

# Assess the Effectiveness of Using Kangaroo Mother Care on Reducing Postpartum Bleeding among Laboring Women: A Randomized Control Trial

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## Abstract

**Background:** Kangaroo Mother Care (KMC) is one of the important interventions that must be implemented immediately after birth, contributing to minimizing postpartum bleeding. Aim: To assess the effectiveness of using KMC in reducing postpartum bleeding among laboring women.

**Materials and Methods:** A randomized controlled clinical trial (Posttest design) was used in the present study. The study was conducted in the labor and delivery unit at King Abdulaziz Medical City (KAMC), Jeddah. 100 laboring women were recruited for the study randomly and divided into two equal groups. The intervention group had KMC while the control group received routine hospital care.

**Results:** The homogeneity is shown among the participants and approved as there is no significant difference between both groups according to socio-demographic and obstetric data. There were statistically significant differences between the intervention and control groups regarding the amount of blood loss related to KMC (p-value = 0.000). Also, a successful first breastfeeding was higher among the intervention group than the control group (p-value = 0.002).

**Conclusions:** The mothers who had KMC immediately after birth had lesser amounts of blood loss and experienced early successful breastfeeding initiation and continuous education and training programs to all midwives and nurses working in the labor and delivery about the importance of implementing KMC.

**Key-words:** effectiveness; kangaroo mother care; postpartum bleeding; labor; women

## Introduction

In general, labor stages differ in timing and duration based on parity, gestational age, and the woman's health status. However, any variation from each stage's normal timing and duration can expose the woman to severe complications [1]. Significantly, the third stage of labor is the critical time for both the mother and the fetus because most of the complications occur during this stage. In this stage, the midwife should be aware of the signs of placental separation from the uterus wall. The third stage's expected duration lasts a few minutes to 30 minutes, and prolonged periods may be associated with abnormal placentation such as placenta accrete [1] Postpartum bleeding is one of the severe

complications during the third stage of labor and is the primary cause of maternal deaths worldwide [2].

### Management during third stage of labor:

The third stage of labor is a critical and unpredictable period. It is expected to be a time of rest after fetal birth, especially if everything went normal. But unfortunately, for some women, it can become a very serious and dangerous time because most types of complications and hemorrhage can occur at this stage of labor. Therefore, it is important to control and minimize the amount of blood loss to the minimum level as possible. Accordingly, active management of the third stage of labor was suggested by WHO [2].

The active management during the third stage of labor is highly recommended to ensure uncomplicated maternal and neonatal outcomes and reduce the incidence of postpartum bleeding. This management includes assessing uterine contractility, administering the uterotonic drugs, performing controlled cord traction, examining the placenta and the membranes, massaging the uterus, checking the vaginal wall and the perineum for the presence of any lacerations, and monitoring vital signs [1].

Kangaroo Mother Care (KMC) is one of the most critical interventions that must be implemented immediately after birth as it can help minimize postpartum bleeding [3]. KMC is an old technique that was first discovered in 1979 in Bogotá, Colombia, by neonatologists Edgar Rey and Hector Martinez when they were caring for premature newborns and had a shortage of incubators in their hospital setting. They placed the premature newborns on the mothers' chest and covered them with warm clothes [4].

KMC was thought to be an alternative to the routine hospital care for stable newborns. However, it is now considered by many developing countries as the most feasible, readily available, and preferred intervention for decreasing maternal and neonatal mortality and morbidity. Although both developing and developed countries have scientifically proven the benefits of KMC, it is still not implemented widely because health care providers are unsure whether to include KMC in their neonatal services [5].

#### **Benefits of postpartum Kangaroo Care:**

It has several positive effects on the newborn's general condition include facilitating the process of a newborn's transition from intrauterine to extrauterine life, improving the heart and lung functions, stabilizing the newborn's body temperature, strengthening the maternal-newborn bond and relationship, and enabling mothers and newborns to use their senses and start contacting each other [6,7]. The natural odors of the mother's breast under normal conditions can reduce crying and allows the newborn to orientate to the mother's breast and initiate breastfeeding [8,9].

