Effects of Southern Thai Traditional Massage and Warm Compression in the Early Postpartum on Lactation and Breast Engorgement Among Primiparous Mothers

Chudanut Khoonphet

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Nursing Science (International Program)

Prince of Songkla University

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Major Program	Nursing Science (International Program)

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Dean of Graduate School

This is to certify that the work here submitted is the result of the candidate's own investigation. Due acknowledgement has been made of any assistance received.

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I hereby certify that this work has not been accepted in substance for any degree, and is not being currently submitted in candidature for any degree.

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ABSTRACT

The common breastfeeding problems including delayed onset of lactation, insufficient milk volume, and breast engorgement are important barriers to successful exclusive breastfeeding among primiparous mothers. These problems can cause primiparous mothers to stop exclusive breastfeeding early. It is necessary to develop an intervention for promoting the onset of lactation, increasing milk volume, and decreasing breast engorgement in primiparous mothers to improve the success of exclusive breastfeeding. Therefore, this study investigated the effects of Southern Thai traditional massage and warm compression in the early postpartum on lactation and breast engorgement among primiparous mothers. The study design was a randomized controlled trial. Participants were primiparous mothers who met the inclusion criteria. A minimized randomization program was used to assign the participants into the Southern Thai traditional massage and warm compression (STMW), the Southern Thai traditional massage (STM), and the control groups and to control for the confounding variables. The total number of participants in this study was 63. The STMW group (n = 21) received 5 minutes of the Southern Thai traditional massage per breast and 15 minutes of warm compression. The STM group (n = 21) received 5 minutes of the Southern Thai

traditional massage per breast. Both interventions were provided 4 times (the 1st time of intervention: at 4-5 hours, the 2nd time of intervention: 10-11 hours, the 3rd time of intervention: 28-29 hours, and the 4th time of intervention: 34-35 hours after giving birth). The control group (n = 21) received the routine care. The onset of lactation was measured by the primiparous mothers who were observed and interviewed every 3 hours after giving birth in the daytime. Milk volume and breast engorgement were measured after finishing the intervention at the 1st time of observation (10-11 hours after giving birth), the 2nd time of observation (28-29 hours after giving birth), and the 3rd time of observation (34-35 hours after giving birth). Descriptive statistics were used to analyze the characteristics of the sample. The chi-square test was used to analyze the differences of nominal data. One-way ANOVA was used to analyze the differences across groups for the continuous data and compare the duration of time after giving birth until the onset of lactation. Repeated-measures ANOVA was used to compare milk volume and breast engorgement across three time points.

The results showed that the onset of lactation was significantly earlier in the STMW group (M = 37.00, SD = 2.56) than in the STM group (M = 40.57, SD = 2.94) and in the control group, and significantly earlier in the STM group than in the control group (M = 45.71, SD = 2.49) ($p < .001$). In terms of milk volume, comparisons of mean score of milk volume among groups revealed that STMW group was significantly higher than the STM group ($p < .001$) and the control group ($p < .001$), the STM group was significantly higher than the control group ($p = .009$). In addition, the mean score of milk volume within group showed that the milk volume in all group measured at the 3rd time of observation was significantly higher than that at the 1st and the 2nd time of observations ($p < .001$) and milk volume at the 2nd time of observation

was significantly higher than that at the 1st time of observation ($p < .001$). The interaction between treatments and times of milk volume was significant ($p < .001$). Breast engorgement of the STMW group was significantly lower than that in the STM group ($p < .05$) and the control group ($p < .05$), and that in the STM group was significantly lower than that in the control group ($p < .05$). Moreover, the mean score of breast engorgement measured at the 1st time of observation was significantly lower than that at the 2nd time (STMW, STM, and control groups, $p = .005$, .001, and < .001, respectively) and that at the 3rd time of observation ($p < .001$), and that measured at the 2nd time of observation was significantly lower than that at the 3rd time of observation ($p < .001$). The interaction between treatment and time of breast engorgement was significant ($p < .001$).

In conclusion, the STMW intervention applied in the early postpartum at 4 times: at 4-5 hours, 10-11 hours, 28-29 hours, and 34-35 hours after giving birth, can promote lactation and prevent breast engorgement. Therefore, the STMW intervention be a useful contributing for nurse practitioners and nurse educators in promoting lactation and preventing breast engorgement.

ชื่อวิทยานิพนธ์ ผลของการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นในระยะแรกหลังคลอดต่อการหลั่งน้ำนมและการคัดตึงเต้านมในมารดาครรภ์แรก

ผู้เขียน ชุดาณัฏฐ์ ขุนเพชร

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ปีการศึกษา 2564

บทคัดย่อ

ปัญหาที่พบบ่อยในการเลี้ยงลูกด้วยนมแม่ ได้แก่ การมีน้ำนมเต็มเต้าล่าช้า ปริมาณน้ำนมไม่เพียงพอ และการคัดตึงเต้านม ซึ่งเป็นอุปสรรคที่สำคัญต่อความสำเร็จในการเลี้ยงลูกด้วยนมแม่อย่างเดียวของมารดาครรภ์แรก ปัญหาเหล่านี้ทำให้มารดาครรภ์แรกหยุดเลี้ยงลูกด้วยนมแม่อย่างเดียวอย่างรวดเร็ว จึงจำเป็นต้องพัฒนาวิธีการส่งเสริมการมีน้ำนมเต็มเต้า เพิ่มปริมาณน้ำนมและลดการตัดตึงเต้านมในมารดาครรภ์แรกเพื่อเพิ่มความสำเร็จของการเลี้ยงลูกด้วยนมแม่อย่างเดียว ดังนั้นการวิจัยนี้จึงศึกษาผลของการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นในระยะแรกหลังคลอดต่อการหลั่งน้ำนมและการคัดตึงเต้านมในมารดาครรภ์แรก การวิจัยนี้เป็นการวิจัยเชิงทดลองแบบสุ่มกลุ่มตัวอย่างคือมารดาครรภ์แรกที่มีคุณสมบัติตรงตามเกณฑ์การคัดเข้าของงานวิจัย ใช้โปรแกรมมินิไม แรนดอมไมเซชั่น (minimized randomization) ในการสุ่มกลุ่มตัวอย่างเข้ากลุ่มการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่น กลุ่มการนวดพื้นบ้านไทยภาคใต้ และกลุ่มควบคุม รวมทั้งควบคุมตัวแปรกวน จำนวนกลุ่มตัวอย่างทั้งหมดในการวิจัยครั้งนี้คือ 63 ราย กลุ่มการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นจำนวน 21 ราย ซึ่งได้รับการนวดพื้นบ้านไทยภาคใต้บริเวณเต้านมข้างละ 5 นาที และการประคบอุ่น 15 นาที กลุ่มการนวดพื้นบ้านไทยภาคใต้จำนวน 21 ราย ซึ่งได้รับการนวดพื้นบ้านไทยภาคใต้บริเวณเต้านมข้างละ 5 นาที ทั้งสองวิธีการแทรกแซงนี้กระทำ 4 ครั้งในช่วง 2 วันแรกหลังคลอด คือ ครั้งที่ 1 เมื่อ 4-5 ชั่วโมง, ครั้งที่ 2 เมื่อ 10-11 ชั่วโมง, ครั้งที่ 3 เมื่อ 28-29 ชั่วโมง และครั้งที่ 4 เมื่อ 34-35 ชั่วโมงหลังคลอด กลุ่มควบคุมจำนวน 21 ราย ซึ่งได้รับการดูแลตามปกติ การมีน้ำนมเต็มเต้าประเมินโดยการสังเกตของมารดาครรภ์แรกและการสัมภาษณ์ทุก 3 ชั่วโมงหลังคลอดในเวลากลางวัน ปริมาณน้ำนมและการคัดตึงเต้านมประเมินหลังได้รับการแทรกแซง คือ ครั้งที่ 1 เมื่อ 10-11 ชั่วโมงหลังคลอด, ครั้งที่ 2 เมื่อ 28-29 ชั่วโมงหลังคลอด และครั้งที่ 3 เมื่อ 34-35 ชั่วโมงหลังคลอด ใช้สถิติเชิงพรรณนาวิเคราะห์ลักษณะกลุ่มตัวอย่าง ใช้สถิติการทดสอบไคสแควร์วิเคราะห์ข้อมูล

ระดับนามบัญญัติ ใช้สถิติการวิเคราะห์ความแปรปรวนทางเดียววิเคราะห์ความแตกต่างของกลุ่มตัวอย่างสำหรับข้อมูลแบบต่อเนื่องและเปรียบเทียบระยะเวลาตั้งแต่หลังคลอดจนกระทั่งมีน้ำนมเต็มเต้า ใช้การวิเคราะห์ความแปรปรวนแบบวัดซ้ำเปรียบเทียบปริมาณน้ำนมและการคัดตึงเต้านมระหว่าง 3 ครั้ง

ผลการวิจัยพบว่า การมีน้ำนมเต็มเต้าของกลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่น (M = 37.00, SD = 2.56) เกิดขึ้นเร็วกว่ากลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้ (M = 40.57, SD = 2.94) และกลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ($p < .001$) กลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้เร็วกว่ากลุ่มควบคุม (M = 45.71, SD = 2.49) อย่างมีนัยสำคัญทางสถิติ ($p < .001$) ในส่วนของปริมาณน้ำนม การเปรียบเทียบคะแนนเฉลี่ยของปริมาณน้ำนมระหว่างกลุ่มพบว่ากลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นมากกว่ากลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้ ($p < .001$) และกลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ($p < .001$) กลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้มากกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ($p = .009$) นอกจากนี้คะแนนเฉลี่ยของปริมาณน้ำนมภายในกลุ่มพบว่า ปริมาณน้ำนมของทุกกลุ่มในการสังเกตครั้งที่ 3 มากกว่าครั้งที่ 1 ($p < .001$) และครั้งที่ 2 ($p < .001$) อย่างมีนัยสำคัญทางสถิติ และปริมาณน้ำนมในการสังเกตครั้งที่ 2 มากกว่าครั้งที่ 1 อย่างมีนัยสำคัญทางสถิติ ($p < .001$) ปฏิสัมพันธ์ระหว่างการรักษาและเวลาของปริมาณน้ำนมมีความแตกต่างอย่างมีนัยสำคัญทางสถิติ ($p < .001$) การคัดตึงเต้านมของกลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นน้อยกว่ากลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้ ($p < .05$) และกลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ($p < .05$) กลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้น้อยกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ($p < .05$) นอกจากนี้คะแนนเฉลี่ยของการคัดตึงเต้านมที่วัดได้เมื่อครั้งที่ 1 ของการสังเกตน้อยกว่าครั้งที่ 2 (กลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่น, กลุ่มที่ได้รับการนวดพื้นบ้านไทยภาคใต้, และกลุ่มควบคุม, p = .005, .001, และ < .001 ตามลำดับ) และครั้งที่ 3 อย่างมีนัยสำคัญทางสถิติ ($p < .001$) เช่นเดียวกับการสังเกตครั้งที่ 2 น้อยกว่าครั้งที่ 3 อย่างมีนัยสำคัญทางสถิติ ($p < .001$) ปฏิสัมพันธ์ระหว่างการรักษาและเวลาของการคัดตึงเต้านมมีความแตกต่างอย่างมีนัยสำคัญทางสถิติ ($p < .001$)

สรุปผลการวิจัย การนวดพื้นบ้านไทยภาคใต้และการประคบอุ่น 4 ครั้ง เมื่อเวลา 4-5 ชั่วโมง, 10-11 ชั่วโมง, 28-29 ชั่วโมง, และ 34-35 ชั่วโมงหลังคลอด สามารถส่งเสริมการสร้างและหลั่งน้ำนมแม่ และป้องกันการคัดตึงเต้านม ดังนั้น การแทรกแซงโดยการนวดพื้นบ้านไทยภาคใต้และ

การประคบอุ่นมีประโยชน์ในการนำไปใช้ในการปฏิบัติการพยาบาลและการสอนเพื่อส่งเสริมการสร้างและหลั่งน้ำนม และป้องกันการคัดตึงเต้านม

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Finally, this thesis is dedicated for my parents and my family, who always provided me with their love, moral support and understanding throughout my doctoral study. I also would like to thank my friends who gave me support and kind help.

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CHAPTER 1

INTRODUCTION

Background and Significance of the Study

Breast milk is known as the healthiest nutrition for infants. It promotes immunity, physical growth (Lawrence, 2022; Martin et al., 2016), and intelligence quotient development of the infants (Castro et al., 2021; Horta et al., 2015). Breastfeeding has also benefits to the mothers by increasing uterine involution, helping to reduce weight (Del Ciampo & Del Ciampo, 2018; Stuebe, 2022), reduces the relative risk of breast cancer (Zhou et al., 2015) and ovarian cancer (Del Ciampo & Del Ciampo, 2018), and helping to reduce living expenses (Association of Women's Health, Obstetric and Neonatal Nurses [AWHONN], 2015). Breastfeeding also helps for reducing the cost of national health expenditure (Walters et al., 2016). Thus, breastfeeding is beneficial to infants, mothers, and the country.

The World Health Organization (WHO) has placed extreme importance on breastfeeding by suggesting exclusive breastfeeding in the first six months of an infant's life (WHO, 2019). In Thailand, breastfeeding has long been recognized and advocated by the government (Apartsakun, 2018). The government put the campaign in the National Food and Nutritional Policy (NFNP) under the National Economic and Social Development Plan (NESDP) (Office of the National Economic and Social Development Council, 2016). The national target of the Twelfth National Health Development Plan (NHDP) has been set for exclusive breastfeeding at six months to be 50% by the year 2025 (Ministry of Public Health, Department of Health [MOPH], 2016). However, the rate of exclusive breastfeeding in Thailand is correctly only 14%,

which is far from the national target (National Statistical Office of Thailand [NSO of Thailand] and United Nations Children's Fund [UNICEF], 2019).

Many literature reviews indicate that the barriers to successful exclusive breastfeeding are maternal employment (Al-Katufi et al., 2020; Bhanderi et al, 2019), lack of maternal knowledge or confidence (Mohammadi et al., 2018; Tangsuksan et al., 2020), and negative breastfeeding experience (Babakazo et al., 2015; El-Houfey et al., 2017). The most common breastfeeding problems concern lactation and include the delayed onset of lactation and insufficient milk volume (Buttham et al., 2017), and breast engorgement (Iqbal et al., 2017). A previous Thai study found that the mean duration of onset of lactation was 57.35 hours after giving birth, with 21.7% occurring after more than 72 hours (Chaingm et al., 2019). Insufficient milk volume is another common breastfeeding problem reported by Thai mothers (Buttham et al., 2017).

Delayed onset of lactation and/or insufficient milk volume might make mothers believe these problems cause their infants to cry loudly and too much (Mohebati et al., 2021). It also causes mothers and families to suffer from anxiety and stress (Mekkamol, 2018; Peacock-Chambers et al., 2017). This can lead mothers to introduce formula to their infants and discontinue breastfeeding (Kaleem et al., 2019; Rhodes, 2017).

Another problem related to unsuccessful exclusive breastfeeding is breast engorgement, which is an important cause of discontinuing exclusive breastfeeding among postpartum mothers (Iqbal et al., 2017; Susiloretni et al., 2015). The mothers with breast engorgement face pain, and feel discomfort (Lauwers & Swisher, 2016; Wambach & Riordan, 2016). Breast engorgement can also cause an interruption of lactation (milk production and secretion). When the breast is full with

breast milk, the prolactin-inhibitor factor (PIF) will inhibit milk production (Lawrence, 2022). This may result in a decrease in breast milk or insufficient milk volume. Breast engorgement is shown to be a critical problem in breastfeeding.

Typically, the mechanism of milk production and milk secretion occurs after delivery of the placenta due to rapidly decreasing levels of estrogen and progesterone hormones, then there is no inhibition of prolactin function (Lawrence, 2022; Lauwers & Swisher, 2016). When the level of prolactin and oxytocin hormones is adequate, this mechanism effectively stimulates milk production and milk secretion or milk ejection. Then mothers can initiate lactation after birth and the amount of milk is sufficient. However, many mothers still have problems related to the above lactation mechanisms.

Many studies have shown that primiparous mothers often have a delayed onset of lactation (Fu et al., 2015; Salahudeen et al., 2013) because they are establishing prolactin receptor for the first time (Hoover & Marasco, 2019) and the secretion of prolactin and oxytocin hormones is slower in primiparous mothers than in multiparous mothers who have previous experienced breastfeeding (Wambach & Riordan, 2016). The median onset of lactation in primiparous mothers is 60 hours or more (Nommsen-Rivers et al., 2010; Rocha et al., 2020). When primiparous mothers experience a delayed onset of lactation and insufficient milk volume, they are more likely to discontinue breastfeeding and resort to formula milk to feed their newborn (Chantry et al., 2014; Feenstra et al., 2018).

Breast engorgement is another common problem for primiparous mothers (Carvalho et al., 2017). When the duct system of a mother's breasts has not been completely drained (Lauwers & Swisher, 2016; Wambach & Riordan, 2016) or the

breasts have lymphatic and vascular blockages (Walker, 2017), pressure increase in the alveoli as well as the milk ducts inside the breasts, lead to breast engorgement (Katrina & Helen, 2022; Lauwers & Swisher, 2016). Breast engorgement is another reason for unsuccessful breastfeeding in primiparous mothers (Talbert et al., 2016).

Unsuccessful breastfeeding has a negative impact on infants, mothers, families, and the nation. The effects of using formula milk on infants include the risk of diarrhea mortality (Fisk et al., 2011; Lamberti et al., 2011), development of allergy to the cow's milk proteins when using a cow's milk-based formula, obesity (Dieterich et al., 2013), and low immunity to prevent allergies and asthma (Amitay & Keinan-Boker, 2015; Dekker et al., 2016). When mothers do not breastfeed, their risk of developing breast cancer in the future increases. Breast cancer can be prevented if mothers breastfeed their babies for up to 2 years (Walters et al., 2016). Economically, the cost of purchasing formula milk can be very expensive for families (AWHONN, 2015). The implications of unsuccessful breastfeeding for a country are the economic losses of children not breastfed due to health care system treatment costs due to the level of preventable morbidity and mortality, future income losses per year due to premature infant and women's mortality, and the largest component of economic losses is cognitive losses (Walters et al., 2019). Therefore, there is a need to develop an intervention to promote the onset of lactation, increase milk volume, and reduce breast engorgement among postpartum mothers to improve the success of exclusive breastfeeding.

Several studies have presented current evidence-based practices that include massage techniques to promote lactation, such as almond oil massage (Anusha, 2015). This massage uses almond oil combined with firm presses and gentle strokes in

circular motions over the breast. Another massage technique, the Oketani massage, consists of eight techniques on each breast (Dehghani et al., 2018; Yuliati et al., 2017). The Self-mamma control massage method (Masae, 2019) involves pressing the breast with the hands in a straight line toward the other breast, obliquely upward toward the opposite shoulder, and in a straight line upward (Pingwong & Kantaruksa, 2017) and the Woolwich massage is performed on the lactiferous sinus above the areola area (Nurvitasari et al., 2019).

The current evidence-based practices related to the reduction of breast engorgement comprise cold cabbage leaves compresses on the breasts (Disha et al., 2015; El-Saidy & Aboushady, 2016; Wong et al., 2017), therapeutic breast massage in lactation (Witt et al., 2016), the finger pads massage (Krishnaveni, 2014), warm compresses (Disha et al., 2015; Eittah & Ashour, 2019; Kaur et al., 2017), and breast massage combined with warm compression (Thakur & Bala, 2018). Most of these interventions help reduce breast engorgement.

Previous studies suggest that massage and warm compression are appropriate strategies to promote lactation in terms of the onset of lactation or milk volume (Khotsang et al., 2016; Punturat & Boonruen, 2017), and reduce breast engorgement (Thakur & Bala, 2018). However, the methods in the previous studies were either massage or warm compression, not combined techniques, and most of them were performed in other countries, possibly yielding different effects due to differences in acceptable practice related to different social belief, culture and practice from Thailand. In addition, the previous studies had limitations, including 1) no randomized control trial design (Nurvitasari et al., 2019; Punturat & Boonruen, 2017; Yuliati et al., 2017), 2) small sample size (Kangkan et al., 2014), and 3) no study investigating the

prevention of breast engorgement (Kaur et al., 2017; Wong et al., 2017). In concluding, the previous studies had limitations in research design, small sample size, and lack of studies conducted in the context of Southern Thailand.

