Effect of Immediate Maternal-Neonatal Skin-to-Skin Contact on the Outcomes of the Third Stage of Labor

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Abstract

Background: *Third stage of labor is the shortest yet the most treacherous, as it may be compounded by the risk of postpartum hemorrhage (PPH). Managing such perilous stage effectively is an imperative to accomplish a safe outcome for the parturients. Immediate skin-to-skin contact (SSC) upon birth could be a protective strategy to mitigate the frequency and severity of PPH during labor, thus securing a safe positive childbirth experience for the mothers.* ***Objective:*** *To assess the effect of immediate maternal-neonatal SSC on the outcomes of the third stage of labor.* ***Settings:*** *This study was implemented at the labor and delivery unit of El-Shatby Hospital for Obstetrics and Gynecology, affiliated to Alexandria University, Egypt.* ***Subjects:*** *A convenient sample of sixty parturients was enrolled from the formerly identified setting and equally allocated into a study (30) and a control (30) group.* ***Tools:*** *Three tools were utilized. Tool-I: Basic data structured interview schedule. Tool-II: Third-stage of labor structured assessment sheet. Tool-III: Quantification of maternal blood loss during the third-stage of labor.* ***Results:*** *Statistically significant differences were revealed between both groups in relation to the outcomes of the third stage of labor. In which a shorter mean duration of the third stage of labor (6.62 ± 2.96 minutes) and less mean amount of blood loss (301.03 ± 51.17 ml) was found among the study group parturients than among the control group parturients (11.58 ± 2.13 minutes and 389.77 ± 84.25 ml, respectively). Also, higher percentages of the study group parturients demonstrated a firm contracted uterus located around the level of umbilicus following the delivery of a complete intact placenta and membranes, with less need for additional therapeutic measures relative to the control group ones.* ***Conclusion****: Immediate maternal-neonatal SSC produced positive effects on the outcomes of the third stage of labor.* ***Recommendations:*** *Training programs for maternity nurses would encourage them to adopt the practice of maternal-neonatal SSC.*

Keywords: labor, third stage, skin-to-skin contact, outcomes.

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Introduction

Maternal health stands out as a pressing global health challenge within the 2030 Sustainable Development Goals (SDGs) agenda established by the United Nations. Target 3.1 of the SDGs calls for advancing maternal health by "reducing the global maternal mortality ratio (MMR) to less than 70 / 100,000 live births by 2030" (United Nations, 2023a). Unfortunately, recent global estimates reveal a concerning stagnation in the global maternal mortality reduction rate between 2016 and 2020 (World Health Organization, 2023a). In 2020 alone, around 287000 women died globally due to

adversities of pregnancy and childbirth. Almost 95% of these deaths occurred in countries with low- and middle-income economies, including Egypt. To eliminate this glaring disparity in maternal survival, an additional target has been set that by 2030, all countries should aim for a two-thirds reduction in their national MMR compared to their 2010 baseline (World Health Organization, 2021). Egypt's MMR declined steadily from 54 to 42 per 100,000 live births between 2010 and 2019. However, this progress was reversed in 2020 as the MMR rose to 49 per 100,000 live births (United Nations, 2023b).

Obstetric hemorrhage is the prime direct cause of maternal mortality, with postpartum hemorrhage (PPH) being the most common form and the most frequent childbirth complication. Alarmingly, most PPH deaths occur within the first four hours following the neonate's delivery, suggesting they are a consequence of events in the third stage of labor. This labor stage involves strong uterine contractions to facilitate placental separation and expulsion, while securing hemostasis at the former site of placental attachment. Inadequate uterine contractility associated with impaired placental separation is the main cause of PPH that is a catastrophic loss of maternal blood. However, most PPH related deaths are largely preventable through effective interventions (Konar, 2022; World Health Organization, 2023b).

The World Health Organization (WHO) has prioritized a set of critical maternal outcomes as targets for clinical care during the third stage of labor. These outcomes mainly entail enhancing uterine contractility and expediting complete placental delivery in the easiest safest manner. With the intent of limiting the associated blood loss and precluding the complications of the third stage of labor thus reducing the urgency for additional therapeutic interventions. Active management of the third stage of labor (AMTSL) has been the most widely recommended package of interventions to prevent PPH and improve birth outcomes (Lowdermilk et al., 2020; World Health Organizatio, 2018).

