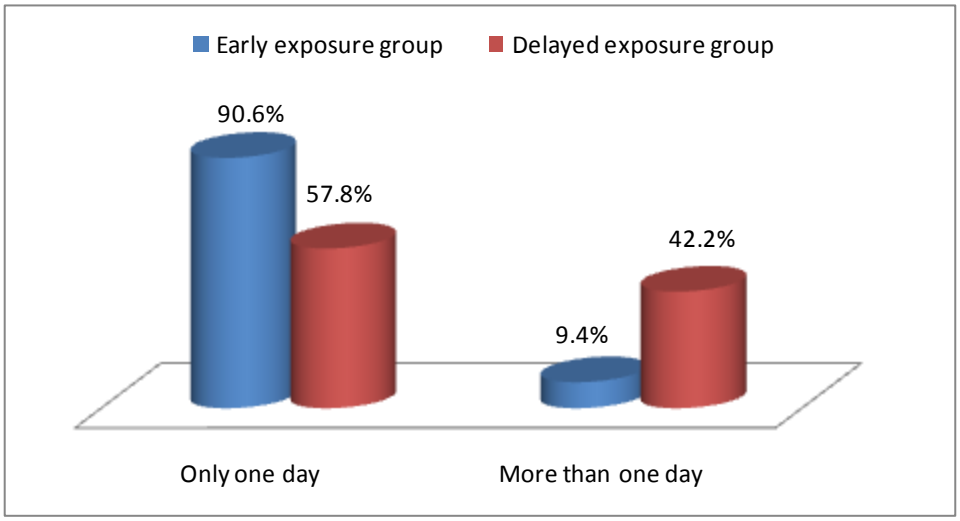
Wound complications	Early exposure (64)		Delayed exposure (64)		Significance test
	No	%	No	%	
Purulent discharge	1	1.6	3	4.7	FET, P0.310
Pain or tenderness	3	4.7	7	10.9	χ^2 = 1.740,P 0.188
Localized swelling	1	1.6	4	6.3	FET, P0.188
Erythema	3	4.7	8	12.3	χ^2 = 2.490,P 0.115
Fever	1	1.6	3	4.7	FET, P 0.310
Wound dehiscence	0	00.0	0	00.0	--------
Abscess	0	00.0	0	00.0	--------

Table (4): Shows that percentages of wound complications were slightly higher in delayed exposure group than those were in early exposure group with no significant difference (P>0.05).

Table (5): Frequency distribution of the studied groups according to comfort level at time of discharge

Items of comfort	Items	Early exposure (64)		Delayed exposure (64)		Significance test
		No	%	No	%	
Sit easily	Yes	57	89.1	29	45.3	χ^2 = 27.783,
	No	7	10.9	35	54.6	P <0.001
Stand easily	Yes	58	90.6	40	62.5	χ^2 = 14.106,
	No	6	9.4	24	37.5	P <0.001
Walking easily	Yes	56	87.5	38	59.4	χ^2 = 12.976,
	No	8	12.5	26	40.6	P <0.001
Squatting	Yes	40	62.3	28	43.8	χ^2 = 4.520,
	No	24	37.7	36	56.2	P 0.034

Table (5) shows that women in early exposure group reported a significant higher percentages of all items of comfort scale (sit easily, stand easily, walking easily and squatting) than those in delayed exposure group (p<0.05).



χ^2 = 18.006, P <0.001

Figure (2): Hospital stay among both groups

Out of 64 women among early exposure group, 90.6% stayed in hospital for one day, compared to 58.8% in delayed exposure group, this means a significant (P<0.001) decrease in the period of the hospital stay among the women who removed the wound dressing early (figure 2). Additionally, all women (100.0%) in the group of early exposure accept to remove dressing as early as this time in the next CS.

Table (6): Relationship between the pain level and comfort state among women in early exposure group.