In Southern Thailand, there is the specific Southern Thai traditional massage (STM), which is used by the traditional midwife. In this specific massage technique, the hands are used to pick or poke the milk line (Jejaroj et al., 2006; Thongsong, 2016) in the axillary area, which contains muscle, lymph nodes, vessels, and nerves (Drake et al., 2015). Therefore, this massage helps stimulate blood circulation and sends a signal to the sensory receptor stimulating the pituitary gland to increase prolactin and oxytocin hormones to promote lactation.

In addition, STW is aimed at draining the fluid through normal lymph channels, which is an appropriate way to prevent breast engorgement (Lauwers & Swisher, 2016). This is based on the reason that prevention is better than reducing breast engorgement. Currently, there has been no research attempting to study STM. Previous studies only explained the method of massage (Hongsittichaikul et al., 2009; Jejaroj et al., 2006; Thongsong, 2016). STM is administered in the early postpartum period because this massage stimulate the pituitary gland to release prolactin and oxytocin hormones, which cause milk production and secretion (Lauwers & Swisher, 2016) as well the newborn's suckling. Therefore, STM uses the same principle as initial rapid breastfeeding in the early postpartum period.

Warm compression helps to stimulate blood circulation. The application of warm compression is useful to increase the productivity of milk, increase the excretion of milk by activating the letdown reflex, and increase the effectiveness of milk removal (Walker, 2017; Wambach & Riordan, 2016). Warm compression helps to reduce breast

engorgement (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016). Therefore, it might be suitable to combine warm compression after performing the massage to promote lactation (both the onset of lactation and increase milk volume) (Punturat & Boonruen, 2017), and prevent breast engorgement (Thakur & Bala, 2018). Consequently, providing STM followed by warm compression in the early postpartum period may help to stimulate the onset of lactation, increase milk volume, and prevent breast engorgement.

In this study, routine care refers to maternal and newborn care, teaching breastfeeding knowledge and basic breastfeeding techniques skill (breastfeeding position and attachment/latch on the breast). Only mothers who have problems with breastfeeding, such as no milk flow or breast engorgement, receive breast massage or warm compression from a nurse specialized in breastfeeding. It can be concluded that previous studies are limited and have some gaps. The effects of Southern Thai traditional massage combined with a warm compress on the onset of lactation, increasing milk volume, and preventing breast engorgement have not been studied. For these reasons, this study uses the STM and warm compression consistent with the context and lifestyle of Southern Thailand to investigate the STM and warm compress in the early postpartum period on the onset of lactation, milk volume, and breast engorgement. The results of this study may help to solve the problems related to the delayed onset of lactation, insufficient milk volume, and breast engorgement.

Objectives of the Study

The main purpose of the study is to investigate the effects of Southern Thai traditional massage and warm compression in the early postpartum period

(STMW) on lactation and breast engorgement among Thai primiparous mothers. The specific objectives of this study are as follows:

1. To compare the onset of lactation among primiparous mothers in 1) the Southern Thai traditional massage and warm compression (STMW) group, 2) the Southern Thai traditional massage (STM) group, and 3) a control group.

2. To compare milk volume among primiparous mothers in the STMW group, STM group, and control group across 3 time points (at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth).

3. To compare breast engorgement among primiparous mothers in the STMW group, STM group, and control group across 3 time points (at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth).

Research Questions of the Study

The research questions are as follows:

1. Is the onset of lactation among primiparous mothers in the STMW group shorter than that in the STM group and control group?

2. Is the milk volume of primiparous mothers in the STMW group higher than that in the STM group and control group across 3 time points (at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth)?

3. Is breast engorgement of primiparous mothers in the STMW group lower than that in the STM group and control group across 3 time points (at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth)?

Conceptual Framework of the Study

The conceptual framework of this study was derived from the literature review. The Southern Thai traditional massage (STM) is the method using the hands to pick or poke at the axillary area and to squeeze or press over the breasts. The axillary and breasts area consists of the milk line, coracobrachialis, pectoralis major muscle, lymph nodes, veins, artery, and the thoracic intercostal nerve (Graham & Montgomery, 2019; Lauwers, 2022). Picking or poking in the axillary area and squeezing or pressing at the pectoralis major muscle in the breasts helps stimulate blood circulation and thoracic intercostal nerve sending a signal to the sensory receptor at the nipple and areolar is stimulate the posterior pituitary gland. This causes the excretion of oxytocin, which will stimulate the muscles around the mammary glands to contract and secrete breast milk (Lauwers & Swisher, 2016), as well as stimulate the anterior pituitary gland to increase prolactin levels promoting lactation (Graham & Montgomery, 2019), which causes effectively milk production and milk secretion (Lauwers & Swisher, 2016).

In addition, STM is a method based on the structure of the lymphatic system. It is a method that helps to drain the fluid to normal lymph channels, which is an appropriate way to prevent and reduce breast engorgement (Lauwers & Swisher, 2016). Breast massage before or during breastfeeding helps to ensure adequate milk removal, may be helpful for breast engorgement (Berens, 2019). Breast massage also helps to reduce stress and causes mothers to relax as well as lowers their level of anxiety (Wongsiri, 2013). Relaxation promotes the pituitary gland to secrete more oxytocin which results in the stimulation of milk secretion or milk ejection (Lauwers & Swisher, 2016; Wambach & Riordan, 2016). On the other hand, if postpartum mothers have

stress and anxiety, this results in less oxytocin being produced, which inhibits milk secretion (Kala, 2018).

Warm compression helps to stimulate blood circulation and cause vasodilation of blood vessels, thereby facilitating milk ejection. In addition, warm compression helps to provoke lactocytes, which are prolactin receptor sites. They increase the transportation of prolactin into the blood and the penetration of prolactin into the milk-producing cells. The warm compress has the effect of stimulating the process of production and secretion of milk effectively (Panngam et al., 2015; Phon-ngam & Mankong, 2021). Warm compression is useful in increasing the efficiency of milk removal, and activating the letdown reflex (Walker, 2017; Wambach & Riordan, 2016). In addition, warm compression is an intervention that reduces breast engorgement (Kaur et al., 2017; Khosravan et al., 2015). It has been indicated that the combination of STM and warm compression is a method that helps to promote the rapid onset of lactation, increase milk volume and prevent breast engorgement, as shown in Figure 1 (conceptual framework of the study), and Figure 2 (research intervention framework of the study).

Figure 1

Conceptual Framework of the Study

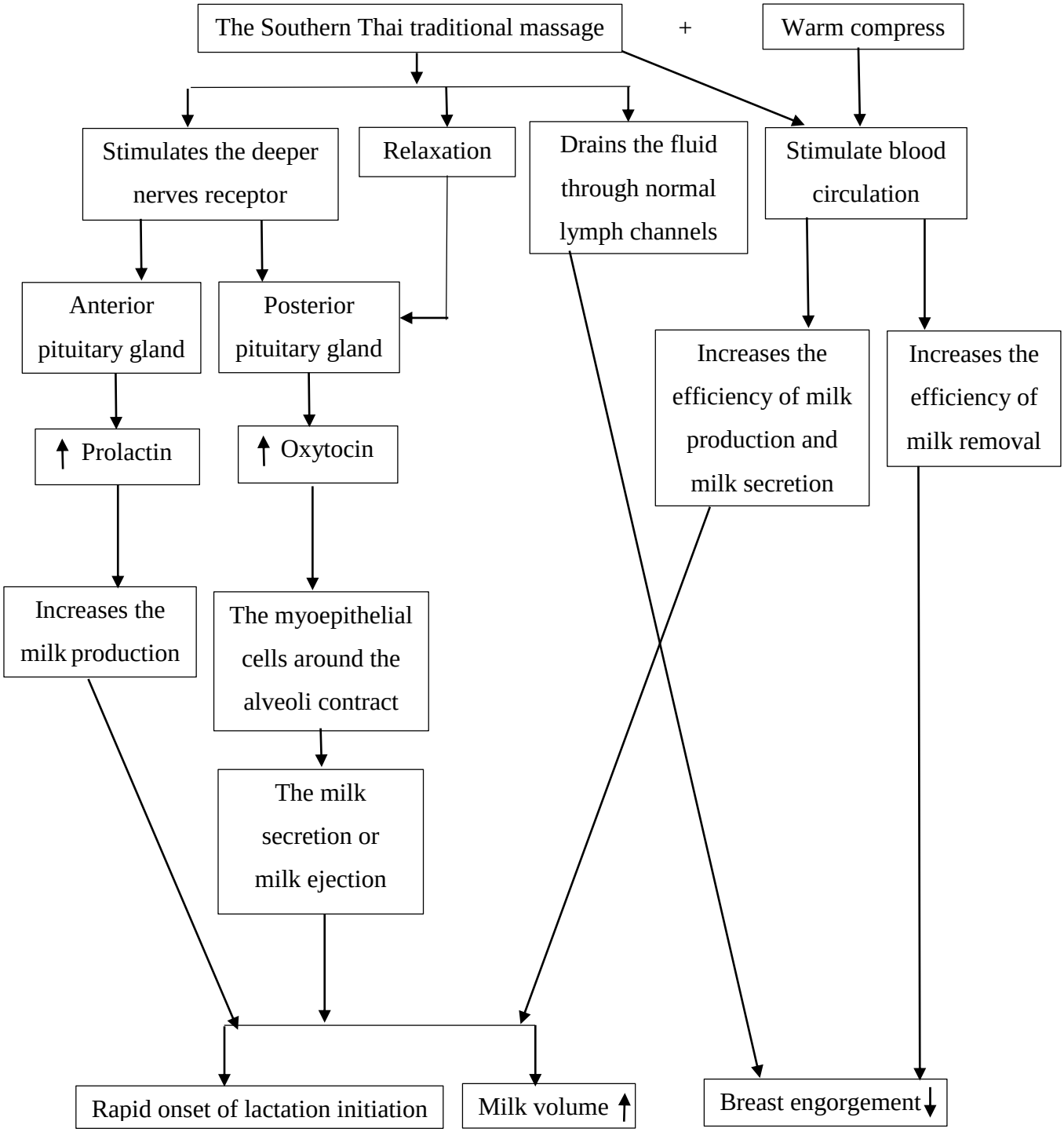
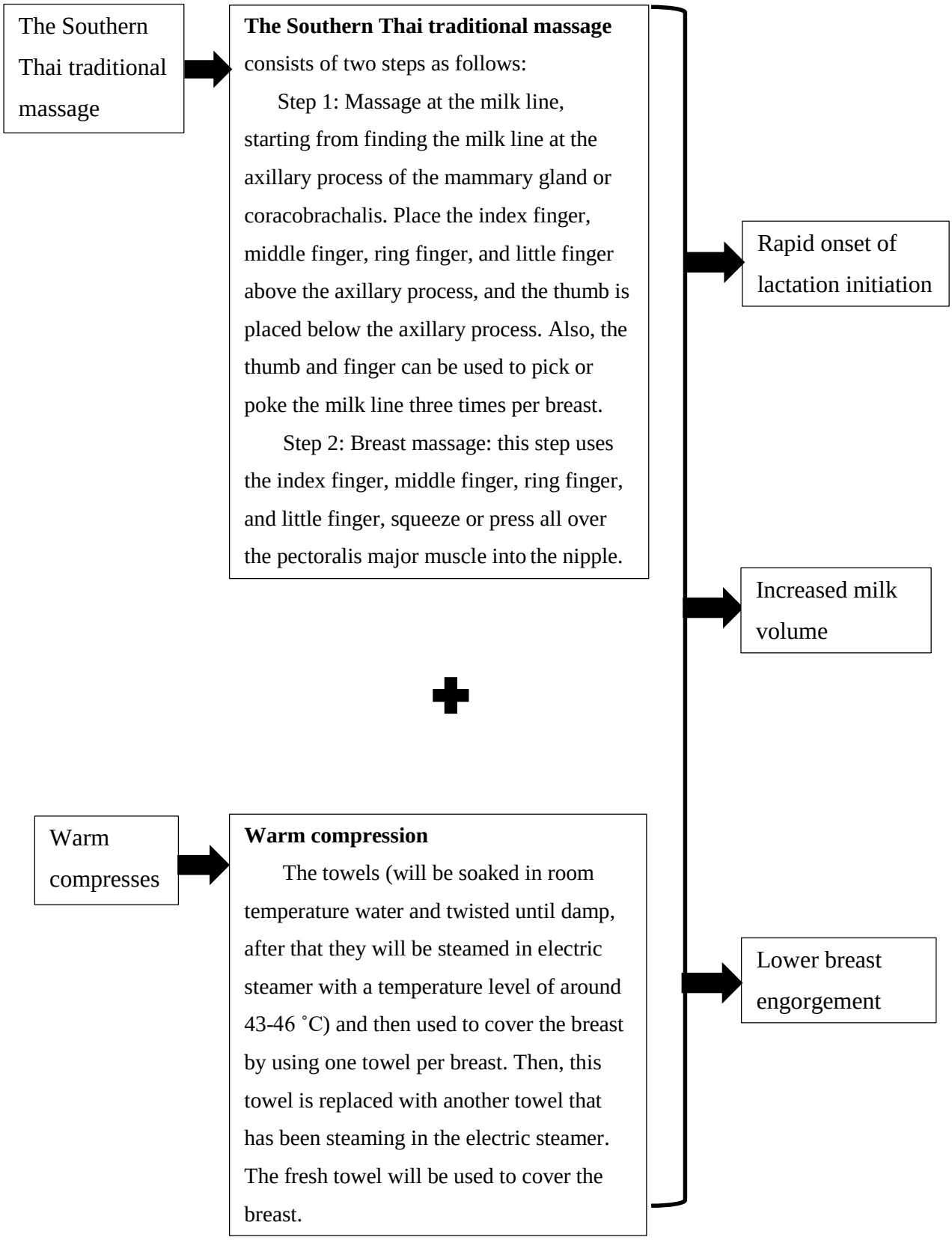


Figure 2

Research Intervention Framework of the Study



Research Hypotheses

The hypotheses of this study are as follows:

1. The onset of lactation in the STMW group is shorter than that in the STM group and control group.

2. The milk volume of primiparous mothers in the STMW group is higher than that in the STM group and control group across 3 time points (at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth).

3. The breast engorgement in the STMW group is lower than that in the STM group and control group across 3 time points (at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth).

Definition of Terms

The Southern Thai traditional massage and warm compression (STMW) program refer to the set of activities of the Southern Thai traditional massage, in which the thumb is placed below and the other fingers placed above the axillary to pick or poke at this area three times, and all over the pectoralis major muscle of the breast area is squeezed or pressed five minutes per breast. After that, warm compression are applied by using towels that have been soaked in room temperature water and twisted until damp. Then, the towels are steamed in an electric steamer, which has a temperature level of 43-46 ˚C. The warm towels are applied as compression to cover both breasts for 10 minutes. The STMW is applied four times at 4-5 hours, 10-11 hours, 28-29 hours, and 34-35 hours after giving birth.

Routine care is the standard of care for primiparous mothers in the postpartum ward in providing any treatments, procedures, and nursing care to primiparous mothers during hospitalization in the postpartum period. The routine care at the postpartum

ward is teaching about breastfeeding and consists of; breastfeeding the newborn every 2-3 hours, allowing the newborn to suck on the breast 10-15 minutes per side, breastfeeding position, and attachment/how to latch on the breast. Additionally, postpartum mothers with breastfeeding problems, such as flat nipples, inverted nipples, no milk flow, or breast engorgement will receive special care from a breastfeeding specialist nurse that includes the management of flat or inverted nipples, breast massage (pressing on the breast area with fingers), and warm compression (pressing on the breasts with a towel soaked in warm water) in the case of no milk flow or breast engorgement.

Lactation is the milk production and secretion that occurs after the placenta is delivered, during which the levels of estrogen and progesterone hormones rapidly decrease, and the prolactin and oxytocin hormones are secreted effectively stimulate the production and secretion of milk. In this study, lactation refers to the onset of lactation and milk volume in primiparous mother after giving birth.

The onset of lactation is the duration of time after giving birth until onset of lactation initiation, which is counted from the time after giving birth until the mother has a feeling of enlargement, swelling, stiffness, and heaviness, including the milk flowing out. The instrument used to measure the onset of lactation in this study was developed by Khotsang et al. (2016), and was evaluated by the primiparous mothers and the researcher asking how the mother felt every 3 hours after delivery during the day.

Milk volume is the amount of breast milk that the newborn receives, which was evaluated by the test weighing method developed by Dewey et al. (2003). Milk volume was measured by weighing a newborn and diaper before and after breastfeeding. After this, the researcher calculated the newborn’s weight gain after

breastfeeding. The milk volume was evaluated after finishing the intervention at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth.

Breast engorgement is the condition of the breast with full of breast milk, lymph fluid and fluid inside, which causes the breast to have symptoms of firmness and tenderness. In this study, the researcher evaluated the breast engorgement after finishing the intervention at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth using the application of the six-point engorgement scale of Hill and Humenick (1994). The pimiparous mothers breastfed their newborns immediately after breast engorgement assessment.

Scope of the Study

The study aimed to investigate the effects of the Southern Thai traditional massage and warm compression on the lactation and breast engorgement. A randomized control trial was used for the research methodology. The sample was primiparous mothers who were aged 19-34 years. This study was carried out at the postpartum ward in Hatyai Hospital. The primiparous mothers who met the inclusion criteria were randomly allocated into three groups consisting of; the STMW, the STM, and the control groups. The STMW group received the Southern Thai traditional massage and warm compression program in the early postpartum period. The STM group received only the Southern Thai traditional massage in the early postpartum period, and the control group received routine care on the postpartum ward.

Significance of the Study

The STMW is an alternative mode, which assists nurses, nursing lecturers, and nursing students to promote lactation and prevent breast engorgement in the

postpartum mother, which would enhance the role of the nurse in the delivery of care to postpartum mothers. Secondly, the STMW is a part of caring that is consistent with the context and way of life of the people in the Southern Thailand. This method is suitable and useful to apply in postpartum services in communities of Southern Thailand. The STMW helps primiparous mothers to produce sufficient breast milk to meet the needs of their newborn without the problems of delayed onset of lactation and breast engorgement. Thus, primiparous mothers will be able to continually breastfeed exclusively.

CHAPTER 2

LITERATURE REVIEW

This literature review explains the primary concept and related knowledge on the effects of the Southern Thai traditional massage and warm compression in the early postpartum period program among primiparous mothers on lactation and breast engorgement. The topics of literature review were organized follows:

1. Breastfeeding among primiparous mothers
    - 1.1 Importance and benefits of breastfeeding
    - 1.2 Factors affecting breastfeeding
    - 1.3 Situation of breastfeeding in primiparous mothers
2. Lactation
    - 2.1 Anatomy and physiology of breasts
    - 2.2 Breast milk production and milk secretion
    - 2.3 Mechanism of lactation
    - 2.4 Measurement for lactation
    - 2.5 Factors affecting lactation
    - 2.6 Impacts of poor lactation (delayed onset of lactation and insufficient milk volume)
3. Breast engorgement
    - 3.1 Definition
    - 3.2 Mechanism of breast engorgement
    - 3.3 Measurement for breast engorgement
    - 3.4 Factors affecting breast engorgement
    - 3.5 Impacts of breast engorgement

4. Managements to promote lactation and prevent breast engorgement

5. The Southern Thai traditional massage

5.1 The characteristics of the Southern Thai traditional massage

5.2 The effects of the Southern Thai traditional massage on lactation and prevention of breast engorgement

5.3 The procedure of the Southern Thai traditional massage

6. Warm compression

6.1 The definition/characteristics of warm compression

6.2 The effect of warm compression on the lactation and breast engorgement

6.3 The procedure of warm compression

Breastfeeding Among Primiparous Mothers

It is well known that breastfeeding has benefits for mothers, infants, and a country. However, breastfeeding rates in many countries, including Thailand, have not yet reached the targeted rate. Breastfeeding is a common public health issue that impacts on the health of mothers, infants, and their families, and also has national economic benefits. Breastfeeding is determined by the following: importance and benefits of breastfeeding, factors affecting breastfeeding, and situation of breastfeeding among primiparous mothers.