The timeframe surrounding birth has also been declared as a valuable opportunity for averting neonatal morbidity and mortality. Accordingly, global health agencies have recommended a bundle of essential newborn care (ENC) interventions to be provided for all healthy neonates immediately following birth. One key component of ENC is maternal-neonatal skin-to-skin contact (SSC) where the neonate is placed directly on the parturient's bare chest/abdomen following birth, draped by a warm blanket. Existing research has primarily focused on establishing SSC's neonatal benefits and breastfeeding outcomes. Attempting to explain the concluded neonatal benefits, researchers hypothesized that SSC mediates its observed impacts through activating neonatal and maternal endogenous oxytocin release. Thus, smoothing neonates' adaptation to extrauterine life and enhancing their survival. Yet, there is little insight into whether this alleged SSC hormonal interplay translates to similar positive outcomes for parturients during labor (Macdonald & Johnson, 2017; Moore et al., 2016; World Health Organization, 2017).

Aims of the Study

Current study aimed to assess the effect of immediate maternal-neonatal SSC on the outcomes of the third stage of labor.

Research hypotheses

- **[H_1]:** Parturients who experience immediate maternal-neonatal SSC after complete delivery of the neonate exhibit a shorter duration of the third stage of labor compared to those who do not experience this contact.
- **[H_2]:** Parturients who experience immediate maternal-neonatal SSC after complete delivery of the neonate display a higher prevalence of a firm contracted uterine fundus located around the level of the umbilicus compared to those who do not experience this contact.

- **[H_3]:** Parturients who experience immediate maternal-neonatal SSC after complete delivery of the neonate demonstrate a higher rate of delivering a complete intact placenta and membranes compared to those who do not experience this contact.
- **[H_4]:** Parturients who experience immediate maternal-neonatal SSC after complete delivery of the neonate exhibit less blood loss during the third stage of labor compared to those who do not experience this contact.
- **[H_5]:** Parturients who experience immediate maternal-neonatal SSC after complete delivery of the neonate exhibit a reduced need for additional therapeutic measures during the third stage of labor compared to those who do not experience this contact.

Materials and Method

Materials

Design: This study employed a quasi-experimental research design.

Settings: Current study was implemented at the labor and delivery unit of El-Shatby Hospital for Obstetrics and Gynecology, affiliated to Alexandria University, Egypt. This hospital was selected due to its satisfactory turnover for the study.

Subjects: A convenient sample of sixty parturients was enrolled from the formerly identified setting according to the following eligibility criteria:

- Age between 18 to less than 35 years.
- Had a normal singleton pregnancy between 37th- 42nd weeks of gestation.
- Had a viable fetus in cephalic presentation.
- No previous history of major obstetric hemorrhage or caesarean section.
- During normal vaginal delivery without pharmacological pain relief.
- Had a normal neonate with the 1st minute Apgar score ≥ 7.
- Willing to participate in the study.

Sample size was calculated using the Epi Info-7 statistical program with the following parameters: Total population: 300 parturients (over one month in 2019), “Confidence level 95%, Expected frequency 50%, Acceptable margin of error 10% and Design effect / power 80%”. Minimal sample size 52 parturients.

Eligible Parturients were evenly appointed to two groups as follows: the first 30 parturients constituted the control group who received the conventional hospital care for the third stage of labor, and the next 30 parturients comprised the study group who practiced immediate SSC following birth.

Tools: Three tools were utilized to collect the necessary data:

Tool-I: Basic data structured interview schedule: It was designed by the researcher and comprised two sections as follows:

1. Sociodemographic attributes such as: age, level of education, occupation and current residence.
2. Reproductive/childbearing history such as: gravidity, parity, number of abortions and number of attended antenatal visits during the current pregnancy.