In particular, the first hour after birth is a critical and sensitive period and is sometimes also called the 'golden hour.' It is the optimal time for KMC between the mother and the newborn when both are ready to coordinate because the alertness of newborn is at the maximum level during the first hour after birth [10,11]. On the other hand, previous studies have proven that the implication of KMC in the early third stage can help reduce postpartum complications. The advantages of KMC to the postpartum mother include maintaining uterine contractions, enhancing placental separation, shortening the third stage of labor, minimizing postpartum bleeding, and protecting the mother from depression. These actions result from a surge in the oxytocin level during KMC [12,13]

Besides the mother's bodies was better than an electric warmer. Also, reduce newborns hypothermic risk when KMC is implemented and thermal control achieved effectively [14,15]. The baby also becomes familiar with the mother's heart sounds and breathing patterns during KMC [16]. Therefore, KMC is recommended to be a safe practice that is a simple, cost-effective, efficient, and uncomplicated method to accelerate the third stage of labor and decrease the rate of postpartum bleeding, which is one of the major causes of maternal mortality and morbidity; [17,18].

#### **Applications of KMC:**

In 2019, the Kingdom of Saudi Arabia (KSA) had twice joined the International Kangaroo Care Awareness Day. The first one was in Care National Hospital in Riyadh, and the second was in Maternity and Children Hospital (MCH), Dammam, in support of the international kangaroo care organization and neonatal improvement program from the Ministry of Health. In this regard, the health professionals received training according to the Newborn Individualized Developmental Care

and Assessment Program (NIDCAP). A breastfeeding training course for all MCH staff was arranged, and family-centered care was developed to promote KMC in the Neonatal Intensive Care Unit (NICU) [19].

#### **Significance of the study:**

The effectiveness of KMC from the viewpoint of midwives, gynecologists, and caregivers to achieve the goal of changing the old practices for the care of labor and delivery to the new practice is highly suggested [20]. The lack of education and training of healthcare practitioners, including midwives on KMC showed their limited decision-making on KMC, which was further evidenced by the absence of standardized practices and the discontinuation of KMC after the mother and the newborn's discharge from the hospital [18].

In Saudi Arabia, there are limited studies on the effect of early KMC between the mother and the newborn on reducing postpartum bleeding [20]. However, the findings of a recent retrospective Saudi study [21] conducted in a tertiary hospital, revealed that the incidence rate of atonic PPH was 2.5% and it increased by 1.8% lately between 2015 to 2018 compared by other two recent studies conducted in Australia and South of Spain [22,23]. Moreover, in this study setting, KMC is not practiced as routine care immediately after birth in the Labor and Delivery unit at King Abdul-Aziz Medical City (KAMC), Jeddah. Therefore, this study aims to fill the gap and assess the effect of KMC on reducing postpartum bleeding.

**H0:** The KMC technique may not reduce postpartum bleeding.

**H1:** The KMC technique may reduce postpartum bleeding.

#### **Materials and Methods**

This study aimed to assess the effectiveness of using kangaroo mother care on reducing postpartum bleeding among laboring women through specific Objectives to assess the effectiveness of using kangaroo mother care on reducing postpartum bleeding among laboring women, assess the effectiveness of kangaroo mother care on the initiation of breastfeeding, and assess the relationship between breastfeeding and postpartum bleeding.

**Study Setting:** The study conducted in the labor room at King Abdulaziz Medical City (KAMC) Jeddah. The hospital is affiliated by the Ministry of National Guard Affairs Western Region is a 600 bedded Joint Commission International (JCI) accredited Tertiary Level Hospital.

**Samole size:** The estimated total sample size was 100 laboured women divided into two groups (50 experimental and 50 control) based on G-Power analysis with a moderate effect size of 0.5, power of 0.80, and significance level at  $p < 0.05$ .