Importance and Benefits of Breastfeeding

Breast milk is the most valuable and useful food for babies. WHO and UNICEF recommend that mothers should exclusively breastfeed during the first six months of a baby's growth (WHO, 2019). Exclusive breastfeeding means that the baby is breastfed without additional food or water, except for medicines, minerals, vitamins, or oral rehydration solutions. After this, food is supplemented according to baby's age, along with breastfeeding until the baby is two years old (WHO, 2013). In addition, WHO has set a goal to increase the proportion of exclusive breastfeeding in the first six months of a child's life to 50% by 2025 (WHO, 2014).

Thailand is one of the countries that promote breastfeeding through policies in line with WHO. Thailand has set a target of at least 50% exclusive breastfeeding for babies in the first six months by 2025 (MOPH, 2018). However, currently, the rate of exclusive breastfeeding in Thailand is only 14% (NSO of Thailand and UNICEF, 2019), while Association of Southeast Asian Nations such as Cambodia, Indonesia and Laos were 65%, 41%, and 40% respectively (World Bank, 2016). Therefore, it is necessary to increase the rate of breastfeeding in Thailand through interventions to manage the problems or barriers that cause unsuccessful breastfeeding.

The benefits of breastfeeding for infants are that breast milk contains immunological properties, which help to prevent infection in babies (Ladomenou & Galanakis, 2013; Martin et al., 2016). In addition, this contains more than 200 types of nutrients, with a proper proportion of nutrients as well as a balance between large and small molecules, as well as enzymes, which is essential for the growth and development of the body and brain of the infant (Lauwers & Swisher, 2016; Martin et al., 2016). Breast milk contains cholesterol, docosahexaenoic acid (DHA), and taurine. These nutrients are the substrate and components for brain development and intelligence (Castro et al., 2021; Krol & Grossmann, 2018). Babies who are breastfed have a higher level of intelligence and brain development than those who receive formula milk (Bernard et al., 2013; Berrera et al., 2014).

Exclusive breastfeeding for at least six months, helps to reduce the mortality rate of children (Victora et al., 2016) because it reduces the incidence of respiratory diseases and diarrhea (Fisk et al., 2011; Horta & Victora, 2013). Breastfeeding can reduce the risk of leukemia (Amitay & Keinan-Boker, 2015) and the incidence of asthma for babies (Dekker et al., 2016). Breast milk helps the infants' digestive system to digest and absorb the nutrients, prevents obesity in babies, and reduces the incidence of allergies to the protein found in formula milk made from cow's milk (Dieterich et al., 2013).

In addition, breast milk is also beneficial for infants in the long term, helping to reduce insulin resistance and prevent hypertension in adulthood (Dieterich et al., 2013; Stuebe, 2022). Breastfeeding also promotes children's social and emotional development (Krol & Grossmann, 2018) by promoting attachment between mother and baby because it makes babies feel secure. Moreover, breast milk contains the leptin hormone, which helps babies recover from stress. Babies who are breastfed for longer

than or equal to 6 months have better mental health than babies who are breastfed less than six months (Oddy et al., 2010).

Breastfeeding also has many benefits for mothers. Physiological benefits, breastfeeding contributes to a faster involution of the uterus (Del Ciampo & Del Ciampo, 2018), because it stimulates the release of the oxytocin hormone, and this hormone helps the uterus to contract well. In addition, this prevents bleeding in the early postpartum period (Lawrence, 2022). Breastfeeding also aids in postpartum weight loss because of the burning of stored fat for use in breast milk production (Del Ciampo & Del Ciampo, 2018; Jarlenski et al., 2014) and helps reduces the relative risk of breast cancer (Dieterich et al., 2013; Zhou et al., 2015) and ovarian cancer (Li et al., 2014; Luan et al., 2013) and reduces women's mortality from breast cancer by up to 20,000 people per year worldwide (Victora et al., 2016). Moreover, this reduces the risk of developing type 2 diabetes (Gunderson et al., 2010) and helps in contraception (Van der Wijden & Manion, 2015). Psychologically, breastfeeding helps reduce maternal anxiety, negative moods, and stress levels because during breastfeeding, mothers release oxytocin and endorphin, which are happy hormones, resulting in mothers having a relaxed, happy mood and bonding with their infant (Krol & Grossmann, 2018). This also helps reduce the cost of purchasing formula milk (AWHONN, 2015; Dieterich et al., 2013).

Breastfeeding helps reduce health expenditure cost in many countries (Quesada, et al., 2020; Siregar, et al., 2018; Walters et al., 2016), including Thailand (Walters et al., 2016). Exclusive breastfeeding for the first six months of a child's life and continued breastfeeding until 2 years of age reduces cognitive loss cost by US$192.60 million (THB 6.07 million) per year, health expenditure costs by US$7.65 million (THB 243.22 million) per year, and treatments costs for diarrhea and pneumonia

by up to US$32.8 (THB 1,032) per episode per child. In Thailand, child mortality from diarrhea and pneumonia is 262 cases yearly, and the maternal mortality from breast cancer is 406 cases. These problems can be prevented by adequate breastfeeding (Walters et al., 2016).

Factors Affecting Breastfeeding

Breastfeeding depends on many factors, namely personal factors, social support factors and health services factors. The details are as follows:

Personal factors

These factors consist of primiparity, maternal employment, breastfeeding knowledge, age, maternal education level, income, and problems or barriers to breastfeeding, which are discussed in more detailed below:

Primiparity is a risk factor in the delay of the onset of lactation (Fu et al., 2015; Hoover & Marasco, 2019) because primiparous mother establish a prolactin receptor for the first time (Hoover & Marasco, 2019). Therefore, breastfeeding hormone secretion is slower in primiparous mothers than in multiparous mothers who are used to breastfeeding (Dewey et al., 2003; Wambach & Riordan, 2016).

Previous studies found that maternal employment is a barrier factor leading to unsuccessful exclusive breastfeeding (Al-Katufi et al., 2020; Bhanderi et al, 2019; Tshering et al., 2018). Working mothers who worked either part-time and full-time had a significantly shorter duration of exclusive breastfeeding compared with mothers who were homemakers (Maharlouei et al., 2018). Mothers may find it uncomfortable to provide breast milk to their infants while they are working and away from their infants. In addition, some of their workplaces may not be suitable for breastfeeding (Thepha et al., 2017). Moreover, the length of maternity leave is a factor influencing exclusive breastfeeding (Phunpom et al., 2020; Tangsuksan et al., 2020).

Maternal knowledge about breastfeeding is another important factor that helps mothers with successful breastfeeding (Chanapai et al., 2014; El-Houfey et al., 2017; Wood & Qureshi, 2017), especially knowledge about the benefits (Primo et al., 2016) and techniques of breastfeeding (Mohammadi et al., 2018). Mothers with a high level of breastfeeding knowledge were 2.97 times more likely to exclusively breastfeed for 6 months than mothers with a low level of knowledge (Chaiopanont, 2016).

Breastfeeding experience, primiparous mothers who have no breastfeeding experience have lower rates of breastfeeding initiation than multiparous mothers (Cohen et al., 2018; Sutherland & Pierce, 2012). Previous breastfeeding experience was a determinant associated with initiation (Che' Muda et al., 2018) and six-month exclusive breastfeeding (Chuprapan et al., 2014; Sangin et al., 2020). Mother's lack of breastfeeding experience was one reason for mothers stopping exclusive breastfeeding before six months. Furthermore, mothers who have experience with breastfeeding are 2.27 times more likely to exclusively breastfeed than mothers without experience (Chaiopanont, 2016).

Lack of breastfeeding experiences among postpartum mother is an important factor affecting successful breastfeeding (Chaiopanont, 2016; Che' Muda et al., 2018; Cohen et al., 2018). When faced with a delayed onset of lactation or insufficient milk, many primiparous mothers who have no breastfeeding experiences stop breastfeeding and feed formula milk to their infants instead (Chantry et al., 2014). The literature review found that 44% of primiparous mothers experienced delayed onset of lactation $\geq$ 72 hours, and the median delayed onset of lactation was 68.9 hours (Nommsen-Rivers et al., 2010). Similarly, 84.3% of primiparous mothers experienced a delayed onset of lactation, with a mean score of onset of lactation time at 57.35 hours (Chaingm et al., 2019). Perceived insufficient milk supply was the reason that most

primiparous mothers gave formula milk to their infants in the hospital (Chantry et al., 2014).

Maternal age is a factor that influences exclusive breastfeeding (Youngwanichsetha, 2013). The study of Chuprapan et al. (2014) showed that 75% of mothers aged between 21 to 35 years give exclusively breastfeed in the first six months while only 67% of mothers younger than 20 give exclusively breastfeeding. Therefore, maternal age is a factor that effects the practice of exclusive breastfeeding (Mensah et al., 2017).

Maternal education level is another factor affecting breastfeeding. Mothers with high levels of education can recognize the knowledge and benefits of breastfeeding, leading to a trend toward successful breastfeeding (Chuprapan et al., 2014; Primo et al., 2016). A meta-analysis found that mothers with high levels of education are more likely to initiate and continue breastfeeding than mothers with the lowest levels of education (Cohen et al., 2018), and the study of Yilmaz and colleagues (2017) showed that low education levels of mother influenced early cessation of exclusive breastfeeding.

Income is a factor that influences the duration and behavior of breastfeeding. The higher income of mothers, the higher chance of breastfeeding compared to the mothers with low income (Nualjam et al., 2013). Moreover, family income was a factor influencing exclusive breastfeeding (Ruan et al., 2019; Tangsuksan et al., 2020)

For breastfeeding difficulties, when mothers faced problems to breastfeeding, most of them decided to introduce formula milk to their infant and discontinued breastfeeding within 3-7 days (Brown et al., 2014; Payakkaraung et al., 2016; Wagner et al., 2013). Thus, barriers of breastfeeding are an essential factor that hinders the success of breastfeeding (Babakazo et al., 2015; El-Houfey et al., 2017).

Most mothers who have experience problems with breastfeeding, such as delayed onset of lactation (Buttham et al., 2017), insufficient milk (Jama et al., 2017; Nasrullah et al., 2018), and breast engorgement (Iqbal et al., 2017; Susiloretni et al., 2015), so they choose to stop breastfeeding. The study by Chuprapan and colleagues (2014) showed that the mothers in the non-exclusive breastfeeding group had more barriers to breastfeeding than the mothers in the exclusive breastfeeding group.

In addition, breast engorgement is a common breastfeeding problem in primiparous mothers (Carvalho et al., 2017; Talbert et al., 2016). In lactogenesis II, the breast contains more blood and fluid, which are necessary for milk production and milk secretion (Wambach & Riordan, 2016). If the duct system of the breast has not emptied completely, breast engorgement will occur. Primiparous mothers experience pain and discomfort in the breast (Katrina & Helen, 2022; Lauwers & Swisher, 2016), which is another problem that leads to discontinuation of breastfeeding. This is because primiparous mothers are not aware of methods to resolve breastfeeding problems (Carvalho et al., 2017). Therefore, it is important to have interventions that promote rapid onset of lactation initiation, increase milk volume, and prevent breast engorgement so that primiparous mothers can continue to exclusively breastfeed.

Family support

Family support has a significant impact on breastfeeding, as adequate social support helps to encourage mothers to breastfeed continually (El-Houfey et al., 2017; Ichsan et al., 2020; Wood & Qureshi, 2017). Similarly, most mothers who successfully exclusively breastfed during the first six months received social support from their husband or their parents or parent in law (Jintrawet et al., 2014). In addition, support and influence from husbands, mothers, or other family members were the

determinants influencing successful breastfeeding (Nuzrina et al., 2016; Sangin et al., 2020).

Health services

Access to public health services (Chuprapan et al., 2014; El-Houfey et al., 2017) is a factor that influences successful exclusive breastfeeding because public health services are a source of knowledge and support for breastfeeding. All public hospitals in Thailand serve breastfeeding policy to promote breastfeeding from labor and birth through to discharge (WHO, 2013). Currently, the public health services of Thailand have the policy to encourage breastfeeding based on the guidance from WHO and UNICEF. The Baby-Friendly Hospital Initiative (BFHI) policy follows the recommendations on the ten steps to successful breastfeeding in a public hospital (Mekkamol, 2018). The BFHI policy helps to increase breastfeeding rate in Thailand.

Professional support

Health professionals, especially nurses, are the primary health care providers who support women to breastfeed from labor and delivery through to discharge (El-Houfey et al., 2017). As indicated in the literature, professional support is one aspect that has an influence on women in making the decision to breastfeed and to be able to breastfeed successfully (Primo et al., 2016).

It can be seen that the determinants influencing successful exclusive breastfeeding are personal factors, family support, health services, and professional support.

Situation of Breastfeeding in Primiparous Mothers

The prevalence of exclusive breastfeeding among primiparous mothers was 39.4% (Mohamed et al., 2018) and 14.1% initiated breastfeeding within one hour of birth (Zafar et al., 2021). Literature review showed that most of primiparous mothers had breastfeeding challenges (Carvalho et al., 2017). They reported that breastfeeding problems were nipple pain (56 %), breast engorgement (48 %) and insufficient milk amount (38 %) (Talbert et al., 2016). In addition, the most common reason for primiparous mothers introducing formula milk to their newborns before six months was insufficient milk production (Zafar et al., 2021). Similarly, the study of Chantry and colleagues (2014) showed that 47% of primiparous mothers introduce formula milk to their newborns in hospital because of perceived insufficient milk production, or newborns presenting the signs of inadequate intake and poor latch. In addition, only 34% of primiparous mothers had correctly practice of breastfeeding and a moderate level of breastfeeding knowledge. However, they had high level of positive breastfeeding attitude (Mog, 2021). Therefore, adequate support and assistance help the primiparous mother, which is an important population to successfully breastfeeding.

Lactation

This topic describes the anatomy and physiology of the breasts, milk production and secretion, the mechanism and measurement of lactation in relation to the onset of lactation and milk volume, as well as the influencing factors and impacts of delayed onset of lactation and milk volume.

Anatomy and Physiology of Breasts

Knowledge of breast anatomy and physiology is an important foundation for lactation, as it helps to understand the mechanisms and problems of breastfeeding.

The breast consists of the mammary glands, skin, supporting tissue (vessels, lymphatic vessels, and nerves), nipple, areola, and Montgomery glands. The breast has mammary glands, which are modified sweat glands. The mammary glands consist of secretory glands, approximately 15-20 lobes, that perform a role in milk production. There are also lactiferous ducts, via which milk reaches the nipple. The end of lactiferous ducts expands into the lactiferous sinus, which is the storage place of milk before the milk comes out through the nipple. Both breasts are located on the deep pectoral fascia that covers the pectoralis major muscle in the anterior thoracic wall. There is a boundary between the ribs 2 to 6 and from the sternum to the front edge of the axillary. The components of the breast consist of skin, supporting tissue, milk-producing tissue, and milk-transporting tissue. In addition, the surface layer of the breast contains the nipple, areola, and Montgomery glands (Berens, 2019; Lauwers & Swisher, 2016; Lawrence, 2022).

The skin components consist of skin layers and contain hair, sebaceous glands, and sweat glands. The skin layer consists of the outer skin layer (the epidermis), which protects the inner skin layer. The inner layer of skin (the dermis) is the location of connective tissue that contains nerve endings, capillaries, lymph channels, and other cells. The under dermis contains the muscle cells, but the areola and nipple area are intermingled between the different skin layers (Berens, 2019; Drake et al., 2015; Lauwers & Swisher, 2016). The skin is a part of the breast that is important for

intervention to promote the onset of lactation and milk volume, and to prevent breast engorgement.

The supporting tissue of the breast consists of vessels, lymphatic vessels and nerves. The vessels in the anterior chest wall area contains internal arteries and veins that run along both sides of the sternum. The internal arteries are the main supply lines in the anterior thoracic wall. They have branches, including in the second to fourth intercostal spaces, which serve to supply the breast around the anteromedial portions (Drake et al., 2015).

In addition, the center parts of the breast area have lymphatic vessels that come with arteries. This channel drains to the parasternal nodes on the thoracic wall, the lateral and above into the axillary nodes, and sometimes this channel are drained into the lymphatic vessels following the lateral branches of the posterior intercostal arteries (Drake et al., 2015).

The breast has sensory nerves that stimulate breast function for lactation. The thoracic intercostal nerves II, III, IV, V, and VI are sensory nerves that cover around the breast and smooth muscle of the nipples and blood vessel areas. However, the sensory nerves that most stimulate the nipples and areola are the intercostal nerves IV and II. Furthermore, the nipples and areola are the areas that are covered by nerves, both autonomic nerves and sensory nerves (Berens, 2019; Drake et al., 2015; Lauwers & Swisher, 2016). Therefore, the nipples and areola are able to function independently without stimulation or stimulation is provided by sensory nerves.

The axillary process of the axillary tail of the mammary gland is the area that extends along the inferior margin of the pectoralis major muscle toward the axilla or some cases maybe expanding along the margin of the muscle to penetrate the deep fascia and enter the axilla. The axillary process is located lower than the apex of the

axilla. The position of the axillary process is the location of the pectoralis major muscle, axillary lymph nodes, axillary vein, and artery. In addition, this position has four thoracic intercostal nerves, which are important sensory nerves to stimulate the feeling of the nipple and areola (Drake et al., 2015; Lauwers & Swisher, 2016). Therefore, vessels, lymphatic vessels, and nerves, which are supporting tissue of the breast, are important elements to promote the onset of lactation, milk volume, and prevent breast engorgement.

The nipple is the protruding part of the breast, which is the area of the breast that a baby latches onto during feeding. The nipple tissue stretches easily and heals quickly. The baby's suckling triggers the sensory nerve ending in the nipple and sends a signal to the mother's brain to trigger oxytocin for milk release (Drake et al., 2015; Lauwers & Swisher, 2016), a letdown reflex.

The areola is a dark circular surface area surrounding the nipple. This area is the position for the baby's mouth. A large ration of the areolar tissue needs to be inside the baby's mouth for successful feeding (Drake et al., 2015; Lauwers & Swisher, 2016).

Montgomery glands or Montgomery's tubercles are sebaceous glands found around the areola. Montgomery glands act to secrete an oily element for supply as a lubricant. Also, the secreted lubricant helps as a protecting agent for the nipple and helps the skin in respiration and in staying pliable (Berens, 2019; Swisher & Lauwers, 2016). The nipple, areola and Montgomery glands contribute to the onset of lactation, milk volume, and the prevention of breast engorgement.

Breast Milk Production and Milk Secretion

After giving birth, the hormones in a mother's body change for lactation to take place through the mechanism of lactation (milk production and milk secretion). The mechanism of milk production and milk secretion is called "Lactogenesis". There are 3 phases of Lactogenesis (Lawrence, 2022; Lauwers & Swisher, 2016; Wambach & Riordan, 2016). Lactogenesis I is the period that begins around the 12th week (Lawrence, 2022) or the first phase of the 3rd trimester (Lauwers & Swisher, 2016) or mid-pregnancy to late pregnancy (Wambach & Riordan, 2016). Each mother may have a different beginning of this phase, which is during week 12-24.

Lactogenesis I is the period of the breast in preparation for milk production during pregnancy. The placenta plays an important role in the production of hormones, such as, estrogen, progesterone, prolactin, and human placental lactogen (hPL). These hormones will stimulate the milk ducts in both breasts and the mammary glands increase to prepare for milk production and secretion. The breast is more extensive; there is the accumulation of nutrients necessary for milk production under the endocrine system. However, in this period milk has not yet been produced due to the high levels of estrogen and progesterone; it has the effect of inhibiting lactogenesis (Berens, 2019; Lauwers & Swisher, 2016; Wambach & Riordan, 2016).