Tool-II: Third-stage of labor structured assessment sheet: It was designed by the researcher and utilized to assess the following maternal parameters: duration of the third stage of labor, characteristics of the uterus (tone and fundal level) and condition of the delivered placenta and membranes. In addition to documenting the parturient’s need for any additional therapeutic measure.

Tool-III: Quantification of maternal blood loss during the third-stage of labor: The gravimetric technique originally developed by Owen H. Wangensteen (1942) was adopted by the researcher to measure the quantity of maternal blood loss during the third stage of labor. Where the blood-soaked materials were weighted on a sensitive scale to estimate the quantity of the lost blood in grams by subtracting the known dry weights of these materials. It was then converted into milliliters using the formula described by Owen Wangensteen “1 gram = 1 milliliter” ("Association of Women’s Health, Obstetric and Neonatal Nurses", 2015). Lastly, each parturient’s

amount/quantity of blood loss was ranked as follows: less than normal blood loss (< 250 ml), normal blood loss (250 – 350 ml) and excessive blood loss (> 350 ml).

Method

- Ethical approval was obtained from the Faculty of Nursing Research Ethical Committee, University of Alexandria.
- Official permission was secured from the study setting's responsible authorities to conduct the study.
- Data collection tools I and II were designed by the researcher based on a thorough review of current pertinent literature, while tool III was adopted.
- A panel of five field experts assessed the content validity of the study tools, and their recommendations were considered.
- Tools' reliability was tested through interrater reliability technique in which Kapa coefficient was 0.94 indicating near perfect agreement between observers.
- A pilot study was conducted involving 6 parturients from the aforementioned study setting (excluded from the actual study sample) to assure feasibility of the study and test clarity and applicability of the data collection tools. Tools were modified accordingly and prepared for use.
- Data collection lasted nine months (from December 2020 to August 2021).
- Each eligible parturient was individually interviewed for 10-15 minutes during the 1st stage of labor to collect data of tool (I) then the researcher remained throughout the 1st and 2nd stages of labor to provide support and record the exact timing of complete neonatal delivery.
- Tool (II) and (III) were utilized to assess the studied maternal outcomes during the third stage of labor, while receiving the following care:
  - For *all parturients* at the beginning of the third stage, a pre-weighted dry absorbent mat was placed under the parturient's lower back and buttocks; while another mat was placed in a large basin situated on the floor below the parturient's genital area. These mats were left in place till complete placental delivery.
  - The *control group* received conventional hospital care, encompassing separation of the parturient and neonate after umbilical cord cutting. The neonate was transferred to a neonatal care unit for immediate care under a radiant warmer, while the mother remained in the delivery room for routine third stage of labor management and the exact time of complete placental expulsion was recorded.
  - Each eligible neonate in the *study group* was dried and placed naked - except for a head cap - in a prone position against the parturient's bare abdomen within the first minute after birth; draped by a pre-warmed blanket to practice maternal-neonatal SSC. Neonate's suctioning and identification were done while on the mother's abdomen. SSC continued till complete placental delivery then the exact time of expulsion was recorded. After placental expulsion, the neonate was taken to receive all the postponed immediate care interventions such as weighing, eye-prophylaxis, vitamin K injection... etc.
- During SSC, neonates' safety was assured through the following measures:
  - The neonate's head was kept in lateral position to facilitate breathing.
  - Neonate's and parturient's condition were closely monitored and SSC was discontinued if any abnormality arose.
  - The blanket and head cap were replaced if dampened to maintain the neonate's temperature.
  - The neonate was supported during the contact to prevent falling.
- After complete placental expulsion the researcher performed the following procedures for all studied parturients:

- The duration of the third stage of labor was calculated in minutes by subtracting the time of neonatal birth from the time of complete placental delivery.
- The parturient's abdomen was manually palpated over the uterine corpus and fundus to determine its tone and level.
- The placenta was received in a basin and washed under running water, then placed on a flat surface to assess its completeness through examining the maternal / fetal surface and the attached membranes.
- The blood-soaked disposable absorbent mats were collected for reweighing using the same weighing scale used prior the application procedure. The following formula (Mat's soaked weight in grams - mat's dry weight in grams = blood loss in grams) was applied to provide a rough estimate of blood loss in grams. Then finally, the blood loss in grams (gm) was converted to blood loss in milliliters (ml) using the formula of 1 gm = 1 ml.
- In case of complications, the received additional therapeutic measures were documented.