The Inclusion criteria, includes age more than 18 years old, delivered a single full-term newborn (37- 42) weeks, post-normal SVD. The exclusion criteria were the mothers with high-risk factors of postpartum bleeding (multiple gestations, grand multigravida, placenta previa, abruption placenta, & history of postpartum bleeding.), women post-caesarean section and infants who need admission to NICU.

**Study design:** A posttest only design was applied, in which the research has two groups (experimental and control group) assigned randomly. Both groups did not pretest before treatment implementation [24].

**Randomization:** The study applied a simple random lottery method to minimize bias (Polit, D.F., Beck, 2010). The investigator wrote a letter (A) on an envelope for the intervention group (KMC plus hospital routine care) and letter (B) on another envelope for the control group (hospital routine care only). Then the participants' eligibility criteria" who agree to participate" are checked carefully, and the participant asked the women to choose one of the envelopes. ( figure 1)

**Data Collection methods:** The data collected on 15<sup>th</sup> August 2018 for six months. The investigator interviewed the laboring woman admitted to labor and delivery, based on the inclusion criteria. Then explained the nature and purpose of the study. A copy of the informed consent was given and explained to the woman to obtain the signature.

In the intervention group was encouraged to start KMC immediately after the birth of the newborn and before the delivery of the placenta, the investigator-assessed newborn's condition using APGAR score and then the undressed newborn held in the prone position on the mother's bare chest between the breasts for at least one hour and both covered with dry prewarmed blanket and the newborn's head was covered with a warm cap to prevent heat loss. Simultaneously, the mother was encouraged to initiate breastfeeding. While the newborn is stable, the investigator asked the nurse to postpone the hospital routine care " Vit K injection, Erythromycine ointment, and measurements until KMC has accomplished to minimize the interruption of KMC". In addition, the investigator-assessed the uterine status by palpating the uterus's location and contractility, and monitored placental separation and completeness of the placenta lobes and membranes, after the delivery. Besides the amount of blood loss was monitored as 100 ml was the minimum and 300 ml was the maximum amount of the bleeding based on the result of the current study for normal Spontaneous vaginal delivery.

In the control group, the women received the routine hospital care without KMC. However, the investigator-assessed the uterine status, location, contractions, the placental separation monitored for 30 minutes as maximum time. Then newborn wrapped in a warm blanket and given to the mothers, and they were encouraged to initiate breastfeeding in Labor and Delivery.

The investigator evaluated the mother, and the newborn's condition after the implementation of KMC. The evaluation included the vital signs, postpartum assessment and uterus's position, in addition to lochia amount, color, and odor.

**Data collection instrument:** It consists of three sections. The first section is demographic and personal data, including five items (age, level of education, occupation, marital status, and parity). Moreover, the second

section is an observational checklist about KMC (time, duration, length, and initiation of breastfeeding), and the third section is a structured questionnaire about the 3rd stage of labor. The observational checklist contained 6 questions to assess postpartum bleeding (uterus status, presence of uterine atony, uterus location, time of placental separation, completeness of the placenta, and estimated amount of blood loss). For control group the KMC section not presented (Appendix 1.)

**Validity and reliability:** This study tool adopted from Essa and Smail (2015) study. It was in the English language, and they checked for content validity by a jury consists of 5 experts in the field and the reliability conducted by watching 10 cases in a pilot study in which Kappa coefficient was 0.92. In our study, the Alpha Cronbach test was done to test the internal reliability for the first ten pilot cases, and the coefficient was 0.90. In addition to a pilot study was also done on 5 cases from each arm with a total of ten cases to examine the feasibility and reliability of recruitment, randomization, and implementation of the study. Based on it, there was no modification done in the questionnaire.

#### **Data Management and Analysis Plan:**

The statistical analysis of numerical data was conducted using the Statistical Package for Social Sciences (SPSS) version 20 software. Descriptive and analytical statistics were used, such as percentages, means, and standard deviations. Chi-square-test, Fisher Exact-test, and T-test with a P-value were set at 0.05 to identify the statistical significance difference between the results.