Lactogenesis II is a period that occurs during 2-3 days after birth (Lawrence, 2022) or 2-5 days after birth (Lauwers & Swisher, 2016), or 2-8 days after delivery (Wambach & Riordan, 2016). Lactogenesis II is the mechanism of milk production and milk secretion. This mechanism occurs after the placenta birth and causes the level of estrogen and progesterone hormones to decrease rapidly. Prolactin hormone is the primary hormone in milk production that is produced from the anterior pituitary gland and can act to stimulate the mammary gland cells to effectively produce

milk (Berens, 2019; Lawrence, 2022). At the same time, the oxytocin hormone is produced by the posterior pituitary gland. Oxytocin hormone has the primary function of controlling the milk secretion or milk ejection by the stimulation of the myoepithelial cells around the mammary glands, which allow the contraction and secretion of milk in the milk duct. This results in the production and secretion of colostrum with high immunity (Lauwers & Swisher, 2016; Wambach & Riordan, 2016).

Lactogenesis III or galactopoesis is a period that begins about 8-10 days after birth (Lawrence, 2022; Wambach & Riordan, 2016). In this phase, mature milk is produced. However, the volume of milk depends on various factors, such as the number of times the infant sucks per day and if the infant sucks correctly because this stimulates deep nerves, oxytocin release, and milk letdown reflex (Lauwers & Swisher, 2016).

Mechanism of Lactation

The onset of lactation and increase in milk volume occurs under a mechanism of milk production and milk secretion, especially in the Lactogenesis II phase. This is a period that occurs after the placenta birth and the hormones needed in breastfeeding, namely, prolactin and oxytocin hormones, are produced (Lawrence, 2022; Wambach & Riordan, 2016), when these hormones can act to stimulate milk production and milk ejection effectively. Thus, there are onset of lactation and increased milk volume (Lauwers & Swisher, 2016; Wambach & Riordan, 2016). In this study, the onset of lactation is the duration of time after giving birth until onset of lactation initiation, which is counted from the time of birth until the mother has a feeling of breast enlargement, swelling, stiffness, heaviness, and milk flowing out. In terms of milk volume, it means the amount of milk that the newborn received.

Measurement for Lactation

Instrument for measuring the onset of lactation

There are a few scales that measure the onset of lactation for postpartum mothers. The details are as follows:

1. The onset of lactation form was developed by Khotsang et al. (2016). This form was used to evaluate the signs and symptoms of an increase in milk volume after giving birth, which is counted from the time of birth until the mother has a feeling of enlargement, swelling, stiffness, and heaviness. The method of use is the postpartum mothers recording their signs and symptoms of onset of lactation and the researcher observing and interviewing the primiparous mothers. Signs and symptoms of onset of lactation consist of; 1) the mother feels breast enlargement, swelling, stiffness, and heaviness, 2) there is the milk flowing out from the breast on the opposite side from that the newborn in feeding on, 3) there is milk flowing out from the newborn's mouth while breastfeeding, and 4) hearing the newborn swallowing milk. When the mother exhibits one of the above signs and symptoms, it is considered the onset of lactation. Previous study showed the reliability coefficient for the overall scale of the onset of lactation was .80, and inter-rater reliability was .80 (Khotsang et al., 2016).

2. The timing of onset of lactation (Zhang et al., 2017) is the number of hours from the mother giving birth to the time that the mother reports feeling fullness at the breast and her milk flowing out. Evaluation begins 24 hours after birth and continues every 4 hours until the mothers noticed a sudden feeling of fullness in their breasts to confirm the onset of lactation. However, there is no mention of reliability, and the application requires translation.

This study used the onset of lactation form, which was developed by Khotsang et al. (2016) because the reliability coefficient for the overall scale of the

onset of lactation form was .80. There is also a Thai version so there was no need to translate. This tool contains questions about the onset of lactation. The questions in this tool are created from literature reviews related to the mechanism of lactation, which has content consistent with the conceptual framework of the onset of lactation in this study. In addition, this tool was used in postpartum mothers, similar is the sample in this study.

Instruments for measuring milk volume

There are many scales to measure milk volume in postpartum mothers. These tools are divided into measurement of expressed milk volume and infant weight change as follows:

1. Measurement of expressed milk volume

1.1 Daily breast milk volume. The evaluation is done after a 30-minute breast massage and at an interval of approximately 2 hours since the previous breast expression by the mother expressing her breasts with a manual breast pump for about 15 minutes. Following this, a syringe is then used to measure the milk volume (Mirzaie et al., 2018). In the study of Damanik (2018), milk volume was measured by daily manual pumping and a syringe to measure milk volume. In addition, there was measured milk volume per day by using manual breast pumping and converted to milliliters (Hesti et al., 2017). In another study, the mothers used an electric breast pump for 15 minutes by themselves to determine milk volume and used a baby milk bottle to measure and record the amount of milk (Mohammadpour et al., 2018).

1.2 The expressed breast milk volume by using a cup graduated in milliliters (Divya et al., 2016). The milk volume by expression during three consecutive expressions. Also, in the study of Sari and colleague (2017), milk volume was measured by expressing breast milk and converted to milliliters using cups during 24 hours.

2. Infant weight

2.1 Daily weight gain, the researcher calculated the average newborn weight gain before and after providing intervention per day (Nurvitasari et al., 2019; Yuliati et al., 2017).

2.2 Test weighing before and after breastfeeding (Dewey et al., 2003) is used to measure the milk volume after the newborn receives breastfeeding. The evaluation of breast milk volume is as follows: weighing baby and diaper before and after breastfeeding. The difference baby weight is the milk weight each time, then it is converted into milk volume. Also, the study of Sulaeman and colleagues (2016), used baby weight gain after suckling converted to milliliters.

This study used a test weighing of the newborn before and after breastfeeding, which was developed by Dewey et al. (2003). Measuring the weight gain is easier, more convenient, and best method to assess milk volume (Amir, 2014; Dewey et al., 2003).

Factors Affecting Lactation

The factors affecting the lactation including onset of lactation and milk volume consist of positive factors (infant sucking or nipple stimulation, frequent breastfeeding or breast pumping, stimulating the sensory pathways), and negative factors (cesarean section, prolonged labor, obesity, postpartum hemorrhage or Sheehan's syndrome, diabetes type I, placenta retention, a having breast surgery, having nipple abnormalities, isolated prolactin (PRL) deficiency, pain or stress, and newborns who have complications. The details are as follows:

Positive factors affecting lactation

1. The sucking of the infant or nipple stimulation is necessary for an increase in prolactin levels. The sucking of the infant or nipple stimulation will

stimulate the sensory receptors at the nerve endings of the nipples and send a signal through the sensory nerve to the posterior pituitary gland for the secretion of oxytocin hormone (Lauwers & Swisher, 2016; Wambach & Riordan, 2016).

2. Frequent breastfeeding or breast pumping. Breastfeeding frequency can predict the onset of lactation (Chaingm et al., 2019). Moreover, number of breastfeeding is a factor affecting timing of onset of lactogenesis-II (Salahudeen et al., 2013).

3. The stimulation of sensory pathways. This comprises visual, tactile, olfactory, and auditory. Stimulation via these sensory pathways of the postpartum mother, helps to promote oxytocin hormone secretion, which stimulates the breast milk secretion (Lauwers & Swisher, 2016; Wambach & Riordan, 2016).

Negative factors affecting lactation

1. The mothers who have a cesarean section begin to breastfeed their baby slower than the mothers with a normal labor. This is because the mothers who have had a cesarean section experience drowsiness and discomfort from the pain which results in late breastfeeding, and thus, the mother with cesarean section is a barrier to the onset of lactation initiation (Salahudeen et al., 2013; Wambach & Riordan, 2016).

2. The mothers with a long stage II of labor have fatigue from giving birth (prolonged labor) (Dewey et al., 2003; Wambach & Riordan, 2016). Thus, a long stage II of delivery result in delayed onset of lactation and insufficient breast milk.

3. The mother with body mass index (BMI) before pregnancy more than 27 kg/m^2 or obesity is also associated with the secretion of breastfeeding hormones. Therefore, this factor results in a delayed onset of lactation and milk volume (Nommsen-Rivers et al., 2010; Salahudeen et al., 2013).

4. Postpartum hemorrhage or Sheehan's syndrome affects the secretion of breastfeeding hormones, and mothers have fatigue from losing blood (Lauwers & Swisher, 2016; Wambach & Riordan, 2016).

5. Gestational diabetes mellitus is another the factor influencing a delayed onset of lactation (Salahudeen et al., 2013).

6. Placenta retention causes delayed secretion of oxytocin and prolactin hormones. This result affect lactation (Lauwers & Swisher, 2016; Wambach & Riordan, 2016).

7. The mothers who have had breast surgery to reduce mammoplasty have reduced mammary glands that perform a role in milk production (Lauwers & Swisher, 2016; Wambach & Riordan, 2016). This factor affects the delayed onset of lactation.

8. Isolated prolactin (PRL) deficiency, gestational ovarian theca lutein cysts, and polycystic ovary syndrome are factors also affecting the secretion of breastfeeding hormones. Therefore, this affects the milk secretion, leading to a delay in the onset of lactation and insufficient milk volume (Lauwers & Swisher, 2016; Wambach & Riordan, 2016).

9. Pain or stress or anxiety of the mother is factor that inhibit the secretion of prolactin and oxytocin hormones. These factors cause delayed onset of lactation for more than 72 hours and low milk volume (Dimitraki et al., 2016; Lauwers & Swisher, 2016).

10. Newborns with health complications, such as birth asphyxia, tongue-tie, cleft lip or cleft palate, etc. They are not able to suck breast milk within 1 hour after birth or every 2-3 hours. Therefore, these factors cause delayed onset of lactation. (Dewey et al., 2003; Wambach & Riordan, 2016). In addition, delayed lactogenesis II

has also been associated with weak breastfeeding of infants and the status of the infant after birth (Nommsen-Rivers et al., 2010). Similarly, Apgar score < 8 was a risk factor that also delayed the onset of lactogenesis II (Salahudeen et al., 2013).

11. Nipple abnormalities (inverted nipples, flat nipples) because the sucking of the baby affects breastfeeding hormonal stimulation, when the mother has a nipple abnormality, the baby is unable to breastfed. This results in a decrease in breastfeeding hormonal stimulation (Dewey et al., 2003; Nommsen-Rivers et al., 2010)

Impacts of Poor Lactation (Delayed Onset of Lactation and Insufficient Milk Volume

The mother with a delayed onset of lactogenesis II has a lower milk volume than the mother with a non-delayed onset of lactogenesis II (Yu et al., 2019). Delayed onset of lactation and insufficient milk volume result in the mothers having breastfeeding difficulties for their newborn. Thus, the baby often cry too much due to being hungry. Mothers and families then get anxious and stressed. They most often decide to introduce formula milk to the newborn (Mohebati et al., 2021; Peacock-Chambers et al., 2017; Wagner et al., 2013). After receiving formula milk, the infant's stomach full, they do not want to suck breast milk. The mother's nipple is not stimulated by the baby's sucking, and this resulting in the anterior and posterior pituitary gland not being stimulated to secrete prolactin and oxytocin hormones (Lauwers & Swisher, 2016; Wambach & Riordan, 2016). Delayed onset of lactation (Brown et al., 2014; Payakkaraung et al., 2016) and insufficient breast milk volume (Amir, 2014; Thepha et al., 2017) are a cause of weaning in the early postpartum period. These mothers are at high risk of unsuccessful exclusive breastfeeding in the first six months (Brownell et al., 2012; Hruschka et al., 2003).

Breast Engorgement

This topic describes the definition, mechanism, and measurement of breast engorgement, as well as the influencing factors and impacts of breast engorgement. The details are as follows:

Definition

Breast engorgement is an indication that there is still a lot of milk in the breast or the milk does not drain has completely. This results in increased pressure in the alveoli and milk ducts of the breast. Therefore, the breast is firm, tender, hard, and painful (Katrina & Helen, 2022; Lauwers & Swisher, 2016). In this study, breast engorgement refers to the condition of the breast containing milk and fluid, so that the breast showed signs and symptoms of firmness and tenderness.

Mechanism of Breast Engorgement

In the lactogenesis II period, the breasts have increased levels of blood, oxygen, and sugar, which are necessary for milk secretion and milk production. The breasts become fuller, heavier, and tender, and the blood vessels on the skin of the breast are visible. If the duct system of the breast has not entirely drained or there is still milk within the breast, this will increase the pressure in the alveoli and milk ducts inside the breast (Katrina & Helen, 2022; Lauwers & Swisher, 2016) or the lymphatic vessels of the breasts which cause blockages (Walker, 2017), resulting in breast engorgement. The mother will have signs and symptoms in the breast that include firmness, hardness, tenderness, and the breast will feel warm or hot, the nipple will flatten, causing the mother to have breast pain, low fever, discomfort, etc. (Lauwers & Swisher, 2016; Wambach & Riordan, 2016).

Measurement for breast engorgement

Instrument for measuring breast engorgement

There are a few tools to measure breast engorgement in postpartum mothers as follows:

1. The six-point breast engorgement scale was adopted from Hill and Humenick (1994). This instrument uses six response stages consisting of soft, no change = 1 score, slight change = 2 score, firm, non-tender =3 score, firm, beginning tenderness = 4 score, firm tender = 5 score, and very firm, very tender = 6 score. This tool is widely used to evaluate breast engorgement. The reliability of the tool was calculated by inter-rater reliability as 0.73 (Eittah & Ashour, 2019; Kaur et al., 2017), and 0.9 (Krishnaveni, 2014). In addition, the reliability of the tool was computed by Karl-Pearson's coefficient and the test-retest method as 8.16 and 0.96, respectively (Kaur & Priyadarshani, 2018). In Thailand, this scale has already been translated into the Thai by Pisitsupamit (2008) (cited in Srichandon, 2011), and the scale has been used in clinical practice for breast engorgement in a study testing the effects of implementing practice guidelines for the prevention and treatment of breast engorgement among lactating mothers (Srichandon, 2011).

2. The breast engorgement evaluation scale for assessing breast hardness (Wong et al., 2017). Breast engorgement was classified from one to six. Level 1 signifies that the breasts are supple and milk flows easily, whereas level 6 indicates that the breasts are firm and painful and no milk flows. A grade of 4 and above are categorized as breast engorgement. There is no mention of reliability.

3. The checklist of breast engorgement score (Khosravan et al., 2015) to assess breast engorgement evaluates erythema (no redness = 0 score, redness in spots in a limited zone = 1 score, full redness in a limited zone = 2 scores, bright redness in

a limited zone = 3 scores, and bright redness up greatest of the breast tissue = 4 scores); breast tightness (no changes = 0 scores, firm and no tenderness = 1 score, tight but not uncomfortable = 2 scores, tight and uncomfortable = 3 scores, tight and agonizing = 4 scores, and very tight and very agonizing = 5 scores); and breast pain (a score between zero and ten). The reliability has been confirmed with Cronbach's alpha values for days 3, 4, and 5 and were .79, .82, and .81, respectively. This checklist has been used by Kvist et al. (2008) (cited in Khosravan et al., 2015). However, this tool evaluates erythema, which is the signs and symptoms of breast engorgement that occurs from the third day after birth. This tool is therefore not suitable for evaluation on day 1 or 2 after birth.

Therefore, the researcher used the six-point breast engorgement scale of Hill and Humenick (1994) to evaluate the breast engorgement scores in this study because this is a tool that has been created based on the concept of the mechanism of breast engorgement. This tool has been used to evaluate breast engorgement in many previous studies (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016; Witt et al., 2016) and was found to be easy in administration and data analysis. The reliability of the tool was calculated with an inter-rater reliability of 0.73 (Eittah & Ashour, 2019; Kaur et al., 2017), and 0.9 (Krishnaveni, 2014). The reliability of the tool was measured by Karl-Pearson's coefficient, with a test-retest procedure of 8.16 (Kaur & Priyadarshani, 2018). In addition, there is a Thai version that was translated by Pisitsupamit (2008) (cited in Srichandon, 2011); however, the reliability of the Thai version was not mentioned.

Factors Affecting Breast Engorgement

Factors influencing breast engorgement include the breast milk not being drained in the breast completely and lymphatic and vascular blockages. The details are as follows:

1. The breast milk is not being drained in the breast completely; the breasts are having a large amount of milk remaining in the breast, which has not completely drained from the duct system. This increases the pressure in the alveoli and milk ducts produced inside the breast, resulting in breast engorgement (Katrina & Helen, 2022; Lauwers & Swisher, 2016).

2. Lymphatic and vascular blockages will lead to breast engorgement (Katrina & Helen, 2022; Walker, 2017).

Impacts of Breast Engorgement

Breast engorgement causes the mothers to have pain, swelling, hotness in the breasts, or the mother may have a low fever. This causes the mother to be uncomfortable. In addition, breast engorgement compromises milk production and can lead to mastitis. Consequently, breast engorgement is one of the major breastfeeding difficulties in terms of perceived insufficient breast milk. It causes of postpartum mothers not being successful in exclusive breastfeeding (Iqbal et al., 2017; Susiloretni et al., 2015). In addition, if breast milk is not drained, this will ultimately affect milk volume because the breast has autocrine or local control of the association between full breast milk and the prolactin-inhibitor factor (Lawrence, 2022; Wambach & Riordan, 2016).

Managements to Promote Lactation and Prevent Breast Engorgement

There are many methods to promote lactation (rapid onset of lactation initiation, increase milk volume), and prevent breast engorgement.

Managements to Promote the Lactation

Previous studies showed that several methods to manage lactation related to promote onset of lactation and/or milk volume including breast massage (Anusha, 2015; Cherian, 2019; Divya et al., 2016; Masae et al., 2019), warm compression (Panngam et al., 2015; Phon-ngam & Mankong, 2020; Wahyuningsih & Liliana, 2019), breast massage and warm compression (Khotsang et al., 2016; Punturat & Boonruen, 2017), partial body massage (Gustirni & Anggrain, 2020; Nurdiana et al., 2016; Sulaeman et al., 2016), neck or back or full body massage (Agustina et al., 2016; Damanik, 2018), auricular therapy (Chen et al., 2017), reflexology (Mirzaie et al., 2018; Mohammadpour et al., 2018) and acupuncture therapy (Lu et al., 2019; Patimah et al., 2019). The details are as follows:

1. Breast massage

In previous study, the researcher provided breastfeeding knowledge and training self-mamma control massage (SMC) method (Masae et al., 2019) in prenatal period. This SMC method consists of pressing the breast with the hands in a straight line toward the other breast, obliquely upward toward the opposite shoulder, and in a straight line upward (Pingwong & Kantaruksa, 2017). Then, participants massage their breasts in postpartum period. Some studies used breast massage consists of rubbing, stroking and kneading. Then the fingers are used to stroke over the entire breast in a clockwise circular motion to promote milk volume (Cherian, 2019). Another study did not mention about the method of breast massage (Divya et al., 2016). In addition,

another study performed massage with firm pressure and gentle strokes in circular motions over both breasts and the nipple with almond oil to the participants (Anusha, 2015).

Moreover, Oketani massage is a breast massage worked on the anatomy of the breast in which the breast is placed on the pectoral muscle. This massage is based on the belief that if the pectoral muscle lacks flexibility; this will result in stiff nipples and milk cannot be excreted. Oketani massage will help separate the fascia between the pectoral muscle and the retro mammary space. The method of Oketani massage consists of eight techniques on each breast by a massage from process 1 to 8 respectively (Dehghani et al., 2018; Yuliati et al., 2017). Another method, the Woolwich massage was performed on the lactiferous sinus 1-1.5 cm above the areola (Nurvitasari et al., 2019). The results showed that milk ejection (Masae et al., 2019), the amount of milk expression (Cherian, 2019; Divya et al., 2016), breast milk adequacy (Anusha, 2015), neonatal weight gain in the experimental group were significantly higher than those in the control group (Dehghani et al., 2018; Nurvitasari et al., 2019; Yuliati et al., 2017).

2. Warm compression

A warm compression is the use of heat to stimulate blood circulation around the breast. In a previous study, the primary investigator compressed warm moist polymer gel pack on the front of the shoulder, under the armpits, and in the breast area (Panngam et al., 2015). In addition, warm moist polymer gel packs (37.5-40 ˚C) were used to compress in the breast area. Then, the nipples and areolar were rolled by the fingers (Phon-ngam & Mankong, 2020). The result of studies showed that the onset of lactation in the intervention group was earlier than in the routine group. Another study, the researcher compressed warm water 41˚C over the breasts, resulting in breast milk volume in the experimental group being significantly higher than in the control group (Wahyuningsih & Liliana, 2019).