Items of comfort	Items	Level of pain				Significance test
		Mild pain (43)		Moderate (21)		
		No	%	No	%	
Sit easily	Yes	42	97.7	15	71.4	FET,
	No	1	2.3	6	28.6	P 0.004
Stand easily	Yes	42	97.7	16	76.2	FET,
	No	1	2.3	5	23.8	P 0.012
Walking easily	Yes	41	95.3	15	71.4	FET,
	No	2	4.7	6	28.6	P 0.012
Squatting	Yes	34	79.1	6	28.6	χ^2 = 15.350,
	No	9	20.9	15	71.4	P <0.001

Among the women in early exposure group, the percentages of those reporting all items of comfort scale (sit easily, stand easily, walking easily and squatting) were higher in women with mild pain compared to those with moderate pain. This means that there was a significant association of comfort with less pain level **(table 6).**

V. Discussion:

The present study was aimed to evaluate the effects of early versus delayed exposure of caesarean section wound on surgical site infections and patients' comfort level. The main study findings revealed that the wound complications and signs of SSI were slightly higher in delayed wound exposure group than those of early exposure group. As well as the early exposure group reported a significant lower pain level and a significant higher percentages of all items of comfort scale than those of delayed exposure group. So the study findings were supported the research hypothesis.

Concerning the pain level, the study results shows that the women who in the early exposure reported a significant lower pain level than those were in other group as well as the wound complications are slightly higher among women who were included in delayed exposure group than those in early exposure group with no significant difference. These findings could be interpreted the main function and effect for wound dressing to control postoperative bleeding, control and ease the pain.

These findings were supported by **NICE clinical guideline, (2011)** in the study conducted about recovery following caesarean section and reported that CS wound care should include CS wound care should include only apply dressings if advised by the doctor. Furthermore early removing of the wound dressing twenty four hours post-operative CS surgery is considered one of the important intervention CS wound care should include controlling pain and infection.

Otherwise, these results were inconsistent with **Kandola, (2019)** in the review titled the measures to maintain cesarean section wound and reported that it is normally to experience wound redness, swelling and pain after cesarean section as well as using sterile dressing to cover the wound incision as long as the surgeon recommend is one of the preventive measures to prevent the infection and reduce pain.

Correspondingly, data base systemic review conducted by **Dumville et al., (2016)** reported that there is no clear evidence to recommend specific type of dressing or if there was one type better, nor that covering wounds with any dressing at all reduced the risk of SSI. Moreover, there was no evident recommendation that any type of dressing was better than other to control pain, improve the scarring, more accepted from the patient or its removal was ease.

Regarding the wound complications, the present study findings revealed that it was found slightly higher among women in the delayed exposure group than those were in early exposure group with no significant difference, which means that the SSI correlated factors were low in the early exposure group rather than other group.

As the healing process is consistent with less appearance of SSI correlated factors. These findings interpreted by the use of dressing at the first hours postoperatively (less than 48 hours) protect the wound and acts as a physical barrier till the epithiliation occur. Otherwise, certain researches have reported that some dressing produced moist area and accelerate the healing and recovery process of wound. Meanwhile, others considered it a disadvantage as an exaggerated exudate remaining in contact to the surface of wound can lead to break down of the skin and surrounding healthy tissue.

These findings were in congruence with **Rose et al., (2018)** in the retrospective audit carried out in Ethiopia concerning post-caesarean section surgical site infections and reported that an incisional surgical site infection was diagnosed by the presence of tenderness, local heat, erythema and presence of discharge from the wound and highlighted the necessity to improve the strategies of care that used pre and post-operative. Similarly, the study conducted by **Toon et al., (2015)** to assess the effect of time (early vs. late removal) post closure of clean and clean-infected surgical wound and found no difference of statistically significant existed between both study groups in the rate of patients who developed SSI within one month post-operatively.