#### **Ethical Considerations:**

The research proposal was submitted to the research unit in the nursing college at King Saud bin Abdulaziz University for approval before submission to KAIMRC to obtain IRB approval. Then the IRB (SP18/092J) dated July 2018 approval obtained. An information sheet explaining the purpose of the study was compiled for circulation to all concerned. The anonymity of the participants, and the information provided kept confidential. The consent explained the purpose of the research and emphasized that participation in the research is voluntary.

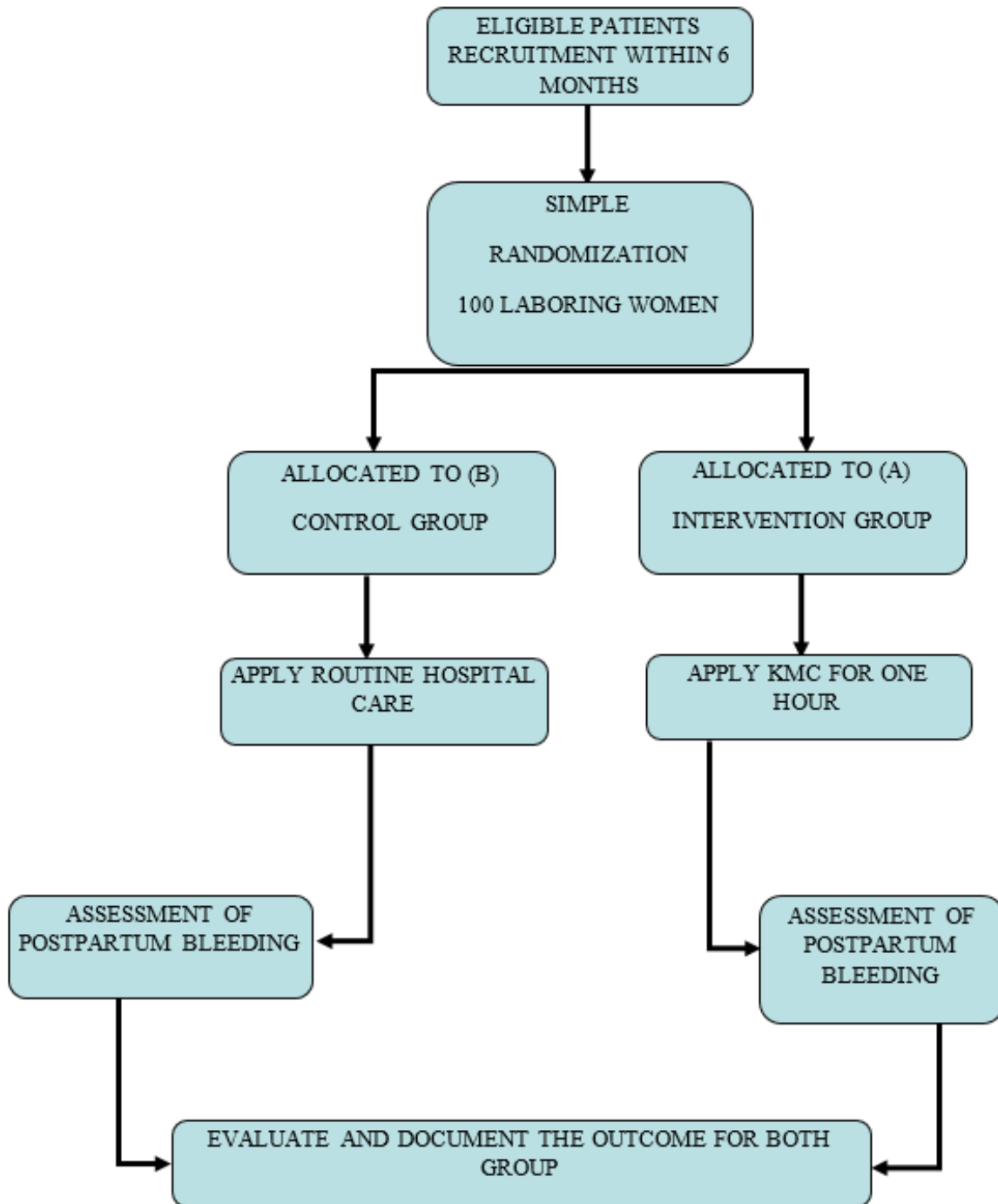


Figure 1: Schematic representation of the sampling technique

**Results**

Table-1 Explains the socio-demographic data in both control and intervention groups and the data presented in the form of mean, SD, frequencies, and percentages. As shown, there are no statistically significant differences between both groups in age, as (p-value = 0.142)

and 70% of intervention group have a secondary level of education, compared to 58% of the control group with (p-value =0.447). The majority 80% and 86% of both groups un-employed for intervention, and control groups respectively with p-value is 0.424.