3. Combining breast massage and warm compression

Previous studies have combined breast massage and warm compresses to promote milk production by stimulating blood circulation (Punturat & Boonruen, 2017). In some studies, the primary investigator provided skin-to-skin contact, assisting the mother with breastfeeding, breastfeeding knowledge, teaching and training breast massage and warm compression in the postpartum period (Khotsang et al., 2016). The result showed that onset of lactation in the experimental group was significantly earlier than in the control group (Khotsang et al., 2016). In another study, the researcher applied Royal style massage by placing double thumbs on the shoulder muscles and pressing. This begins at the groove above the shoulder bone joints and the shoulder is pressed until the neck button (C7). After this, double thumbs are pressed on the shoulder until the neck button is in the same direction. After that, warm compresses were applied on both shoulders and breasts. The result of these studies presented that lactation level scale in the intervention group was significantly higher than in the control group (Punturat & Boonruen, 2017).

4. Partial body massage

In terms of partial body massage, the primary investigator is applied massage at the partial body to stimulate oxytocin hormone secretion. In a previous study, the researcher massaged along the spine and combined with breast care (Gustirni & Anggrain, 2020). In another study, the researchers massaged along the spine through acupressure points (Nurdiana et al., 2016) or massaged both side of the spine forward with the thumb (Sulaeman et al., 2016). In another study, starting from gentle massage over the breasts and oxytocin massage was used to the participants (Hesti et al., 2017; Rahayuningsih et al., 2016). In addition, digital oxytocin massage was administered (Anggorowati et al., 2016), and oxytocin massage was applied with relaxation

techniques (Sari et al., 2017). Result of these studies showed that breast milk volume in the experimental group was significantly higher than in the control group significantly.

5. Neck or back or full body massage

Some studies used the neck or back or full body massage to promote milk production. The study of Damanik (2018) massaged at the neck area, but this study did not mention the details of neck massage. In another study, the researcher used massage for the whole body with essential oil, administering aromatherapy oils with inhalation through a diffuser and massaged the full body combined with aromatherapy (Agustina et al., 2016). In addition, the researcher applied back massage by pressing both thumbs on the lateral side of the spine (Patel et al., 2013). These procedures helped to increase milk volume (Agustina et al., 2016; Damanik, 2018; Patel et al., 2013).

6. Auricular therapy.

Using reflexology helped to increase in breast milk expression. A systematic review on auricular therapy showed that fundamental Chinese studies used mature Vaccaria seed from the Vaccaria tree which were squeezed on acupoints to support auricular acupressure. The total number of chosen acupoints circled is three to fourteen. The six acupoints most chosen were endocrine, liver, mammary glands, spleen, chest, and stomach. Auricular therapy involves using the hand to press the Vaccaria seeds on the appropriate auricular acupoints. This process takes 10-15 seconds per acupoint and the total time of an auricular therapy session is 20 minutes. The result showed that auricular therapy helps to promote lactation (Chen et al., 2017).

7. Reflexology.

Previous studies showed that foot reflexology helps to stimulate milk volume (Mirzaie et al., 2018; Mohammadpour et al., 2018). In the study of Mirzaie and colleagues (2018), the experimental group received feet massage, in the first 5 minutes the foot were massaged all over. The next 5 minutes consisted of massaging and pressing the dorsal extent of the center finger, between the thumb and ring finger on the hand. In addition, another study of Mohammadpour and colleagues (2018) foot reflexology started by massage at the calf to the ankle and shifted on to the sole, and ultimately the mothers' toes obtained a comfortable massage. Next, the acupressure point for the pituitary gland which is directly in the center of the toe was squeezed continuously. In conclusion the results of using reflexology in these studies were increase in breast milk expression.

8. Acupuncture tuina therapy or lactapuncture

Acupuncture is an old form of medical massage in Chinese medicine, with used finger weight to points that are sensitized by organ impairment (Lu et al., 2019). For lactapuncture (Patimah et al., 2019), the study did not mention the details of the procedure. These studies could increase breast milk expression (Lu et al., 2019; Patimah et al., 2019).

The brief literature review about onset of lactation and milk volume are shown in Tables 1 and 2.

Managements to Prevent and Reduce Breast Engorgement

The managements to prevent or reduce breast engorgement were cold cabbage leaves (Disha et al., 2015; El-Saidy & Aboushady, 2016; Wong et al., 2017), Hollyhock leaf compresses together with a warm and cold compress (Khosravan et al., 2015), warm compresses (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016; Kaur

et al., 2017) and breast massage (Krishnaveni, 2014; Witt et al., 2016). The details are as follows:

1. Cold cabbage leaves

Previous study, the researcher putted cold cabbage leaves in a zip-lock bag and frozen for fifteen minutes or soaked in the refrigerator for one hour (Wong et al., 2017) or approximately 20-30 minutes (Disha et al., 2015; El-Saidy & Aboushady, 2016). Then, cold cabbage leaves were placed cover the breasts. The cold cabbage leaves help to reduce the engorgement severity (El-Saidy & Aboushady, 2016) and the breast engorgement scale (Disha et al., 2015; Wong et al., 2017).

2. Hollyhock leaf compresses together with a warm and cold compress

This intervention started with the application of a warm compress (43-46 ˚C) and a cold compress (10-18 ˚C). After 10-15 minutes, 6 to 8 spoonfuls (40-50 milliliter) of hollyhock leaf that had been thoroughly crushed were rubbed on the breast area. The intervention was performed three times a day for two days. The finding showed that the severity of breast engorgement after two days of the intervention tended to decrease. Hollyhock leaf compresses together with warm and cold compresses, helped to decrease the severity of breast engorgement with statistical significance (Khosravan et al., 2015).

3. Warm compression

Most of researchers used warm compression to reduce breast engorgement (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016; Kaur et al., 2017). In the study of Kaur and colleagues (2017) the researchers applied the cloths with temperature 43-46 ˚C to cover the breast and the cloth was changed every 5 minutes. In another study, the researcher used warm sponge cloth compresses (43-46 ˚C) on the breasts (Eittah &

Ashour, 2019; El-Saidy & Aboushady, 2016). The findings of these studies showed that warm compresses helped to reduce breast engorgement.

4. Massage

Therapeutic breast massage in the lactation (TBML) method was created based on the basis of the lymphatic system to expel the secretions back to the axillary lymph node (Witt et al., 2016). In addition, massaging was performed on the breast by massaging with soft, gentle, circular and kneading movements from the center to the periphery (Krishnaveni, 2014). Another study, the researcher applied breast massage combined with warm compresses by using of sponge cloths over the breasts. However, the researcher did not mention the massage method (Thakur & Bala, 2018). The results showed that massage (Krishnaveni, 2014; Witt et al., 2016) or massage with warm compresses (Thakur & Bala, 2018) helped reduce breast engorgement.

The brief literature review about breast engorgement is shown in Table 3.

The result of a systematic review showed that there were many massage techniques to increase milk production (Nuampa & Payakkaraung, 2021). However, several studies suggested that massage and warm compression are appropriate strategies to promote milk production with respect to the onset of lactation or milk volume (Khotsang et al., 2016; Punturat & Boonruen, 2017), and reduce breast engorgement (Thakur & Bala, 2018). However, all the previous studies, whether experimental studies or quasi-experimental research designs, had no random selection (Punturat & Boonruen, 2017; Thakur & Bala, 2018). This can result in selection bias, which was a limitation of these research studies (Polit & Beck, 2018). In addition, some studies had a small sample size (Kangkan et al., 2014). Using a small sample size may have resulted in a sample size inappropriate for testing the hypotheses of the study (Polit & Beck, 2018).

Table 1

Literature Review about Onset of Lactation

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of onset of lactation		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Khotsang et al. (2016)	Comparative experimental	Skin-to-skin contact, assisting the mother with breastfeeding, breastfeeding knowledge, teaching and training breast massage and warm compression in postpartum period.	Routine care	Day 1 (2-4 hr.)	N/A	N/A	N/A	N/A	Onset of lactation	*M* (*SD*) 29 (7.90)	*M* (*SD*) 45.37 (11.56)	-6.08*
Panngam et al. (2015)	RCT	Compression with warm, moist polymer gel packs; compressed warm, moist polymer gel packs on the front of the shoulder, under the armpits, and in the breast area.	Routine care	Day 1-2	20	2	1	40	Onset of milk production	*M* (*SD*) 32.14 (13.32)	*M* (*SD*) 42.77 (8.37)	3.16**
Phon-ngam and Mankong (2020)	Quasi-experiment	Warm moist gel pack chest compression integrated with nipples stimulation; Applied warm moist gel pack (37.5-40 ˚C) compress in breast area. Then roll the nipples and areola with fingers.	Breast massage; gentle, circular massage, stroking from the base of the breast to the nipple and shaking the breast.	Day 1	20	1	4	80	Onset of milk ejection	*M* (*SD*) 28.93 (18.08)	*M* (*SD*) 62.32 (16.88)	-7.02***

Note. * $p < .05$, ** $p = .001$, *** $p < .001$, RCT = randomized controlled trial.

Table 2

Literature Review about Milk Volume

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of milk volume		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Agustina et al. (2016)	Quasi-experiment with non-equivalent control group	Ex1: Massage; massage the whole body with essential oil. Ex2: Aromatherapy; administering aromatherapy oils with inhalation through a diffuser. Ex3: Aromatherapy massage; participants received massage and aromatherapy.	Routine care	Day 3	Ex1: 45-50 Ex2: 30 Ex3: 45-50	2	2	200	Baby weigh gain convert to ml or hand expression (total volume per day)	*M* (*SD*) Ex1: 172.18 (12.40) Ex2: 166.36 (16.85) Ex3: 190.00 (20.94)	*M* (*SD*) 131.82 (25.34)	N/A****
Anggorowati et al. (2016)	Quasi-experiment (pretest-posttest)	Digital oxytocin massage; the acupuncture points of the electrodes are located in the first intercostal space of B1-17 and B1-18.	Routine care	Within 6 months	20	N/A	3	N/A	Breast milk production; using manual breast milk pump	*M* (*SD*) 20.76 (19.31)	*M* (*SD*) 3.62 (6.04)	N/A*
Anusha (2015)	Quasi-experiment	Almond oil massage; use of almond oil with firm pressure and gentle strokes in circular motions over both breasts and the nipple.	Routine care	Day 1	10	3	3	90	Breast milk adequacy checklist	*M* (*SD*) 18.20 (1.38)	*M* (*SD*) 10.70 (3.82)	77.7*

Note. * $p < .05$, **** $p < .01$, N/A = not mention about F/χ^2.

Table 2

Literature Review about Milk Volume (Continued)

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of milk volume		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Cherian (2019)	Quasi-experiment	Breast massage	Routine care	N/A	N/A	N/A	N/A	N/A	Amount of breast milk expression at day3	Morning = 20.50 Afternoon = 24.70 Evening = 28.90	Morning = 17.20 Afternoon = 17.90 Evening = 17.50	2.67^{***} 5.50^{***} 9.03^{***}
Damanik (2018)	Pre-experiment	Neck massage	Massage the pectoralis major muscles.	Day 1	15	1	3	45	Milk expression by using breast pump and syringe (Average per day)	39.44	15.56	N/A^{*}
Dehghani et al. (2018)	RCT	Oketani massage; massage with eight manual techniques.	Routine care	N/A	30	1	2	N/A	Newborn weight gain at 14 and 28 days	*M* (*SD*) Day 14: 3,778 (4) Day 28: 4,527 (5)	*M* (*SD*) Day 14: 3,358 (3) Day 28: 3,857 (3)	N/A^{***} N/A^{***}

Note. * $p < .05$, *** $p < .001$, N/A = not mention about F/χ^2, RCT = randomized controlled trial.

Table 2

Literature Review about Milk Volume (Continued)

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of milk volume		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Divya et al. (2016)	Quasi-experiment (pretest and post-test)	Breast massage, participants were taught about breast massage and breast milk expression. Breast massage consists of rubbing, stroking and kneading. Then the fingers are used to stroke over the entire breast in a clockwise circular motion.	-	Days 3-8	5 pre breast	N/A	N/A	10	Breast milk expression volume	Post-test *M* (*SD*) 15.56 (8.38)	Pretest *M* (*SD*) 7.33 (4.86)	4.22^{***}
Gustirini and Anggrain (2020)	Quasi-experiment	Oxytocin massage and breast care	Routine care	1	N/A	2	14	N/A	Newborn who had increase weight at day 6 and day 9	Post-test 73.3% 100%	Pretest 40% 56.7%	N/A^{*}
Hesti et al. (2017)	Quasi-experiment (pretest-posttest)	Breast care, gentle massage techniques were used. The breasts and areola area were compressed or sorted. After then, providing oxytocin massage by neck, scapula and ribs of the spine were massaged in 5-6 circles.	Education and advice on breast care.	Day 1	15-20	2	3	120	Breast milk volume by using manual breast pump (milk volume per day)	*M* (*SD*) 203.82 (54.33)	*M* (*SD*) 54.90 (28.95)	N/A^{*}

Note. * $p < .05$, **** $p < .01$, N/A = not mention about F/χ^2.

Table 2

Literature Review about Milk Volume (Continued)

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of milk volume		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Khanal et al. (2016)	Quantitative (pretest-posttest)	Back massage; pressing with thumbs on the back on the side of the spine, in circular motions. Then movements "back and forth" from the neck to the loin and back to the neck were performed.	Routine care	Day 1 (2 hr.)	10	3	3	90	Newborn weight (Average at day 3)	*M* (*SD*) 13.83 (2.40)	*M* (*SD*) 9.00 (2.27)	6.53**
Lu et al. (2019)	RCT	Acupuncture tuina therapy; massage at the tibia, thigh bulge, nose, cervical spine and intercostal space.	Routine care	Day 3	15	1	2	60	Breast milk pump (at 72-96 hrs.)	*M* (*SD*) 51.25 (48.51)	*M* (*SD*) 5.68 (10.05)	N/A***
Masae et al. (2019)	Quasi-experiment	Breastfeeding knowledge and SMC massage (Self-Mamma Control method); in the prenatal period, teaching breastfeeding knowledge and training SMC massage. In the postpartum period, participants applied the SMC method by themselves at within 4 hours, 8-12 hours, 12-24 hours, and 24-48 hours after giving birth.	Routine care	Day 1 (Within 4 hr.)	N/A	2	2	N/A	Lactation level scale at 4, 12, 24, and 48 hr. after birth	Mean rank 4 hr. = 29.00 12 hr. = 32.00 24 hr. = 29.86 48 hr. = 33.54	Mean rank 4 hr. = 22.00 12 hr. = 19.00 24 hr. = 21.14 48 hr. = 17.46	4.99* 14.05* 7.23** 20.85***

Note. * $p < .05$, ** $p = .001$, *** $p < .001$, N/A = not mention about F/χ^2.

Table 2

Literature Review about Milk Volume (Continued)

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of milk volume		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Mirzaie et al. (2018)	RCT	Reflexology massage starting from washing feet with warm water. Then massage the calf to the ankle.	Foot massage; start with general massage of both feet. Then massage the irrelevant points of the breast.	Day 7-54	20	1	7	140	Breast milk expression from manual pump measured by syringe (daily breast milk at day 1, 4, 7)	*M* (*SD*) Day1: 10.30 (28.26) Day4: 29.70 (34.90) Day7: 58.00 (64.60)	*M* (*SD*) Day1: 6.70 (31.60) Day4: 12.50 (31.80) Day7: 8.90 (47.00)	N/A^{ns} N/A^{ns} N/A***
Mohammadpour et al. (2018)	RCT	Reflexology; stating with the washed feet by warm water. Then, massage from the calf to the ankle.	Routine care	Day 3	20 per foot	1	6	360	Breast milk volume from electric pump	*M* (*SD*) Day1: 3.18 (3.02) Day2: 7.22 (3.25) Day3: 11.46 (4.25) Day4: 14.94 (5.91) Day5: 18.54 (5.85) Day6: 20.98 (6.99)	*M* (*SD*) Day1: 0 (0) Day2: 3.30 (2.45) Day3: 6.64 (5.29) Day4: 10.66 (4.08) Day5: 14.52 (5.50) Day6: 18.74 (7.50)	44.00**
Nurdiana et al. (2016)	Quasi-experiment (one group pretest-posttest)	Oxytocin massage; massage along the spine through acupressure points.	-	Day 1	10	2	3	60	Baby weigh gain	Post-test 3,747	Pretest 3,461	N/A*

Note. * $p < .05$, ** $p = .001$, *** $p < .001$, ^{ns} = no significant, N/A = not mention about F/χ^2, RCT = randomized controlled trial.

Table 2

Literature Review about Milk Volume (Continued)

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of milk volume		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Nurvitasari et al. (2019)	Quasi-experiment	Woolwich massage; massage is performed on the lactiferous sinus 1-1.5 cm above the areola.	Routine care	Day 8	15	N/A	6	N/A	Newborn weight (Average increase)	405.50	238.88	N/A*
Patel et al. (2013)	Quasi-experiment with non-equivalent control group	Back massage; massage with both thumbs on the lateral side of the spine. Massage from the neck to the buttocks and back to the neck.	Routine care	Day 1 (2 hr.)	15	4	4	180	Infant weight gain at day 1, 2, and 3	*M* (*SD*) Day1: 10.90 (2.48) Day2: 24.60 (3.36) Day3: 36.84 (5.84)	*M* (*SD*) Day1: 6.89 (3.02) Day2: 19.28 (5.94) Day3: 30.16 (7.58)	6.89** 9.14** 11.47**
Patimah et al. (2019)	Quasi-experiment	Lactapuncture massage.	Routine care	Day 3	30	1	2	60	Breast milk expression	*M* (*SD*) 9.36 (0.71)	*M* (*SD*) 7.39 (0.23)	N/A***
Punturat and Boonruen (2017)	Quasi-experiment	Royal style massage and herbal compression; using royal style massage (should basis) and combing the breast. Then herbal compression.	Royal style massage; use of royal style massage and herbal compression	Day 1	55	1	1	55	Lactation level scale	*M* (*SD*) Ex group (Post-test) 2.07 (0.69) Con group (Post-test) 0.73 (0.64) Ex group 2.07 (0.69)	*M* (*SD*) Ex group (Pretest) 0.57 (0.50) Con group (Post-test) 1.20 (0.66) Ex group 1.20 (0.66)	-4.06*** -13.04*** -1.46ns

Note. * $p < .05$, ** $p = .001$, *** $p < .001$, ns = no significant, N/A = not mention about F/χ^2.

Table 2

Literature Review about Milk Volume (Continued)

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of milk volume		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Rahayuningsih et al. (2016)	RCT	Breast care and oxytocin massage; starting with breast care by massaging the breast. Then oxytocin massage by massaging the part along the spine to the 5th and 6th rib bones.	Routine care	Day 1	N/A	2	3	N/A	Breast milk production; using milk expression	*M* (*SD*) 17.37 (9.70)	*M* (*SD*) 1.58 (1.69)	N/A***
Sari et al. (2017)	RCT	Oxytocin massage and hypnobreastfeeding; starting from the oxytocin massage, massaging at the lateral vertebrae and at the 5th and 6th. Subsequently, relaxation techniques are applied in hypnobreastfeeding.	Routine care	Day 1	N/A	N/A	N/A	N/A	Breast milk expression	*M* (*SD*) 13.07 (10.36)	*M* (*SD*) 5.17 (4.21)	N/A***

Note. *** $p < .001$, N/A = not mention about F/χ^2, RCT = randomized controlled trial.