- The placenta and blood-soaked materials were discarded according to setting's policy.
- Data was firstly collected from the control group then from the study group to evade the risk of contamination between the studied groups.
- Outcomes of the third stage of labor were compared between both groups to determine the effect of the studied intervention.

Ethical considerations:

Research purpose was explained for each recruited parturient, who then provided a written informed consent. Parturient's privacy, anonymity, data confidentiality, voluntary participation with the right to withdraw at any time were all maintained throughout the study.

Statistical Analysis

The collected data was categorized, coded, computerized, tabulated and analyzed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive and analytical statistics were used to describe the characteristics of two studied groups and compare between their outcomes.

Results

Table (I) shows that both study and control groups had a relatively similar socio-demographic attributes.

According to **table (II)**, no statistically significant difference was detected between the two groups in relation to their reproductive history ($p>0.05$). Where almost two-fifths (43.3% and 36.7%) of the study and control groups, respectively, were primigravidae with no previous parities (43.3% and 40%, respectively). Considerable proportions of the study (83.3%) and control (76.7%) groups attended at least 4 antenatal visits.

Table (III) exhibits a highly statistically significant difference between the study and control groups regarding the duration of the third stage of labor ($p < 0.001$). The mean duration of the third stage of labor was shorter among the study group subjects (6.62 ± 2.96 minutes) than among the control group subjects (11.58 ± 2.13 minutes).

Table (IV) presents a statistically significant difference between the two groups concerning overall characteristics of the uterus at the end of the third stage of labor ($p<0.05$). Firm uterine consistency was noted among the entire (100%) study group compared to slightly more than three-fifths (63.3%) of the control group. As much as 80% of the study group compared to only 60% of the control one had a normal fundal height. None (0%) of the study group subjects received a therapeutic uterotonic compared to slightly more than one-third (36.7%) of the control group subjects.

As displayed in **table (V),** a statistically significant difference was recorded between

both groups regarding the general state of the expulsed placenta and membranes as well as their need for manual removal of placental remnants ($p<0.05$). The expulsed placenta and membranes were generally incomplete among slightly less than one-quarter (23.3%) of the control group compared to none (0%) of the study group. Accordingly, manual removal of placental remnants was needed for hardly one-quarter (23.3%) of the control group compared to none (0%) of the study group.

Table (VI) portrays a highly statistically significant difference between both groups regarding the quantity of maternal blood loss throughout the third stage of labor ($p < 0.001$). Where the mean quantity of maternal blood loss throughout the third stage of labor was higher (389.77 ± 84.25 ml) among the control group than the study group (301.03 ± 51.17 ml).

Discussion

The present study findings revealed a notably shorter mean *duration of the third stage of labor* (6.62 ± 2.96 minutes) among the study group parturients relative to (11.58 ± 2.13 minutes) among the control group ones. This result is congruent with the discoveries of a non-randomized controlled study conducted by **Mohamed et al. (2022)** in **Egypt** to determine "the effect of SSC on maternal and neonatal outcomes". In addition to the findings of **Gündüz and Öztürk (2023)** study that appraised "the effect of SSC on placental separation time and initiation of breastfeeding" in **Turkey**. Both studies reported that maternal-neonatal SSC reduced the duration of the third stage of labor when compared to conventional care

This consistency between the findings of the current study and the aforementioned two researches could be elucidated based on three mechanisms hypothesized in literature to trigger such clinical impact of SSC. Firstly, **Uvnäs-Moberg et al. (2020)** argued that SSC constitutes a pleasant somatosensory stimulus that might trigger the parturient's endogenous oxytocin release, inducing its linked central and peripheral effects; particularly the uterine contractile activity. Secondly, **Buckley et al. (2023)** and **Uvnäs-Moberg and Petersson (2022)** had both proposed that SSC could potentiate the parasympathetic nervous system dominance which fosters effective uterine contractions. Thirdly, a Cochrane review by **Moore et al. (2016)** mentioned that the neonate's crawling attempts from the parturient's abdomen towards the breast mimic the massage movements which might impel uterine contractions. These uterine contractions could expedite placental delivery thereby shorten the duration of the third stage.