Basic characteristics	Intervention group (n)=50		Control group (n)=50		P.V
	Mean ± SD		Mean ± SD		
Age	29.82 ± 6.070		28.08 ± 5.685		0.142
<b>Education level</b>	n	%	n	%	0.447
Primary school	4	8	8	16	
Secondary school	35	70	29	58	
Diploma	2	4	1	2	
Bachelor's degree	9	18	12	24	
<b>Occupation</b>					0.424
Employee	10	20	7	14	
Not employee	40	80	43	86	

\*P-value < 0.05, N= total number, SD= standard deviation

**Table 1:** Description of the participants regarding socio-demographic data.

In table-2 comparison between the two groups of participants to 82%, and 76% of the intervention and control group are multiparous with p-value = 0.461. The mean gestational age, 38.8 in the intervention group and 39.1

in the control group showed no significant difference between the two groups with p-value 0.294. The newborn's birth weight was 3148 and 3054 in intervention and control groups, respectively, and showed no significant difference between both groups.

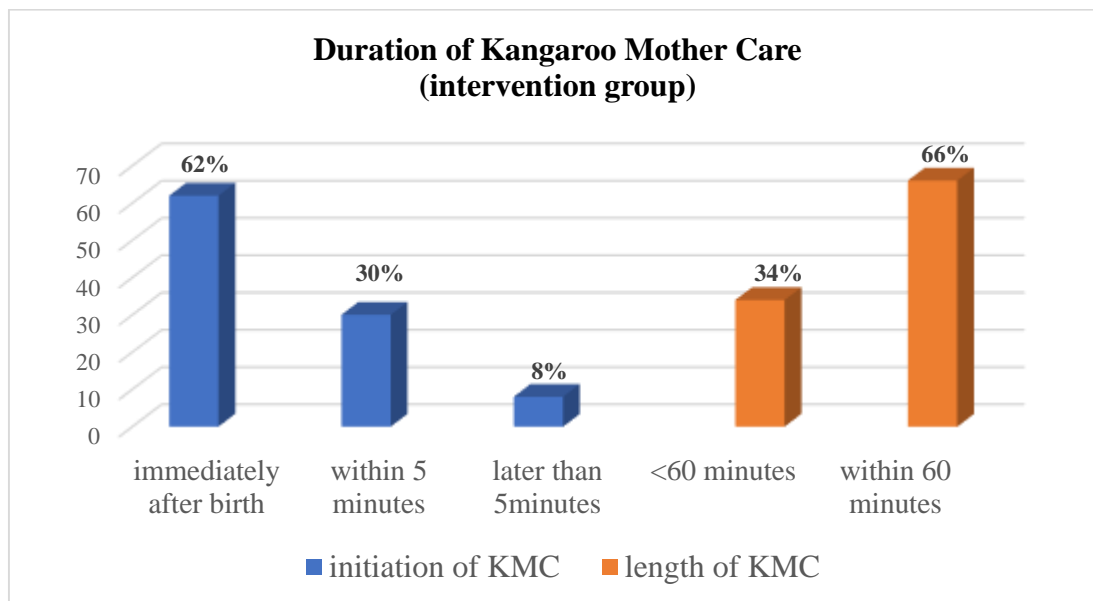
Basic characteristics	Intervention group (n)=50		Control group (n)=50		P.V
	Mean (SD)		Mean (SD)		
<b>Parity</b>	n	%	n	%	0.461
Primiparous	9	18	12	24	
Multiparous	41	82	38	76	
Gestational age	38.88 ± (1.062)		39.12 ± 1.206		0.294
Newborn's weight	3148.78 ± 462.647		3054.92 ± 429.215		0.296