Table 2

Literature Review about Milk Volume (Continued)

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of milk volume		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Sulaeman et al. (2016)	Quasi-experiment	Partial body massage, which maneuvered oxytocin massage by massage both sides of the spine forward with the thumb, press a circular motion in small pieces with the thumbs, and massage both spines downward.	Routine care	Day 1	2-3	2	3	18	Baby weight gain after suckling	*M* (*SD*) 9.62 (1.78)	*M* (*SD*) 4.47 (1.78)	N/A*
Wahyuningsih and Liliana (2019)	Quasi-experiment	Warm compression; use of warm water 41 ˚C cover the breasts.	Health education.	N/A	10	1	1	10	Breast milk volume by pumping (ml)	*M* (*SD*) 50.00 (7.30)	*M* (*SD*) 30.00 (6.63)	NA**
Yuliati et al. (2017)	Quasi-experiment	Oketani massage and rolling technique; starting with rolling massage. Then use the oketani massage technique.	Breast care	Day 1 (12 hr.)	45	2	3	270	Infant weight gain	264.27	131.75	N/A*

Note. * $p < .05$, ** $p = .001$, N/A = not mention about F/χ^2.

Table 3

Literature Review about Breast Engorgement

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of breast engorgement		
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	F/χ^2
Disha et al. (2015)	Quasi-experiment	Chilled cabbage leaves	Hot compression	Day 1-7	N/A	2	7	N/A	Six-point engorgement scale	Pretest 1.06 (0.24) Post-test 5.88 (0.33) *M* (*SD*) 1.06 (0.24)	Pretest 1.16 (0.36) Post-test 5.62 (0.49) *M* (*SD*) 1.16 (0.36)	44.58^{***} 44.58^{***} 1.15^{ns}
Eittah and Ashour (2019)	RCT	Warm compression; using warm sponge cloth compresses (43-46 ˚C), the sponge was changed every 2 minutes.	Chilled cabbage leaves	Days 4-6	20	3	2	120	Number of mothers who had breast engorgement after intervention assessed from six-point engorgement scale	30%	54%	N/A^{**}
El-Saiday and Aboushady (2016)	Quasi-experiment	Ex1: Warm compress; use of a warm sponge cloth (43-46 ˚C) over the chest. Ex2: Cold cabbage leaves; use of cold cabbage leaves placed in the mother's brassiere.	-	Within 5 days	15-20	1	1	15-20	Six-point engorgement scale	Post-test *M* (*SD*) Ex1: 1.40 (0.80) Ex2: 1.20 (0.40)	Pretest *M* (*SD*) Ex1: 3.40 (1.56) Ex2: 3.4 (1.53)	7.8^{***} 8.9^{***}

Note. ** $p = .001$, *** $p < .001$, ^{ns} = no significant, N/A = not mention about F/χ^2, RCT = randomized controlled trial.

Table 3

Literature Review about Breast Engorgement (Continued)

Authors/ year	Design	Intervention		Duration of intervention					Measurement of outcomes	Results of breast engorgement		F/χ^2
		Experiment	Control	Starting time (After birth)	Duration per session (minutes)	Interval (time/day)	Period (day)	Total of time (minutes)		Intervention	Control	
Kaur et al. (2017)	Quasi-experiment	Ex1: Cold compress; using clothes (10-18 ˚C) Ex2: Hot compress; using clothes (43-46 ˚C) In both groups, a different clothing was changed every 5 minutes.	Routine care	N/A	15	2	3	90	Six-point engorgement scale	Post-test *M* (*SD*) Ex1: 2.80 (0.71) Ex2: 2.10 (1.21)	Pretest *M* (*SD*) Ex1: 2.87 (0.63) Ex2: 2.80 (0.66)	12.98^{****} 14.69^{****}
Krishnaveni (2014)	Quasi-experiment	Breast massage; massage with soft, gentle, circular and kneading movements from the center to the periphery.	Routine care	Days 3-5	10-15	2	3	90	Six-point engorgement scale	*M* (*SD*) 1.13 (1.10)	*M* (*SD*) 2.83 (2.77)	4.88^{*}
Thakur and Bala (2018)	Quasi-experiment	Warm compression with breast massage; use of sponge cloths over breasts and breast massage.	Routine care	Days 2-3	20	3	2	120	Six-point engorgement scale	*M* (*SD*) 1.60 (0.56)	*M* (*SD*) 5.93 (0.25)	N/A^{*}
Witt et al. (2015)	-	Therapeutic breast massage in lactation	-	N/A	30	1	1	30	Six-point engorgement scale	Post-test *M* (*SD*) 3.48 (1.20)	Pretest *M* (*SD*) 5.31 (1.2)	N/A^{***}
Wong et al. (2017)	RCT	Ex1: Cold cabbage leaves; use of cold cabbage leaves on the top of both breasts. Ex2: Cold gel packs; use of cold gel packs on both breasts.	Routine care	Within 14 days after birth	120	2	1	240	Breast engorgement (hardness) assessment scale	*M* (*SD*) Ex1: 3.41 (0.70) Ex2: 3.65 (0.80)	*M* (*SD*) 3.99 (0.80)	16.26^{***}

Note. * $p < .05$, *** $p < .001$, **** $p < .01$, N/A = not mention about F/χ^2, RCT = randomized controlled trial.

Moreover, most of the previous studies helped to reduce breast engorgement; however, prevention is better than having to find a solution. Therefore, this study looked at preventing breast engorgement because this helps to reduce the incident of breast engorgement which is a cause of unsuccessful exclusive breastfeeding (Iqbal et al., 2017; Susiloretni et al., 2015)

Moreover, the methods in the previous studies were either massage or warm compression, not combined techniques and most of them were performed in other countries which might be difference in social belief, culture and practice. Southern Thailand has the specific Southern Thai traditional massage (STM), which is used by the traditional midwife. In this specific massage technique, hands are used to pick or poke the milk line (Jejaroj et al., 2006; Thongsong, 2016). Currently, there has been no study attempting to investigate the STM. Previous studies only explain the method of massage (Hongsittichaikul et al., 2009; Jejaroj et al., 2006; Thongsong, 2016).

Warm compression helps stimulate blood circulation. The use of warm compression is useful to increase milk production, increase milk secretion by activating the letdown reflex, increases the effectiveness of milk removal (Walker, 2017; Wambach & Riordan, 2016) and helps to reduce breast engorgement (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016; Thakur & Bala, 2018). Therefore, it might be useful to combine STM with warm compression to promote the onset of lactation, increase milk volume, and prevent breast engorgement.

The Southern Thai Traditional Massage

This topic of Southern Thai traditional massage (STM) presents the characteristics, procedures, and effects of STM on lactation and prevention of breast engorgement. The details are as follows:

The Characteristics of the Southern Thai Traditional Massage

In Southern Thailand, the STM is a specific method used by the traditional midwife. It has been passed down from past generations to the present, thus the knowledge and experience has been communicated from one generation to another. This is especially so in the part of midwifery, as in the past, there were traditional midwives who were responsible for the care of women from the beginning of the pregnancy period until the postpartum period. The traditional midwife serves as a folk medicine person who provides health care for mothers according to local wisdom that is consistent with the culture of the community in the southern region. In the context of the Muslims, they are called "toa bi dae" (Pumtong et al., 2010).

At present, the knowledge and experience in using traditional midwifery wisdom are communicated in the form of articles in qualitative research since there are very few traditional midwives at present. They passed away without a successor. In addition, modern medicine has had a great impact on the extinction of traditional midwives. This leads to the loss of valuable wisdom (Saksoong & Chaunchaiyasit, 2018). Therefore, the methods of the traditional midwife in maternal care to match the current nursing context should be promoted and applied. Local wisdom that has benefit and is of value to the south of Thailand should be preserved and inherited.

Postpartum maternal care of traditional birth attendants consists of 1) fire after childbirth, 2) massage such as uterine massage, breast massage, 3) providing care about food (Department for Development of Thai Traditional and Alternative Medicine, 2018). In this study, attention is paid to postpartum maternal care, especially regarding breast massaging to stimulate milk, to help the mother have enough milk to meet her baby's needs, as well as reduce the problems and obstacles of breastfeeding.

The Effects of Southern Thai Traditional Massage on Lactation and Prevention of Breast Engorgement

STM method used the hands for picking or poking at the axillary process area or the milk line, which passes through the mammary gland. Another method of STM are is squeezing or pressing the breast area at the pectoralis major muscle. These methods help stimulate blood circulation and sends a signal to the sensory receptor at the nipple and areolar stimulating the pituitary gland (Sultana et al., 2013) releases prolactin and oxytocin, which causes milk production and milk secretion (Drake et al., 2015; Lauwers & Swisher, 2016). The axillary and breast area contains the pectoralis major muscle, lymph nodes, and vessels, both veins and an artery, and the thoracic intercostal nerves II, III, IV, V, and VI (Drake et al., 2015; Lauwers & Swisher, 2016).

The STM is also a method based on the structure of the lymphatic system. It is a method that helps to drain the fluid to normal lymph channels, which is an appropriate way to prevent and reduce breast engorgement (Lauwers & Swisher, 2016). Breast massage helps to decrease the hardness of the breast (Meng et al., 2015). In addition, breast massage also helps to reduce stress and causes mothers to relax as well as lowers levels of anxiety (Wongsiri, 2013). Therefore, relaxation promotes the pituitary gland to secrete more oxytocin which results in the stimulation of milk secretion or milk ejection (Lauwers & Swisher, 2016; Wambach & Riordan, 2016). Thus, the Southern Thai traditional massage can promote the onset of lactation, increase milk volume, and prevent breast engorgement.

The Procedures of the Southern Thai Traditional Massage

The Southern Thai traditional massage consists of two steps. *Step one* of the Southern Thai traditional massage is the method using the hand to pick or poke at the milk line or the axillary process area three times per breast (Hongsittichaikul et al.,

2009; Jejaroj et al., 2006; Thongsong, 2016). *Step two* of the Southern Thai traditional massage is massaging continuously from the first step. The fingers (except the thumb) are used is squeeze or press all over the pectoralis major muscle at the breasts (Jejaroj et al., 2006; Thongsong, 2016).

Warm Compression

Warm compression is a method to make it more useful for stimulating the onset of lactation, increasing milk volume, and preventing or solving breast engorgement.

The Definition/Characteristics of Warm Compression

Warm compression is intervention that is usually integrated with breast massage to reduce the breast engorgement (Thakur & Bala, 2018), promote milk ejection (Punturat & Boonruen, 2017), and stimulate milk production (Khotsang et al., 2016; Panngam et al., 2015). However, in some studies, warm compression was only used for reducing breast engorgement (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016; Kaur et al., 2017). Therefore, warm compression after breast massage was applied in this study.

The Effects of Warm Compression on Lactation and Breast Engorgement

Warm compression helps to stimulate blood circulation. In addition, it helps to provoke lactocytes, which are prolactin receptor sites. It increases the transport of prolactin into the blood and the penetration of prolactin into the milk-producing cells. Warm compression has the effect of stimulating the process of production and secretion of milk effectively (Panngam et al., 2015; Phon-ngam & Mankong, 2021). So, warm compression increases the efficiency of the milk removal, and reduces breast engorgement. In addition, warm compression is useful in activating the letdown reflex

(Walker, 2017; Wambach & Riordan, 2016). Previous study presented that warm compression helps to stimulate the onset of lactation in primiparous mothers (Panngam et al., 2015) and reduces breast engorgement (Kaur et al., 2017; Khosravan et al., 2015).

According to a literature review, interventions stimulate the onset of lactation, increase milk volume, and prevent breast engorgement. The application of a warm compress is one method that helps to promote the onset of lactation (Khotsang et al., 2016; Panngam et al., 2015). Also, warm compression, together with massage, help to increase milk volume (Anusha, 2015; Punturat & Boonruen, 2017). Warm compression is a method that reduces breast engorgement (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016; Kaur et al., 2017).

The Procedures of Warm Compression

According to the literature review, warm compression was applied after finishing the massage (Kangkan et al., 2014; Punturat & Boonruen, 2017). The warm compress program has two steps as follows:

1. Towels are used for each breast (Kangkan et al., 2014). The towels are soaked in room temperature water and twisted until damp. Then, the towels are steamed in an electric steamer with a temperature level of around 43-46 ˚C (Eittah & Ashour, 2019; Kaur et al., 2017) for 10 minutes (Panngam et al., 2015).

2. The towels are used to cover the breast by using one towel per breast for 2 minutes (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016). After this, the towel is replaced with another towel that has been steaming in electric steamer and then used to cover the breast following the same procedure as above. This warm compression process continues for 15 minutes (El-Saidy & Aboushady, 2016; Kaur et al., 2017).

Summary

Breastfeeding has significance and benefits for mothers, babies, family, and the nation. Factors affecting successful breastfeeding are personal factors, family support factors, and health services factors. However, many primiparous mothers who have no breastfeeding experience, and face the situation of delayed onset of lactation, insufficient milk volume, and breast engorgement, and they feel stressed and anxious. In such a situation, most mothers decide to feed their newborns formula milk. Therefore, the nurse-midwifes and other health care providers should prevent these problems by promoting the rapid onset of lactation initiation, increase milk in volume, and prevention of breast engorgement during the primiparous mothers' hospitalization. Southern Thai traditional massage and warm compression might help these primiparous mothers to have rapid onset of lactation initiation and sufficient milk volume, as well as help to prevent breast engorgement.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter describes the methodological aspects of examination of the effects of the Southern Thai traditional massage and warm compression on lactation and breast engorgement among Thai primiparous mothers. This chapter comprises the research design, research interventions, research outcomes, research setting, population and sample, instrumentations, validity and reliability, ethical considerations, data collection procedures, control of threats to internal validity, and data analysis.

Research Design

A randomized controlled trial with no blinding was used to investigate the effects of the Southern Thai traditional massage and warm compression program to promote lactation and prevent breast engorgement among Thai primiparous mothers. This study used minimized randomization to assign the participants into 3 groups 1) Southern Thai traditional massage and warm compression (STMW) group, or 2) Southern Thai traditional massage (STM) group, or 3) control group. The Southern Thai traditional massage and warm compression program was applied in the STMW group, and Southern Thai traditional massage program performed in the STM group. Both interventions have given at 4 time points (first time: at 4-5 hours, second time: 10-11 hours, third time: 28-29 hours, and forth time: 34-35 hours after giving birth). The control group received the standard care. Regarding data collection, the onset of lactation was evaluated by the participants recording the onset of lactation form and the researcher checked every 3 hours after giving birth during the daytime. Breast engorgement and milk volume were reviewed after finishing the intervention at the 2nd time: 10-11 hours,

the 3rd time: 28-29 hours, and the 4th time: 34-35 hours after giving birth. The researcher did not include the 1st time of intervention for data collection because the participants had just begun to enter the lactogenesis II period, thus most of them still had no milk flowing out. The research design and data collection are shown in Table 4.

Research Setting

This study was carried out in the postpartum ward at Hatyai Hospital, which is a health center for tertiary care in Songkhla province. There were 30 beds in postpartum ward at Hatyai Hospital. The primiparous mothers were admitted for labor and postnatal care in this hospital. They were provided bedside intervention by closing the curtains or in a private room, which was separate from other mothers. It was convenient for providing the interventions.

Population and Sample

The population of this study was the primiparous mothers who had been admitted to the postpartum ward at Hatyai Hospital and met the inclusion criteria. They were invited for participation in this study.

Table 4

Experimental Procedure

Groups		Hours after giving birth																		
		3	4-5	6	9	10-11	12	15	18	21	24	27	28-29	30	33	34-35	36	39	42	45	48
R	STMW	O1	X1+X2	O1	O1	X1+X2	O2	O1	O1	O1	O1	O1	X1+X2	O3	O1	X1+X2	O4	O1	O1	O1	O1
	STM	O1	X1	O1	O1	X1	O2	O1	O1	O1	O1	O1	X1	O3	O1	X1	O4	O1	O1	O1	O1
	Control	O1		O1	O1		O2	O1	O1	O1	O1	O1		O3	O1		O4	O1	O1	O1	O1

R was minimized randomization

STMW was the group that received the Southern Thai traditional massage and warm compression, STM was the group that received the Southern Thai traditional massage, and control group was the group that received routine care

X1 provided the Southern Thai traditional massage, X2 provided warm compression

O1 assess and record the onset of lactation every 3 hours after giving birth,

O2 assess and record the onset of lactation, milk volume and breast engorgement which was collected after finishing the intervention at 10-11 hours after giving birth

O3 assess and record the onset of lactation, milk volume and breast engorgement which was collected after finishing the intervention at 28-29 hours after giving birth

O4 assess and record the onset of lactation, milk volume and breast engorgement which was collected after finishing the intervention at 34-35 hours after giving birth

Sample Size

In this study, the sample size calculation was done using power analysis. The effect size of the previous research regarding the effects of a lactational program on the onset of the lactation of mothers after a cesarean section was 1.12 [i.e., a large effect size] (Khotsang et al., 2016). In addition, the effect size of breast massage on milk volume in postpartum mothers with insufficient milk volume was 1.28 (Punturat & Boonruen, 2017). Similarly, the study regarding the effects of breast massage on the volume of expressed breast milk among mothers of babies admitted to the NICU showed a large effect size of 1.57 (Cherian, 2019). Moreover, the effect size of breast massage on the severity of breast engorgement was 0.80 (Krishnaveni, 2014). This study used the effect size of 0.80 and a power of 0.80.

The researcher calculated the sample size from the Cohen sample size table of the t-test for the mean (Table 2.4.1 $\alpha = 0.05$) and selected the effect size of 0.80 and a power of 0.80. (Cohen, 1988, p.54). As a result, there were 20 participants per group and a total of 60 participants in this study. However, the researcher planned to account for any dropout of participants by adding 5% more participants per group. Therefore, the total minimum number of participants needed for this study was 63 (21 participants per group).

Inclusion Criteria

In this study, the researcher selected the participants according to the inclusion criteria of mothers and newborns. The details are as follows: for a mother 1) primiparous mother, 2) age 19 to 34 years, 3) normal labor at 1 a.m. to 1 p.m., 4) no medical contraindications to breastfeeding, 5) no health complications during labor or the postpartum period, such as, postpartum hemorrhage, pregnancy-induced hypertension,

etc., 6) normal breasts and nipples, 7) never having had breast surgery, and 8) can communicate in Thai language. The inclusion criteria of newborn were 1) no health complications during labor and the postpartum period, 2) Apgar scores after birth more than eight**,** 3) no health complications that cloud interrupt breastfeeding such as cleft lip, cleft palate and tongue-tie, and 4) birth weight 2,500-3,900 grams.

Exclusion Criteria

The participants who had any health complications during the intervention or were not able to attend the 4 time points of the intervention, or the participants who received herbal and pharmaceutical galactagogues while receiving an intervention were excluded from the study. In addition, the newborns of the participants who had any complications during the intervention and had to be separated from the mother were also excluded.

Sampling Procedures

When this nursing intervention had received ethical approval, cooperation was sought from the head nurse and staff nurses in the postpartum ward. They contacted the mothers who met the inclusion criteria. After that, the researcher asked for permission from the mothers. When they agreed and signed in an informed consent form to participate in this research, the researcher assigned the participants into three groups.

Randomization

Minimized randomization was used to assign the participants into the STMW group or STM group or control group for controlling the confounding variables

of the participants into each group equally (Suresh et al., 2016). There were confounding variables that could not be controlled and may significantly affect the intervention process and outcome. These confounding variables consist of 1) the birth weight of the newborn, which was divided into two categories consisting of; 2,500-3,200 grams and 3,201-3,900 grams and 2) the body mass index (BMI) of the mother before pregnancy, which was divided two categories consisting of; 18.5-27.5 kg/m^2, > 27.5 kg/m^2 because a BMI more than 27 kg/m^2 (Chaingm et al., 2019; Wambach & Riordan, 2016) and the birth weight of a newborn (Nommsen-Rivers et al., 2010; Salahudeen et al., 2013) can delay the onset of lactation and cause insufficiency milk volume. These confounding variables were collected and entered the minimized randomization software version 2.01.

Instrumentations

In this study, the instruments consisted of a research interventions instrument and a data collection instrument. The details are as follows:

Instruments for Research Intervention

The research intervention instruments were the Southern Thai traditional massage and warm compression (STMW) protocol.

The STMW protocol is a set of intervention methods for primiparous mothers, which start on the postpartum ward. The details are as follows:

1) The participant lay on a bed and with the arms beside the body (Figure 3A).

2) The researcher used her right hand for finding the milk line at the axillary process of the mammary gland on the right or left breast. After that, the researcher placed an index finger, middle finger, ring finger, and little finger above the axillary process and

the thumb was placed below the axillary process. The thumb was used to pick or poke the milk line three times per breast (Figure 3B).