However, this same current study result is incongruent with the findings of **Turan and Erenel, (2018),** who studied "the effect of SSC on the placental separation time, mother's oxytocin and pain levels" in **Turkey**. Their results showed absence of any significant difference between the intervention and conventional care groups regarding the duration of the third stage of labor. This disagreement between this Turkish study findings and the current study results may be attributed to the fact that the timing of birth in the Turkish study participants was not standardized across the two studied groups. Where most of the intervention group subjects gave birth during daytime hours (12:01 to 18:00) while most of the control group gave birth during night and early morning hours (00:01 to 06:00). According to literature, melatonin - a hormone released by the pineal gland during night time and early morning - synergizes with oxytocin resulting in increased myometrial contractility and enhanced sensitivity of the myometrium to oxytocin (Karpovitch et al., 2018; Olcese, 2020). This may had blurred the effect of SSC among the Turkish study subjects.

Concerning *uterine tonus*, *fundal height and the need for therapeutic uterotonics*, the present study findings displayed that the study group was more likely to have a firm uterine tone with a fundal height near or below the umbilicus and no need for

therapeutic uterotonics compared to the control one. These results agree with the findings of two other studies. First: **Abdelmenem et al. (2019)** who explored "the effect of early maternal and newborn SSC after birth on the duration of third stage of labor and initiation of breastfeeding" in **Egypt.** Second: a scoping review done by **Ruiz et al. (2023)** to evaluate "SSC in the third stage of labor and postpartum hemorrhage prevention" in **Brazil**. Both studies revealed that immediate maternal-neonatal SSC had improved the uterine tone and physiological involution alongside reducing the requirement for therapeutic uterotonics. Such accordance between the present study results and the previous two could lend support to the claimed relationship between SSC practice and increased maternal oxytocin level which favors uterine contractility.

Yet, these same results denoted in the current study on uterine tonus and fundal height contradict the results of revealed by **Al-Alaa et al. (2021),** who executed a study to "assess the effectiveness of using kangaroo mother care on reducing postpartum bleeding among laboring women" in the **Kingdom of Saudi Arabia**. Their results demonstrated that majority of the subjects in the study and control groups had a contracted uterus and the fundus was located at or below the umbilicus, with no statistical significance differences between the two studied groups. This discrepancy between the current study findings and those of the Saudi study could be imputed to possible variations in the routine hospital care received by the parturients across the different study settings. They did not fully elaborate on their routine practices, but their parturients might have received prophylactic uterotonics prior placental delivery as part of the routine care protocol in their study setting, unlike the current study where uterotonics were only administered if complications arose.

Once more, the present study results in relation to the need for therapeutic uterotonics is inconsistent with the findings reported in another **Egyptian** study done by **Hewedy et al. (2023)** to test "the effect of immediate mother and newborn SSC on their health". Their results featured an insignificant statistical difference between the SSC and control groups in the use of uterotonics as all their parturints had received uterotonics. This divergence between the results of the current study and the latter one could be attributed to differences in the subjects' delivery mode. Where in the current study all the recruited subjects had a normal vaginal delivery, while in the contradicting study more than three-fifths of the subjects in each group had delivered by C-section and the remainder had delivered vaginally. It is possible that these differing modes of delivery point to variations in the followed care pathways, which might have necessitated the routine use of preventive uterotonics for the opposing study subjects, unlike the current study. As for their vaginal delivery subjects, uterotonic administration timing and indication were not specified whether it was at earlier labor stages for induction or the beginning of the third stage as a prophylaxis. Both timings and indications for uterotonic use were different from the present study as discussed earlier.