\*P-value < 0.05, N= total number, SD= standard deviation

**Table-2:** Description of the participants regarding obstetric data.

As shown in fig.2, two-thirds of the intervention group, 62%, started KMC immediately after birth, and 8% started later than 5 minutes.

Regarding the length of KMC, the intervention group reveals 66% kept the newborn in KMC for a duration within 60 minutes.



**Figure 2:** Timing and duration of Kangaroo Mother Care in the intervention group

Table-3 showed that the majority 84% of the intervention group and more than half 56% of the control group-initiated breastfeeding after birth, and there was a significant relationship between KMC and breastfeeding

initiation ( $p < 0.002$ ). Furthermore, 56% and 30% of the intervention group and control group respectively initiated the breastfeeding after 10 minutes of birth and revealed a significant relationship between KMC and breastfeeding timing ( $p < 0.013$ ).

	Intervention group n=50		Control group n=50		
	n	%	n	%	P.V
Did breastfeeding initiated					
Yes	42	84	28	56	0.002
No	8	16	22	44	
If yes initiated at					0.013
After 10 minutes	28	56	15	30	
After 20 minutes	11	22	9	18	
After 30 minutes	3	6	4	8	

\*P-value < 0.05, N= total number

**Table-3:** Comparison between control and intervention groups according to their initiation of breastfeeding after labor.

Table 4. showed most of the intervention group and control group 98%, and 96% respectively has a contracted uterus with no statistical significance difference at  $p < 0.558$ .

	Intervention group (n)=50		Control group (n)=50		
	n	%	n	%	P.V
Uterine contractions					
yes	49	98	48	96	0.558
no	1	2	2	4	
Position of the uterus					
At or lower than the umbilical level	49	98	48	96	0.558
Above umbilical level	1	2	2	4	

\*P-value < 0.05, N= total number

**Table-4:** Comparison between the participants according to uterine contraction and position

Table-5 showed the vast majority of the intervention group and control group 94% and 86% respectively have placental separation in less than 30 minutes with no statistical significance difference at  $p < 0.262$ .

	Intervention group (n)=50		Control group (n)=50		
	n	%	n	%	P.V
Time of placental separation					
< 30 minutes	47	94	43	86	0.262
within 30 minutes	3	6	5	10	
>30 minutes			2	4	
completeness of the placenta					
complete	50	100	50	100	

\*P-value < 0.05, N= total number

**Table-5:** Comparison between the participants according to the completeness and time of placental separation.

Table-6 shows the comparison between the intervention and control group according to the amount of the blood loss reveals that the mean amount

of blood loss is 168 ml and 264 ml in intervention and control group, respectively, with a statistically significant difference at  $p < 0.001$ .

	Intervention group (n)=50			Control group (n)=50			P.V
	Mean ± SD	Minimum	Maximum	Mean ± SD	Minimum	Maximum	
<b>Amount of blood loss</b>	168± 77.433	100	600	264 ± 90.936	150	650	0.001

\*P-value < 0.05, N= total number, SD= standard deviation

**Table-6:** Comparison of the amount of blood loss between the participants.

**Discussion**

The current study results revealed no statistically significant difference in the uterine contractions between intervention and control groups,



according to KMC. Similarly, the uterus's position either above or under the level of the umbilicus, there is no significant difference between both groups, according to KMC. Adversely, [26] conducted a study in Egypt on the early Skin-to-Skin Contact (SSC): its effect on the third stage of labor and breastfeeding initiation. The results showed a significant difference between both groups in uterine contractions and the fundus level with KMC immediately after birth.