3) The researcher used the index finger, middle finger, and ring finger squeezing or pressing (into the nipple) all over the pectoralis major muscle of the breasts (Figure 3C).

4) The researcher used moderate pressure (about 2 kilograms), which can be observed from the press, and the skin having a faint shadow that supports the finger (Figure 3D, 3E, and 3F).

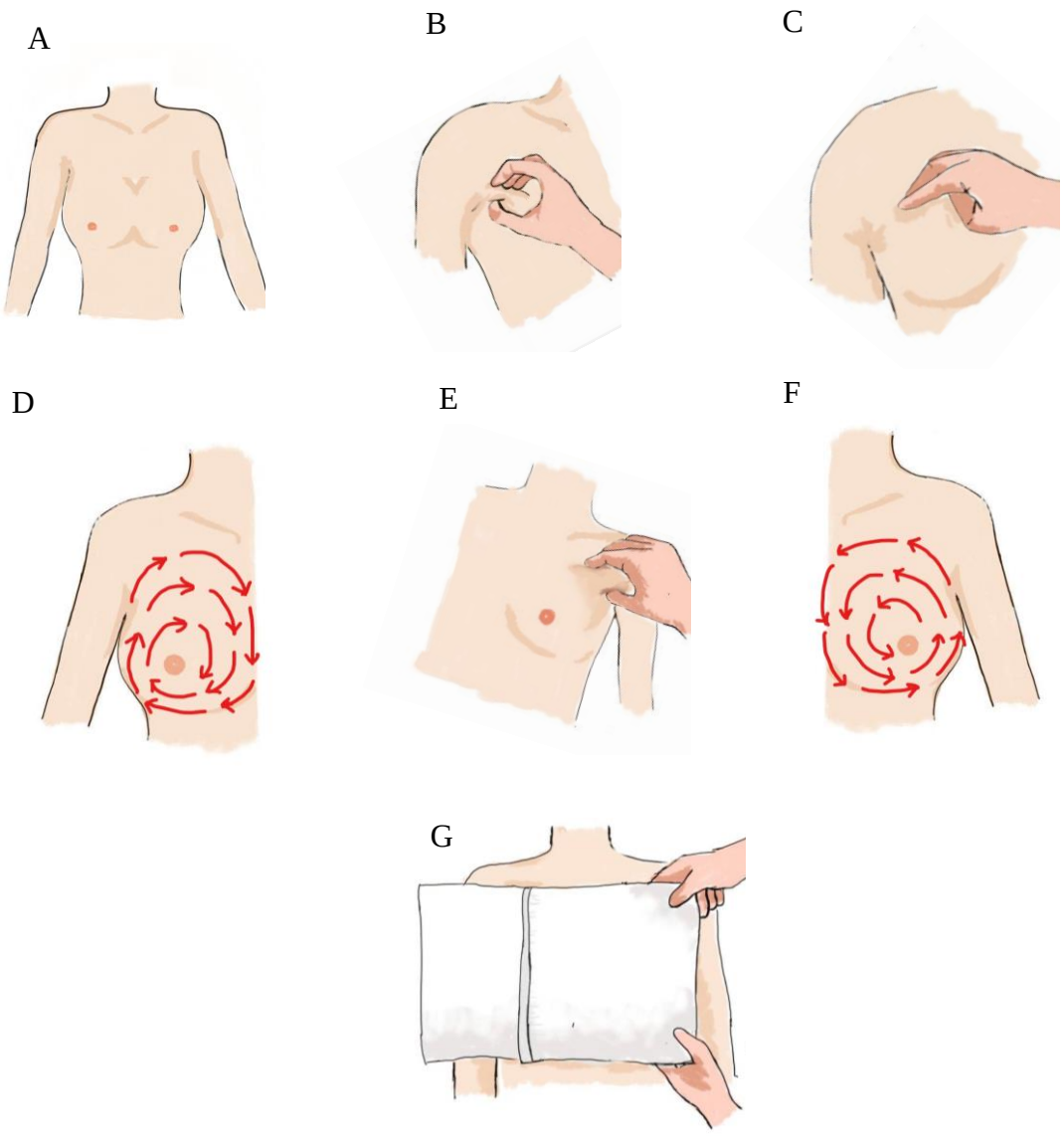
5) Then, the researcher massaged the other breast using the same method. This massage method took 5 minutes for each breast.

6) The researcher used towels with a temperature of around 43-46 ˚C to cover the breast by using one towel per breast for 2 minutes. After this, the towel was replaced with another towel. This warm compression process continues for 15 minutes (Figure 3G). The processes and methods of Southern Thai traditional massage and warm compression protocol in this study are explained in Figure 3.

This program was applied four times because the postpartum mother with a normal labor is usually admitted in the hospital for 48 hours. In the real situation at Hatyai Hospital after giving birth, the postpartum mothers and their newborn stay in the labor ward for about 2 hours. Then they are referred to the postpartum ward which takes about 30 minutes to complete. When arriving on the postpartum ward, the nurse initial assesses the postpartum mother (vital signs, lochia, uterine contractions, breasts and breast milk flow) and newborn (vital signs, weight, vaccine injection, any abnormal signs and symptoms). It takes about 1 hour to check the newborn before it is reunited with his/her mother.

Figure 3

The Processes and Methods of Southern Thai Traditional Massage and Warm Compression protocol in This Study



Note. Towel is made from 100% cotton, size: 12 inch × 12 inch, each weighing about 56 grams - the weight of each towel is an indication of the thickness of towel, pile: double loop. The towels were soaked in room temperature water and twisted until damp. Then, the towels were steamed in an electric steamer at a temperature of around 43-46 ˚C for 10 minutes.

The process from the birth of a newborn to being reunited with its mother in the postpartum ward takes a total about 3 hours and 30 minutes. When the nurse hands the newborn to the mother after birth, she also helps initiate breastfeeding. Stimulation of the onset of lactation and milk volume should start as soon as possible. The Southern Thai traditional massage and warm compression should be applied before the newborn begins to nurse at the mother's breasts in the postpartum ward. Therefore, the researcher first applied the massage to the participant at 4-5 hours after giving birth.

Newborns should breastfeed from their mother's breasts every 2-3 hours (Kala, 2018; Lauwers & Swisher, 2016; Wambach & Riordan, 2016). To allow the mothers to relax, the researcher performed the second massage 6 hours after the first massage. Thus, the second massage took place 10-11 hours after delivery. To allow the mothers to fully rest at night, the researcher conducted the intervention in the daytime (twice on the first day and twice on the second day). The third was performed 18 hours after the second massage and the fourth massage was applied 6 hours after the third massage. Thus, the third and fourth massages occurred 28-29 hours and 34-35 hours after giving birth, respectively.

The Instruments for Data Collection

The instrument**s** for data collection consisted of a demographic data form, and outcome measures including the onset of lactation form, the milk volume, and the breast engorgement scale. The details are as follows:

1. The demographic data form

The demographic data form was developed by the researcher. It included personal information consisting of age, religion, marital status, family characteristics, education level, occupation, family income per month, sufficiency of income, body mass index before pregnancy, and breastfeeding intentions. There were ten items. Birth

information consisted of date/month/year/time of giving birth, the duration of the first, second, and third phase of labor, the quantity of receiving oxytocin, any complication during labor and postpartum, Apgar score of the newborn, birth weight of the newborn, the first time the newborn breastfed from the mother's breast in the labor room, and medication received during labor and postpartum period. There are eight items.

2. The outcome measurement instruments

2.1 For the onset of lactation form (OLF), the researcher used a tool that was developed by Khotsang et al. (2016). Previous studies showed the reliability coefficient of the onset of lactation form was .80. The OLF is a form to record the duration of time after giving birth until the onset of lactation. The onset of lactation was evaluated the signs and symptoms experienced by the primiparous mothers recorded. It is counted from time of delivery until the mother has a feeling of breast enlargement, swelling, stiffness, and heaviness, including the milk flowing out. In addition, the researcher observed and interviewed the primiparous mothers every 3 hours after birth during the daytime and then the period of time from giving birth to onset of lactation was recorded. The criteria for evaluating any signs and symptoms of the onset of lactation are as follows:

1. The mother feels breast enlargement, swelling, stiffness, and heaviness. Feeling of tingling pain in the breast. There is milk flowing out

2. There is milk flowing out from the breast on the opposite side that the newborn receives breastfeeding

3. There is milk flowing out from the newborn's mouth while breastfeeding

4. Hearing the newborn swallowing the milk.

2.2 The milk volume (MV) was measured as weight gain of the newborns between before and after breastfeeding. The test of weighing was developed by Dewey et al. (2003). The evaluation of breast milk volume is as follows:

1. The researcher weighed the newborn with diaper by digital scales and the weight (in grams), recorded.

2. The researcher brings the newborn for breastfeed. While feeding the newborn, the mother must encourage the newborn to suckle continuously at each breast at least 15 minutes. The time at which the newborn sucking at the mother's breast was recorded per side, and the time at which the newborn stopped sucking was also recorded. The duration of the newborn suckling at the breast (in minutes), was recorded.

3. The researcher weighed the newborn with diaper after breastfeeding on the same digital scales and the weight recorded (in grams).

4. Measuring the newborn's weight gain after breastfeeding. The volume of breast milk was assessed at 3 time points after the completion of the intervention.

2.3 The six-point engorgement scale (SPES) was developed by Hill and Humenick (1994). It is widely accepted and was used by Srichandon (2011) in Thai for measure breast engorgement in postpartum mothers. The SPES was used to assess participants' breast engorgement (firmness and tenderness). Breast engorgement was assessed at the end of the intervention at 3 time points postpartum before milk volume assessment. The rating scale has six scores, as follows:

1 score = soft, no change

2 scores = slight change

3 scores = firm, non-tender

4 scores = firm, beginning tenderness

5 scores = firm, tender

6 scores = very firm and very tender

2.4 Record form for promoting breastfeeding in the postpartum period. This instrument was used to record the promotion of breastfeeding in the postpartum period in order to collect data on the massage or warm compression procedures received by the participants from professional nurses or breastfeeding specialist nurses. The answers of this record were receiving or not receiving each aspect of nursing care, date/month/year, star time, end time, and notes.

Validity and Reliability

Validity of STMW Intervention

The content validity of STMW intervention was reviewed by three experts who were 1) a nursing lecturer who is a specialist in breastfeeding, Faculty of Nursing, Prince of Songkla University, 2) a traditional Thai medicine lecturer who is a specialist in Southern traditional massage, and 3) a traditional Thai medicine lecturer who is a specialist in breast anatomy and Southern traditional massage, Faculty of Traditional Thai Medicine, Prince of Songkla University (Appendix E) to verify the appropriateness, adequacy, and ease of use. The validity of intervention yielded a value of 0.80. To assess the feasibility of the STMW intervention**,** the researcher improved and corrected the intervention according to the experts' recommendations and applied the intervention to ten primiparous mothers who had similar characteristics to the sample to assess the feasibility of implementing this intervention in the present study.

Reliability

The milk volume tool, the researcher tested the stability and accuracy of measurement of the digital scales used for weighing the newborns by checking with a standard weight of 1 kilogram before weighing any newborn every day. Standard weight was created and set by the Calibration Laboratory Company Limited. However, the researcher tested these tools again.

Ethical Considerations

This study was approved by the Center for Health Science-Human Research Ethics Committee (HSc-HREC), Prince of Songkla University, Thailand (Code: HSc-HREC-63-042-1-3), and the Human Research Ethics Committee, Hatyai Hospital, Thailand (Code: HYH EC 048-64-02). Before data collection, the researcher explained the objectives and details of the research to the primiparous mothers. This included the informed consent of the participants and the opportunity for them to take part in the activities of the voluntary research project and to sign the informed consent if they voluntarily joined the research program. In addition, the researcher explained that the results would be presented generally, and participants' individual names would not be shown. All information obtained from the research was kept confidential; data would be destroyed after two years and only used for this research. The participants had the right to cancel or withdraw from the research at any time, as required. This did not affect the participant or her newborn or any person involved. In addition, the researcher must be ethical in the infant weighing process after the infant has breastfed. Therefore, the researcher proceeded gently and used a soft, warm cloth to keep the newborn warm, similar to the warmth they received from their mothers. In addition, the researcher must act ethically throughout the data collection process.

Intervention Fidelity

Five components of intervention fidelity comprise intervention design, training of providers, intervention delivery, receipt of intervention, and enactment of skills gained from the intervention (Murphy & Gutman, 2012). The details are as follows:

1. Intervention design is “the content and dose of the intervention and the use of any comparison groups”. The details of the number, length, and frequency of the intervention were explained by the researcher. In this study, the intervention of Southern Thai traditional massage and warm compression (STMW) or Southern Thai traditional massage (STM). STMW or STM was applied to the primiparous mothers after childbirth. The STM intervention was applied 5 minutes per breast, twice a day. The STMW intervention was applied 5 minutes per breast of STM and 15 minutes of warm compression, twice a day. The usual care alone was applied in the control group.

2. Provider training consists of many providers delivering the same intervention in the same way. Providers should be trained in the intervention so that they can always follow the standard process. In this study, only the investigator used the STMW or STM intervention. The investigator participated in massage and postpartum care course and trained in the Southern Thai traditional massage from a traditional midwife (Appendix F).

3. Intervention delivery is “any methods used to standardize the interventions”. Researchers can use written intervention manuals to ensure fidelity in a relationship by helping to control for differences between providers, ensuring adherence to the intervention protocol, and maintaining the apparent characteristics of the intervention. In this study, the Southern Thai traditional massage and warm

compression (STMW) process and techniques were clearly written for application (Appendix A).

4. Receipt of intervention is "how the participants received the intervention". The researcher can assess this component by tracking attendance at session and administering measure. The participants in the STMW group only knew that they would receive 5 minutes of the Southern Thai traditional massage intervention and 15 minutes of warm compression twice a day in the participant's hospital bed with the curtain closed or in a private room. In addition, the participants knew that they had a prearranged meeting for the next massage session following the STMW protocol. The participants in the STM group knew only they would receive 5 minutes of the Southern Thai traditional massage intervention twice a day like the STMW group. The control group received the usual care. The three groups of participants did not know who was in the STMW, STM or control group.

5. Enactment of skills gained from the intervention is "how people apply the intervention content in daily life". In this study, only the researcher provided STMW or STM intervention for primiparous mother at four time points for only two days after giving birth. Therefore, the participants did not gain any skill regarding the STMW intervention. However, the participants in all groups gained knowledge about the signs and symptoms of the onset of lactation.

Research Process

The study was conducted between April and September 2021. The research methods in this study were divided into two phases: the preparation phase, and intervention and data collection phase, as follows:

1. Preparation phase

1.1 The researcher participated in the 300-hour massage and postpartum mothers' care training course to acquire knowledge and certification from the Thai Medical Health School in Hatyai, which has been recognized by the acceptance of standards from the Department of Health Service Support, Ministry of Public Health.

1.2 The researcher participated in the Southern Thai traditional massage training according to traditional midwifery from Mrs. Sainab Heehae, who is a traditional midwife with experience in caring for the postpartum mothers, and she has significant experience in massaging to stimulate milk volume of more than six years in Thepha District, Songkhla. The researcher received both theoretical and practical training for two days until the researcher got confirmation from the traditional midwife that the researcher was able to correctly use the Southern Thai traditional massage according to the traditional wisdom of Muslims.

2. Intervention and data collection phase

2.1 After this research had obtained approval from the ethics committee, the researcher contacted the head of the postpartum ward at Hatyai Hospital and described the research project, objectives, research methodology, population and sample, inclusion criteria, and data collected methods of this study.

2.2 The head nurse and staff nurses in the postpartum ward checked for eligible mothers then asked the maternal permission for the researcher to contact the participants.

2.3 After the permission was given, the researcher asked the mothers who met the inclusion criteria to be participants in this study at the postpartum ward. The researcher informed the participants of the objectives of the study. After that, the researcher asked the primiparous mothers to participate and sign informed consent.

2.4 The demographic data form was administered to the participants at the postpartum ward. Then, the researcher used the minimized randomization program version 2.01 to assign the participants into the STMW or STM, or control groups. Each group received the intervention as follows:

2.4.1 For the STM group, the researcher only massaged at the breasts (following the STMW protocol step 1-6) at 4 time points of intervention after delivery.

2.4.2 The STMW group, started the same as the STM group. Then, the researcher applied warm compression at the breasts of the participants at 4 time points of intervention after delivery.

2.4.3 The control group received routine care from a nurse at the postpartum care ward in Hatyai Hospital. The routine care of the postpartum ward consists of teaching about breastfeeding knowledge and skill, providing nursing care, caring for the maternal and newborn, perineum care, etc. Breast massage and warm compression are provided to postpartum mothers with breastfeeding problems, such as no milk flow, breast engorgement. They receive breast massage and warm compression from a lactation consultant nurse.

2.5 The data related to the onset of lactation, milk volume, and breast engorgement in all groups were collected by using the onset of lactation form, which was evaluated and recorded by primiparous mothers. The researcher also observed and interviewed them during the day every 3 hours after giving birth. The milk volume and the six-point engorgement scale were collected after finishing the intervention at 10-11 hours (the 1st time of observation), 28-29 hours (the 2nd time of observation), and 34-35 hours (the 3rd time of observation) after giving birth.

Since data collections were done during the covid-19 situation, thus raising a critical challenge while conducting this research because this research intervention was breast massage. The researcher be place in close proximity to the participant. Data collection from a distance was not possible. The researcher must protect herself and prevent the spread of COVOD-19 infection to participants. Therefore, the participants were provided with protective equipment, namely mask, face shield, micropore tape for mask area to avoid risks to participants.

Controlling Threats to Internal Validity

In regard to threats to internal validity, there are 13 threats, namely history, testing, maturation, statistical regression, instrumentation, selection bias, mortality, compensatory equalization of treatment, ambiguity about the direction of causal influence, interactions with selection, diffusion, or imitation of treatment, the resentful demoralization of participants receiving less desirable treatments, and compensatory rivalry by respondents receiving less desirable treatments (Cook & Campbell, 1979). The researcher attempted to prevent threats to internal validity as follows:

1. History threat: This is an effect that may be a result of an occurrence that interferes with the study. In this study, the researcher used the minimized randomization method to control for the confounding variables and assign the participants equally into three groups consisting of STMW, STW, and control groups. In addition, the researcher closed the curtain at the postpartum mother's bed for blinding the nurse in the unit. This threat did not occur in this study.

2. The testing threat: This is a threat which may result from the number of times answers are elicited. This study collected the onset of lactation, milk volume, and

breast engorgement as physiological testing. Therefore, this study does not have a testing threat.

3. The maturation threat: This effect may be a result of the participants' increasing age, intelligence, health, as well as becoming more knowledgeable during the experimental period, but this is not the outcome of the intervention. This study does not have a maturation threat because the testing of outcome was based on physiological change, which does not involve the cognitive aspect or intelligence of the participants.

4. Statistical regression threat: It is an effect which may be because of participants being categorized into experimental groups based on the scores of a pre-test. However, when these occurrences and assessments are not actual, high pre-test scores will lower scores at the post-test, and low pre-test scores will produce higher score at the post-test scores. In this study, the researcher used the minimized randomization method to assign the participants to each group equally before data collection. Therefore, a statistical regression threat was prevented.

5. Instrumentation threat is the character of a measure that may alter over time or circumstances in a method that could be a distraction with an intervention effect. In this research, there are tools used to measure the results of the three variables consisting of the onset of lactation form, milk volume, and the six-point breast engorgement scale. In regard to the onset of lactation form in the study of Khotsang et al. (2016), this tool was used to evaluate the onset of lactation with an inter-rater reliability of .80. The assessment method for measuring milk volume is test weighing. To control the instruments, the researcher undertook quality control inspection of the digital weighing scales by using 1.0-kilogram standard weight before test weighing every time. In terms of the six-point breast engorgement scale (Hill & Humenick, 1994), in the study of Kaur et al. (2017), this tool was used to evaluate breast engorgement with an inter-rater reliability of .73. The

researcher evaluated the results of this study. Therefore, the researcher trained herself to specialize in the use of tools to prevent measurement errors and tolerances. In addition, the researcher adhered to the research ethics of conduct to prevent bias in research evaluation.