Moreover, another study conducted by **Zuarez-Easton et al., (2017)** about the post CS infection who mentioned the results of met-analysis reviews about post-cesarean SSI and stated that there no difference of statistically significant concerning the rate of surgical site infection among patients who had removed the wound dressing within 6 hrs. Versus delayed removal (24–48 hours). Moreover, the satisfaction level were more among women who early removed wound dressing. Similarly, **Toon et al., (2015**) reported that there were no significant differences existed between the groups in terms of occurrence of SSIs or dehiscence of surgical wound.

Such agreement found by **Ramamoorthy et al., (2012)** in the study performed in a systemic review to assess the effect & the benefit of early versus delay dressing removal on the surgical site infection. The study findings considered that the existence of surgical site infection can double the costs of the surgical procedure, applying or removing a dressing, type of materials used such as collagen or hydrocolloid as well as the physical form of dressing e.g. ointment and foam. It was estimated that some types of wound dressings are prepared to control the environment for proper healing, So that frequent change of dressing is not necessary for monitoring the wound.

Furthermore, these findings were concordant with the study conducted at the Obstetric department in Colombo South Teaching Hospital **by Chandrasiri & Fernandopullae, (2016)** who assess if the early removal of wound dressing has an effect on the occurrence of SSI. Reported that localized swelling and tenderness were the most observed wound complications nevertheless, there was no presence of significant difference shown between both groups.

Regarding the comfort level, the present study revealed that the women included in the early exposure group and removed the wound dressing early from 6-12 hours had a significant higher percentage of all items of comfort level than those in delayed exposure group. Similarly, the results of the study were shown that there is a significant association of comfort level and women with less pain level, as the percentages of those reporting all items of comfort scale (sit easily, stand easily, walking easily and squatting) were higher in women with mild pain among women of early removal compared to those with moderate pain.

These findings could be interpreted as the decrease or absent of SSI correlated factors are associated with increase the comfort level. In addition, there was a significant decrease in period of hospital stay with early removal as well as there was a great acceptance of all women included in the study to remove dressing as early as this time in the next CS.

These findings were correspond with the study carried by **Chandrasiri & Fernandopullae (2016)** who found that the patients who early removed the dressing were capable to accomplish all the specified daily duties easily and more effectively than others. Furthermore, the results showed that women who removed dressing early were feeling more comfortable and able to perform simple tasks more easily after early exposure in comparison to delayed exposure. Moreover, early exposure was well accepted by the majority of patients who had this intervention evidenced by 85% of women enrolled in the intervention group prefer early removal of wound dressing for the next CS surgery and 90% assumed it improved their comfort feeling. Likewise, **Kawakita and Landy (2017)** reported that the removal of wound dressing between 24 to 48 hours was recommended by Centers for Disease Control and Prevention.

In contrast, results conducted by **Peleg et al., (2016)** were incongruent in a comparative randomized controlled trial to compare early dressing removal (6 vs. 24 hours postoperative C-Section). As it showed that there was no significantly different as regard to the incidence of wound complications existed between the groups. Meanwhile, the women who removed the dressing of wound early post-operative were more satisfied than those in other group evidenced by 75.6% compared to 56.9%.

Regarding the hospital stay, the results of the current study revealed that the early exposure of the wound has an effect on the length of hospital stay and expenses as well as there was notable significant reduction in the duration of hospital stay among the women who removed the wound dressing early compared to other study group. Likewise, **Toon et al., (2015)** stated that women who early removed the wound dressing were had short hospital stay and discharged early.

VI. Conclusion:

Overall the results of the present study highlighted that early exposure of the wound reduce the incidence of wound complications and SSI with no significance difference. Furthermore, it has significant effect to lower the pain level and increase comfort level among the women underwent cesarean-section surgery.

Recommendations:

- Integrating the early removal of wound dressing as an evidence based measure to reduce post-cesarean section wound infection in the governmental hospitals.
- Examine the effect of early wound exposure on different types of surgeries in different setting.
- Applying an educational sessions for the pregnant women about the positive effect of early dressing removal to decrease the incidence of SSI.
- Further studies are essential to examine if the wound dressing is essential after 48 hours post-operative in different types of surgery and its effect on level of contamination.

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CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest in the study.

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