These findings are in line with Essa and Ismail, who conducted a study in Egypt 2015 on the effect of early maternal/newborn skin-to-skin contact after birth on the duration of the third stage of labor and initiation of breastfeeding. Besides, the result of their study demonstrated that there is a statistically positive relation between SSC and many factors concerning the third stage of labor that includes time and complete separation of the placenta, immediate contraction of the uterus, and uterine position. The reason behind the differences between our study results and previously mentioned studies may be due to the difference in the participants' characteristics as the researchers recruited only primigravida. In contrast, in our study, the majority of the participants are multigravida women.

In this regard,[27] who studied early skin-to-skin contact effects on the mother and the newborn in Madrid, found a significant reduction in the time of placental expulsion in the study group than in the control group. The conflict between this study results and our study result may be due to the difference in the sample size where they recruited 274 women 137 in each group while in our study, only 100 women were recruited 50 women in each group. The other reason for the conflict is SSC's duration as the author implements it for completed 2 hours.

#### *The effectiveness of KMC in reducing blood loss*

Regarding the relationship between KMC and the reduction in the amount of blood loss, this study revealed a highly significant relation between KMC and the amount of blood loss. The mean amount of blood loss was lesser within the intervention group than the amount of blood loss within the control group. Similarly [17] findings in their systematic review and meta-analysis about the effect of mother-infant skin to skin contact after birth on the third stage of labor which showed that early SSC between the mother and newborn could reduce the mean duration of the third stage of labor as well as decrease the blood loss.

Moreover, findings of another study [26] showed a highly statistically significant difference among the participants in the postpartum bleeding after early SSC application. The reason of that finding referred to the initial contact between the mother and the newborn where the attempts of the newborn to breastfeed further augment and surge the maternal oxytocin levels, in addition strengthen the uterine contractions which help the placenta to separate and the uterus to contract effectively so, the oxytocin acts in this way to prevent postpartum bleeding. In the same line an Egyptian study [7] showed a statistically positive relation between SSC and the absence of any signs of postpartum hemorrhage.

In the agreement of this study result, [28] has studied the effect of early maternal-newborn skin contact during the third stage of labor on childbirth outcomes, and the results indicated that the mean amount of blood loss was lower in the intervention than the control group immediately after birth. Probably due to when the neonate touches the mother's abdomen, it enhances the uterine contractions.

Moreover, our study findings in line with [8] study the effects of SSC and breastfeeding at birth on the incidence of PPH in Australia, and the results reflected a positive relation between SSC and uterine contraction and reduction in postpartum bleeding. Similar to the findings to these results the study by Joshi, 2012 [29] which conducted a randomized, controlled trial about the effect of kangaroo care on maternal and neonatal outcomes, in Lonavala, India and the results reflected that Kangaroo mother Care (KMC) improved the maternal outcomes of the third stage

of labor in terms of the height of fundus, uterine contractions, and postpartum bleeding.

#### *Effectiveness of kangaroo mother care on the initiation of breastfeeding:*

In this study, the result showed a significant relation between KMC, initiation of breastfeeding, and the timing of the breastfeeding between both groups. In this regard,[30]. conducted a systematic review on the role of kangaroo mother care in growth and breastfeeding rates in low birth weight neonates and showed that KMC has a positive effect on the very low birth weight infants and also lead to increase in the breastfeeding rates. Likewise, [31] study confirmed that early attachment of the newborn to the breast with early successful first breastfeeding for a longer time compared with the control group who received the routine hospital care. Moreover, the findings of Turkish study [6] demonstrated that breastfeeding and lactation started earlier in infants that received SSC compared to the control group.