Regarding the *general state of the expulsed placenta and membranes*, the findings of the present study indicated that overall completeness of the placenta and membrane was more frequently observed in the study group than in the control group. This data is compatible with the discoveries of **Parikh et al. (2018)** who researched the "effect of early maternal newborn skin to skin contact in labor room on third stage of labor and success at breastfeeding" in **India.** Alongside the results of **Ruiz et al. (2023)**. They consistently highlighted that complete expulsion of the placenta and membranes was significantly greater in their study groups compared to their control groups. This resemblance of findings could be ascribed to the evident prompt uterine contractility among the SSC subjects that could have assisted in detaching and expelling the

placenta more efficiently thus reducing PPH risk.

This same result of the present study regarding the condition of the expulsed placenta is opposite to the findings disclosed by **Al-Alaa et al. (2021)**. They reported that placental completeness was evident in all subjects of their both groups. The difference between their results and the current study findings might be due to the nature of conventional care employed in each study setting. In the previous study setting the applied care protocols might have included the preventive use of uterotonics to facilitate efficient placental delivery for all subjects during the third stage. This routine prophylactic use of uterotonics was not implemented for the current study subjects as uterotonics was only administered for theraputic indications.

Based on the findings of the current study, immediate maternal-neonatal SSC lowered the number of parturients requiring *manual removal of the missed placental fragments* compared to routine hospital care. This variable was not explored in the available researches studying the impact of SSC on maternal outcomes during the third stage of labor. The scarcity of such data may be due to possible differences in the adopted care guidelines across the different study settings. Nonetheless, this result could be rationalized within the context of this present study's earlier discussed findings demonstrating that SSC could be associated with adequate uterine contractility. This in turn would lead to faster more efficient placental expulsion and proper uterine involution. Therebyby, reducing the risk of retained placental fragments and the need for manual removal.

The current study findings portrayed that the study group exhibited a notable less *blood loss* during the third stage of labor relative to the control group. This result is in line with the findings revealed in the study executed by **Mohamed et al. (2022)** and a **Turkish** trial by **Kartal et al. (2022)** who investigated "effects of SSC on afterpain and postpartum hemorrhage". Both studies pointed out a statistically significant difference between their SSC and routine care groups regarding the amount of blood loss experienced during the third stage, with the SSC subjects experiencing lesser amounts of blood loss compared to the control ones. These two supporting studies had imputed their results to the presumed SSC underlying physiology that may stimulate uterine contractions. According to literature, these contractions would expedite delivering a complete placenta while creating living ligatures to constrict the torn blood vessels (Marshall & Raynor, 2020). Limiting blood loss during vaginal delivery may indicate minimizing the parturient's risk for PPH since the increased amount of blood loss had traditionally been used to signify the incidence of such catastrophic maternal outcome.

Conclusion

All five hypotheses are accepted. Accordingly, the present study findings confirmed the positive effect of immediate maternal-neonatal SSC on the outcomes of the third stage of labor.

Recommendations

Considering the current study's findings, the following recommendations are suggested:

- Incorporating immediate maternal-neonatal SSC into maternity curricula may be considered by the related educational institutions.
- Pre- and in-service training programs for maternity nurses would sensitize them about the importance of maternal-neonatal SSC and encourage them to adopt this practice.
- Further study to assess parturients' satisfaction with the practice of immediate maternal-neonatal SSC.

Table (I): Distribution of the studied parturients in both groups based on their sociodemographic attributes.

Sociodemographic attributes	Group				Test of Significance (p-value)
	Study (n=30)		Control (n=30)		
	No	%	No	%	
Age (years)					
<20	2	6.7	3	10.0	χ^2=0.481 (p=0.923)
20–	12	40.0	11	36.6	
25–	13	43.3	14	46.7	
30– <35	3	10.0	2	6.7	
Level of education					
▪ Illiterate or read & write	2	6.7	1	3.3	χ^2=0.970 (p=0.808)
▪ Primary or preparatory	4	13.3	6	20.0	
▪ Secondary or its equivalent	13	43.3	14	46.7	
▪ University or higher	11	36.7	9	30.0	
Occupation					
▪ Housewife	27	90	26	86.7	χ^2=0.162 (p=0.688)
▪ Working	3	10	4	13.3	
Current residence					
▪ Rural	8	26.7	10	33.3	χ^2=0.317 (p=0.573)
▪ Urban	22	73.3	20	66.7	

Table (II): Distribution of the studied parturients in both groups based on their reproductive /childbearing history.

Childbearing history	Group				Test of Significance (p-value)
	Study (n=30)		Control (n=30)		
	No	%	No	%	
Gravidity					
▪ Once	13	43.3	11	36.7	χ^2=0.762 (p=0.858)
▪ Twice	10	33.3	9	30.0	
▪ Three times or more	7	23.3	10	33.3	
Parity					
▪ None	13	43.3	12	40.0	χ^2=1.241 (p=0.538)
▪ Once	12	40.0	10	33.3	
▪ Twice	3	10.0	5	16.7	
▪ Three times	2	6.7	3	10.0	
Number of abortions					
▪ None	27	90	25	83.3	χ^2=1.220 (p=0.543)
▪ Once	3	10	4	13.3	
▪ Twice	0	0	1	3.3	
Number of antenatal visits during current pregnancy					χ^2=0.417 (p=0.519)
< 4 visits	5	16.7	7	23.3	
≥ 4 visits	25	83.3	23	76.7	

Table (III): Distribution of the studied parturients in both groups based on the duration of the third-stage of labor.

Duration of the third stage of labor (minutes)	Group				Test of Significance (p-value)
	Study (n=30)		Control (n=30)		
	No	%	No	%	
<5	10	33.3	0	0.0	
5–	13	43.3	8	26.7	χ^2=20.419*
10–	7	23.3	19	63.3	(^{MC}p<0.001)*
15–	0	0.0	3	10.0	
Min–Max	1.49 – 11.47		8.24 –16.09		t=7.444*
Mean ± SD	6.62 ± 2.96		11.58 ± 2.13		(P<0.001)*

Table (IV): Distribution of the studied parturients in both groups based on the characteristics of the uterus at the end of the third-stage of labor.

Characteristics of the uterus	Group				Test of Significance (p-value)
	Study (n=30)		Control(n=30)		
	No	%	No	%	
Tone/consistency of the uterus					
▪ Firm	30	100	19	63.3	χ^2=13.469*
▪ Soft	0	0	11	36.7	(p<0.001)*
Height of the funds #					
▪ Below normal height	5	16.7	1	3.3	χ^2=12.063*
▪ Normal height	24	80.0	18	60.0	(^{MC}p=0.002)*
▪ Above normal height	1	3.3	11	36.7	
Received a therapeutic uterotonic					χ^2=13.469*
▪ Yes	0	0	11	36.7	(p<0.001)*
▪ No	30	100	19	63.3	

Table (V): Distribution of the studied parturients in both groups based on the condition of the expulsed placenta and membranes.

Condition of placenta and membranes	Group				Test of Significance (p-value)
	Study (n=30)		Control (n=30)		
	No	%	No	%	
General state of the placenta and membranes					
▪ Complete	30	100	23	76.7	χ^2=7.925*
▪ Incomplete	0	0	7	23.3	(^{FE}p=0.011)*
Need for manual removal of placental remnants					
▪ Yes	0	0	7	23.3	χ^2=7.925*
▪ No	30	100	23	76.7	(^{FE}p=0.011)*

Table (VI): Distribution of the studied parturients in both groups based on the quantity of maternal blood loss throughout the third-stage of labor.

Quantity of maternal blood loss (millimeters)	Group				Test of Significance (p-value)
	Study (n=30)		Control (n=30)		
	No	%	No	%	
Less than normal quantity (< 250)	4	13.3	0	0.0	χ^2=22.210* (^{MC}p<0.001)*
Normal quantity (250 – 350)	25	83.3	13	43.3	
Excessive quantity (> 350)	1	3.3	17	56.7	
Min–Max	164.0 – 368.0		275.0 – 581.0		U=146.50*
Mean ± SD	301.03 ± 51.17		389.77 ± 84.25		(p<0.001)*

χ^2: Chi square test MC: Monte Carlo FE: Fisher Exact U: Mann Whitney test t: t-test
p: p value for comparing between the studied groups
*: Statistically significant at p ≤ 0.05

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