Parallel with our study findings, Mohammed, 2017 [28] examined the effect of early maternal-newborn skin contact during the third stage of labor on childbirth outcomes, and the findings indicated that maternal-newborn skin contact had a positive effect on breastfeeding initiation more in the intervention group than the control group. Similarly, Heidarzadeh et al. [32] study indicated that the mothers who performed KMC in NICU for their newborns had more exclusive breastfeeding than those of the control group. This result supported by the finding of a systematic review of 15 randomized controlled trials which conducted by Conde-Agudelo & Díaz-Rossello, [12] that compared KMC and conventional newborn care that has compelling evidence that KMC is positively associated with increase chances of successful breastfeeding in the intervention group at a time of hospital discharge. Likewise, the study about "holding the baby and early mother-infant contact after childbirth and outcomes" of Redshaw, Hennegan, & Kruske, [33] was stated that early contact during KMC between the women and their newborn appeared beneficial after birth and more likely to initiate breastfeeding successfully.

On the other hand, breastfeeding initiation was disturbed resulted in ineffective suckling of the newborn and low attachment between the mother and the newborn in the study of Cantrill et al., [9] on the effective suckling concerning SSC hours of life. One of the reasons behind these results was that SSC's frequent interruptions might have interfered with some infants achieving suckling and effective breastfeeding within the first hour after birth.

The other reason is the maternal birth choice at the time; for example, some mothers preferred to give birth in positions where it was not possible or safe to hold their newborn immediately (such as standing up birth or leaning over the bed). After birth, mother fatigue can be one of the reasons that contributed to ineffective breastfeeding as some mothers started holding their newborns but requested another person to hold the baby because she needs to relax and get comfortable or needed medical attention. Another factor known to interfere with effective breastfeeding in the newborn is the use of analgesic drugs for the mother during birth. Some newborns who did not attach and suckled virtually have been affected adversely by analgesia.

#### **Strengths:**

- The ability to use a high-quality and non-pharmacological technique, which is KMC, to provide optimal protection for both women and newborn and reduce postpartum bleeding, consequently reducing maternal mortality and morbidity.
- Also, enhancing and encouraging the breastfeeding initiation of being KMC in the gold time (the first hour after birth) has short and long term positive effects on from promoting bonding when

the woman and newborn as directed by WHO recommendations for postpartum management and feeding (WHO, 2012).

### Limitations:

- The implementing KMC have obstacles due to shortage of staff, increased workload, and the staff attempts to complete their obligations without delaying.
- Increases the interruption between the woman and newborns during KMC due to hospital routine care.
- Lack of knowledge and training of the staff regarding KMC implementation
- Sample size was limited due to limited time frame for data collection.

### Conclusion:

The application of early KMC in this study discloses many benefits for the mothers and newborns. As the study reveal reduction of blood loss concerning KMC group. Besides, breastfeeding early initiation and increase in duration due to skin-to-skin contact. Moreover, the breastfeeding decreased the amount of blood loss and reflected less postpartum bleeding among intervention groups. Also, the mothers expressed a positive reaction regarding their feeling during babies contact hours to their bodies.

### Recommendations

*Based on the present study's findings, the study recommends the following:*

KMC should be performed immediately after birth and continued for at least one hour whenever possible.

A continuous training program about the implementation of KMC is needed for all midwives and nurses in delivery rooms and the other assistants.

Should have a cooperation protocol with the organization, health care providers, and the families.

Encourage the integration of mothers' satisfaction level in future studies regarding KMC.

All health care providers should be aware of KMC components, which are correct positioning with the skin-to-skin contact, and benefits of early breastfeeding as possible during KMC.

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**Author Contributions:** Conceptualization, H. Al; Investigation, H. Al; Methodology, H. Al; Project administration, H. Al; Supervision, H. Al; and HF; Validation, HF; Writing – original draft, HF; Writing – review & editing, H. Al and HF.

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