6. The selection bias threat is the difference between the types of participants in the experimental group when compared to other groups. The selection bias did not occur because the researcher used the minimized randomization method to assign the participants to each group.

7. Mortality threat: This threat is an effect of the different types of humans who dropout from each therapy group during the progress of an investigation. This kind of threat did not appear in this study. However, one participant was excluded from this study because the newborn had health complication and was admitted at the neonatal intensive care unit.

8. Compensatory equalization of treatment threat: This is a threat when an effect may be because the participants received unequal interventions. This study consists of 3 groups in which each group had a different intervention. Therefore, to prevent this threat, after collecting the data, the researcher provided the intervention to the participants of the STM group and the control group who need this intervention before discharge to prevent the compensatory equalization of treatment threat.

9. Ambiguity about the direction of causal influence threat is a deficiency of clearness of the first variable that may yield disorientation. In this study, this threat was controlled by collecting the data on time, and in the environment and situation that was closest to each other. Also, the researcher controlled the factors that affected the results of study.

10. Interactions with selection threat is selection maturation outcomes when intervention groups are developing at dissimilar rapidity. To prevent this threat, the researcher used the minimize randomization to assign the participants.

11. Diffusion treatment threat is the dissemination of information or details of each intervention to another group. In this study, the intervention information was transferred to another group. Therefore, the strategy to control this threat was to provide the intervention on the postpartum mother's bed with the curtain closed.

12. The resentful demoralization of participants receiving less desirable treatment threat. When an investigation is apparent, the response of a no-therapy control group or groups getting less seductive treatments can feel hate and demoralization, as well as attempt compensative competition. In this study, the control group did not receive the Southern tradition massage and warm compression. Thus, they may be getting less seductive treatments, which may lead to resentful demoralization. Therefore, this threat cloud not be controlled because the participant would be discharged from hospital when finishing data collection.

13. Compensatory rivalry by respondents receiving less desirable treatment threat: This is a threat when an effect may be due to the assignment of participants to experimental and control groups. If participants in the control group know that they will receive less desirable benefits, they may try to compensate for this difference by outperforming the intervention group. Therefore, the researcher provided the intervention on the postpartum mother's bed with the curtain closed or private room. The participants did not know what intervention other participant received. Therefore, there was no event that could motivate compensating less desirable.

In addition, to control threats related to manipulation to provide the same intervention for the participants, the researcher alone massaged the subjects. The

massager, in this case the researcher, massaged three to four cases per day. Every time before a massage, the massager pressed her fingers on the weighing scales to check the weight of her fingers to maintain the same weight for all massages.

Data Analysis

1. Descriptive statistics were used to analyze the characteristics of the sample, i.e., demographics characteristics (personal information and birth information) of the participants. Chi-square test was used for categorical variables or to analyze the differences of the nominal data, and F-test one-way analysis of variance [ANOVA] was used to analyze the differences of the sample for the continuous data.

2. ANOVA was used to compare the onset of lactation among the STMW, STM, and control groups (Hypothesis 1). The use of ANOVA statistics requires testing of the assumptions of independent samples, normal distribution, and equal variances. After this, the analysis of variance of the mean scores of the onset of lactation among three groups was performed. The results were statistically significant, the researcher performed the post hoc test for comparison of the difference of the mean of the onset of lactation between groups.

3. Repeated-measures ANOVA was used to compare the milk volume in the STMW, STM, and control groups across three time points at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth (Hypothesis 2). Using repeated-measures ANOVA statistics requires testing the assumptions of normal distribution, homogeneity of variance, and independent samples. When the results of repeated-measures ANOVA were statistically significant, the researcher performed the multiple comparison for comparison of the difference of the mean of the milk volume between groups.

4. Repeated-measures ANOVA was used to compare the breast engorgement among the STMW group, STM group, and control group across three time points (Hypothesis 3). Using repeated-measures ANOVA statistics requires testing the assumptions for normal distribution, homogeneity of variance, and independent samples. When the results of repeated-measures ANOVA were statistically significant, the researcher performed the multiple comparison to compare of the difference of the mean of the breast engorgement between groups.

CHAPTER 4

RESULTS AND DISCUSSION

In this study, only 64 participants met the inclusion criteria from 236 eligible cases. One participant was excluded from analysis because the newborn of this participant had health complications during the postpartum period and had to be separated from the mother. So, the numbers of participants were 21 participants in each group and data from them were used in the analysis. The diagram of the selection process of this study is shown in Figure 4.

The Characteristics of Participants

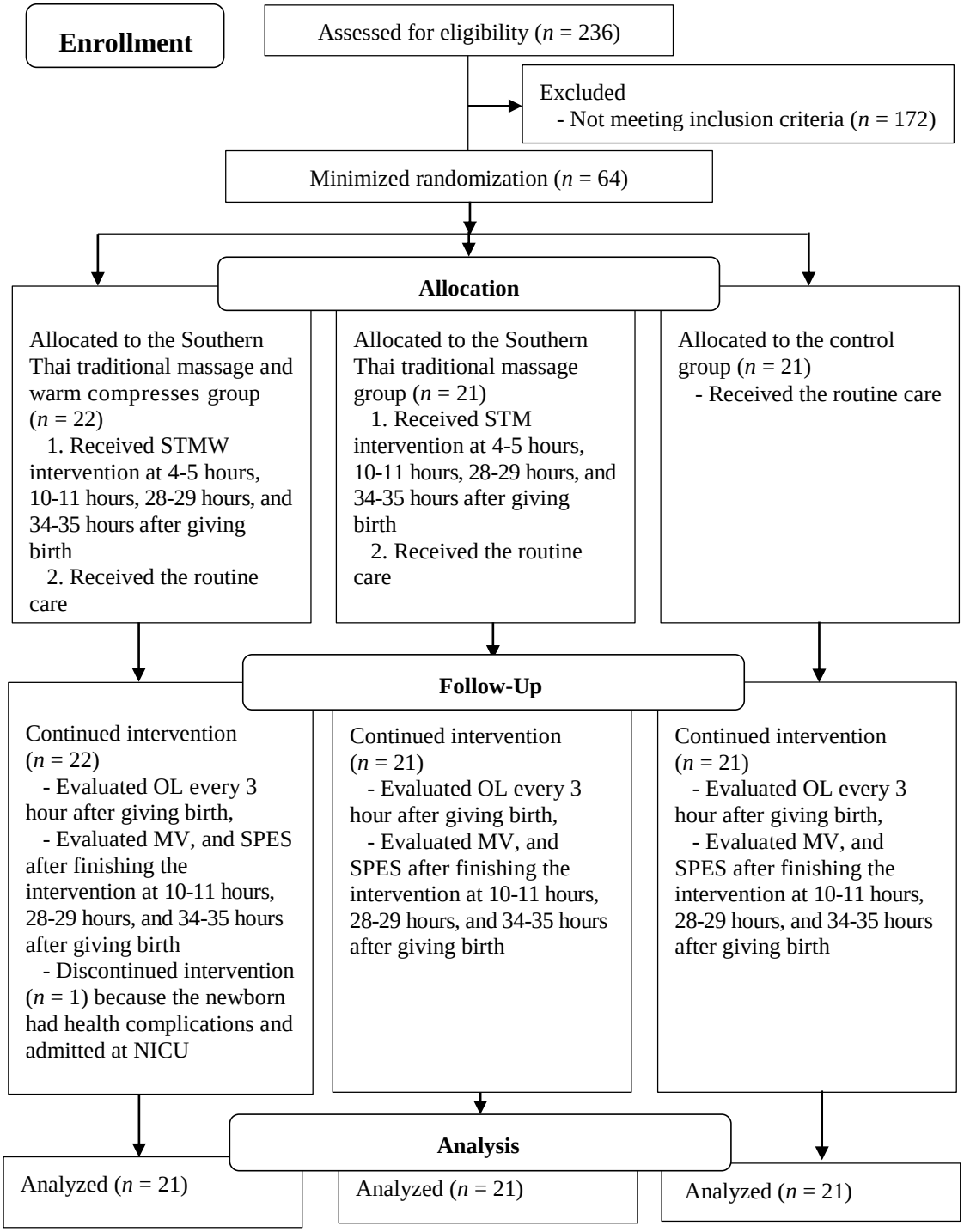
The Data of Personal Information

As shown in Table 5, the characteristics of participants in each group were similar. Comparing the demographic data of participants among three groups, there were no statistically significant differences in terms of religion (p = .26), family characteristics (p = .89), education level (p = .65), occupation (p = .77), or sufficiency of income (p = .69).

Before comparison among three groups of continuous data, the skewness and kurtosis value of STMW, STM, and control groups were tested and the results presented that the data were normally distributed. The one-way ANOVA showed that there were no statistically significant differences in terms of age (p = .74), family income (p = .33), body mass index before pregnancy (p = .81), or breastfeeding intention (p = .32). The data are reported in Table 5

Figure 4

Diagram of the Selection Process



Note. STMW = Southern Thai traditional massage and warm compression, STM = Southern Thai traditional massage, OL = onset of lactation form, MV = milk volume, SPES = six-point engorgement, NICU = neonatal intensive care unit.

Table 5

*Comparisons the Characteristics of Participants in the Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups (*N = *63)*

Demographic data	STMW group (*n* = 21)		STM group (*n* = 21)		Control group (*n* = 21)		*F/* χ^2	*p*
	n	%	*n*	%	*n*	%		
Age (years)	*M (SD*)		*M (SD)*		*M (SD)*		0.29[c]	.74
	24.48 (4.45)		23.48 (4.17)		24.24 (4.54)			
Religion							2.67[a]	.26
Buddhist	14	66.70	10	47.60	9	42.90		
Muslim	7	33.30	11	52.40	12	57.10		
Marital status							N/A	N/A
Married	21	100.00	21	100.00	21	100.00		
Family characteristics							0.22[b]	.89
Nuclear family	4	19.00	3	14.30	4	19.00		
Extended family	17	81.00	18	85.70	17	81.00		
Education level							4.17[b]	.65
Less/equal grade 6	3	14.30	3	14.30	1	4.80		
Grade 7 to grade 9	4	19.00	5	23.80	6	28.60		
Grade 10-12	9	42.90	5	23.80	9	42.80		
Bachelor or higher	5	23.80	8	38.10	5	23.80		

Note. [a] Pearson chi-square, [b] Likelihood ratio, [c] One-way ANOVA, BMI = body mass index, N/A = not mention about *F/* χ^2 and *p*.

Table 5

*Comparisons the Characteristics of Participants in the Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups (*N *= 63) (continued)*

Demographic data	STMW group (*n* = 21)		STM group (*n* = 21)		Control group (*n* = 21)		*F/* χ^2	*p*
	n	%	*n*	%	*n*	%		
Occupations							6.48[b]	.77
Employee	5	23.80	5	23.80	5	23.80		
Self-employed	1	4.80	1	4.80	0	0		
Trader	2	9.50	6	28.60	3	14.30		
Agriculturist	1	4.80	0	0	1	4.80		
Housewife	10	47.60	8	38.00	11	52.30		
Student	2	9.50	1	4.80	1	4.80		
Family income per month (baht/month)	*M (SD)*		*M (SD)*		*M (SD)*		1.12[c]	.33
	18,285.71 (9,471.76)		17,928.57 (10,656.31)		14,428.57 (7,082.17)			
Sufficiency of income							0.71[b]	.69
Enough	17	81.00	17	81.00	15	71.40		
Not enough	4	19.00	4	19.00	6	28.60		
BMI before pregnancy (kg/m^2)	*M (SD)*		*M (SD)*		*M (SD)*		0.20[c]	.81
	21.89 (4.79)		21.58 (5.09)		20.99 (3.76)			
Breastfeeding intentions (month)	*M (SD)*		*M (SD)*		*M (SD)*		1.14[c]	.32
	10.29 (5.77)		12.86 (6.91)		10.43 (5.81)			

Note. [a] Pearson chi-square, [b] Likelihood ratio, [c] One-way ANOVA, BMI = body mass index, N/A = not mention about *F/* χ^2 and *p*.

The Birth History

As presented in Table 6, the results showed that there was not statistical difference of obstetrics information in terms of first-time breastfeeding after giving birth (p = .84) and medication received during stage of labor (p = .26).

Before comparison among three groups of continuous data, the skewness and kurtosis value of STMW, STM, and control groups were tested and the results presented that the data were normally distributed. The one-way ANOVA showed that there were no statistically significant differences in terms of duration of the labor phase (p = .17), quantity of oxytocin received (p = .60), Apgar score of newborns at the 1st minute (p = .37), and birth weight of newborn (p = .74). The data are shown in Table 6. Therefore, the data of personal information and birth history were homogeneity of three groups (p > .05).

Table 6

*Comparisons of the Birth History in the Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups (*N = *63)*

Data of birth information	STMW group (*n* = 21)		STM group (*n* = 21)		Control group (*n* = 21)		*F/* χ^2	*p*
	n	%	*n*	%	*n*	%		
Duration of the labor phase (minutes)	*M (SD)*		*M (SD)*		*M (SD)*		1.79[c]	.17
	475.61 (169.24)		582.38 (265.33)		466.19 (217.27)			
Quantity of oxytocin received (unit)	*M (SD)*		*M (SD)*		*M (SD)*		0.50[c]	.60
	22.38 (6.24)		20.29 (5.07)		20.95 (8.89)			
Complications of mother during labor and postpartum							N/A	N/A
Yes	0	0	0	0	0	0		
No	21	100.00	21	100.00	21	100.00		
Complications of newborn during labor and postpartum							N/A	N/A
Yes	0	0	0	0	0	0		
No	21	100.00	21	100.00	21	100.00		
Apgar score of newborns at 1st minute (score)	*M (SD)*		*M (SD)*		*M (SD)*		1.00[c]	.37
	8.95 (0.21)		9 (0.00)		9 (0.00)			
Apgar score of newborns at 5th minute (score)	*M (SD)*		*M (SD)*		*M (SD)*		N/A	N/A
	9 (0.00)		9 (0.00)		9 (0.00)			

Note. [c] One-way ANOVA, Apgar = appearance, pulse, grimace, activity, and respiration, N/A = not mention about *F/* χ^2 and *p*.

Table 6

*Comparisons of the Birth History in the Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups (*N = *63) (continued)*

Data of birth information	STMW group (*n* = 21)		STM group (*n* = 21)		Control group (*n* = 21)		*F/* χ^2	*p*
	n	%	*n*	%	*n*	%		
Birth weight of newborn (grams)	*M (SD)*		*M (SD)*		*M (SD)*		0.29[c]	.74
The first-time breastfeeding after giving birth	3,013.81 (300.56)		3,030.71 (334.85)		3,086.67 (332.18)			
Within 30 minutes	0	0	1	4.80	0	0	2.74[b]	.84
31 minutes to 1 hour	5	23.80	3	14.30	4	19.00		
1 hour 1 minute to 2 hours	1	4.80	1	4.80	1	4.80		
After 2 hours	15	71.40	16	76.10	16	76.10		
Medication received during stage of labor								
Oxytocin IV drip	10	47.60	8	38.10	9	42.80	7.63[b]	.26
Oxytocin IV drip, Pethidine 50 mg IM, Plasil 10 mg IM	3	14.30	8	38.10	4	19.00		
Oxytocin IV, Pethidine 50 mg IV drip	3	14.30	0	0	1	4.80		
No medication received	5	23.80	5	23.80	7	33.40		
Medication received during labor and postpartum period								
Oxytocin 10 mg IM, Oxytocin IV drip, Paracetamol, Obimin AZ	21	100.00	21	100.00	21	100.00	N/A	N/A

Note. [b] Likelihood ratio, [c] One-way ANOVA, IV = intravenous drip, IM = intramuscular injection, N/A = not mention about *F/* χ^2 and *p*.

The Results of Hypotheses

The research hypotheses of this study were:

1) The onset of lactation in the Southern Thai traditional massage and warm compression (STMW) group is shorter than those in the Southern Thai traditional massage (STM) group and control group,

2) The milk volume of primiparous mothers in the STMW group is higher than those in the STM group and control group across 3 time points (at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth), and

3) The breast engorgement in the STMW group is lower than those in the STM group and control group across 3 time points (at 10-11 hours, 28-29 hours, and 34-35 hours after giving birth).

Before testing the hypotheses, the data were tested for the assumptions of one-way ANOVA and repeated-measures ANOVA which consist of the following 1) Normal distribution-the data met the assumption because skewness and kurtosis were not more or less than ±1.96 (Polit & Beck, 2017) or Skewness ≤ 3, Kurtosis ≤ 10 (Kline, 2016) (Table 15; Appendix B) 2) For the assumptions of one-way ANOVA, the Levene's test was checked and the data met the assumption for the test of equality of variances (Table 16; Appendix B). For the assumptions of repeated-measures ANOVA, the Box's M test of equality of covariance matrices was not significantly (Table 17; Appendix B) and the Mauchly's test of sphericity was not significant (Table 18; Appendix B), therefore, the repeated-measures ANOVA could be used.

The results of hypothesis 1

The means of timing of the onset of lactation in the STMW, STM, and control groups were 37.00 (*SD* = 2.56), 40.57 (*SD* = 2.94) and 45.71 (*SD* = 2.49), respectively (Table 8).

The one-way ANOVA test was used to compare the duration of times after giving birth until the onset of lactation among the STMW, STM, and the control groups. The results showed that there was a statistically significant difference of the onset of lactation among the three groups ($F = 56.30$, $p < .001$) (Table 7).

Therefore, the post hoc test was performed. The LSD post hoc test showed that there were statistically significant differences all three multiple comparisons of the onset of lactation among the STMW group, the STM group, and the control group. The onset of lactation in the STMW group was significantly earlier than those in the STM group ($MD = -3.57$, $p < .001$) and control group ($MD = -8.71$, $p < .001$), also the mean of the onset of lactation in STM group was statistically significantly earlier than that in the control group ($MD = -5.14$, $p < .001$) (Table 8). These results supported hypothesis 1.

Table 7

*One-way ANOVA for Analysis of Variance of the Onset of Lactation Among the Southern Thai Traditional Massage and Warm Compression, the Southern Thai Traditional Massage, and the Control Groups (*N = 63*)*

Sources of variances	*SS*	*df*	*MS*	*F*	*p*
Between group	806.00	2	403.00	56.30	< .001
Within group (error)	429.42	60	7.15		
Total	1,235.42	62			

Table 8

*Multiple Comparisons of the Mean of the Onset of Lactation Among the Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups (*N = *63)*

Group comparisons	*M* (*SD*)			*MD*	*SE*	*F*	*p*
	STMW group	STM group	Control group				
STMW with STM	37.00 (2.56)	40.57 (2.94)		-3.57	0.82	56.30	< .001
STMW with control	37.00 (2.56)		45.71 (2.49)	-8.71	0.82		< .001
STM with control		40.57 (2.94)	45.71 (2.49)	-5.14	0.82		< .001

Note. MD = Mean difference.

The results of hypothesis 2

The means of the milk volume in the STMW, STM, and control groups were 12.14 (*SD* = 3.93), 8.25 (*SD* = 3.21) and 5.64 (*SD* = 7.39), respectively (Table 10). The repeated-measures ANOVA was used to compare the mean milk volume among the STMW, STM, and control groups. The results showed that there was a statistically significant difference of the mean scores of milk volume among the STMW, STM, and control groups ($F = 22.70$, $p < .001$) (Table 9).

Omnibus test was significant, therefore a multiple comparison was performed. The LSD test of milk volume among the STMW, STM, and control groups showed that there were statistically significant differences between groups. The mean difference of milk volume in STMW group was significantly higher than those in the STM group (MD = 3.89, $p < .001$) and control group (MD = 6.51, $p < .001$). The mean difference of milk volume in the STM group was significantly higher than that in the control group (MD = 2.62, $p = .009$) (Table 10 and Figure 5).

Moreover, repeated-measures ANOVA was used to compare the changes in mean score of milk volume measured across three time points (the 1st time of observation = 10-11 hours after giving birth, the 2nd time of observation = 28-29 hours after giving birth, and the 3rd time of observation = 34-35 hours after giving birth) within the STMW, STM, and control groups to test the interaction between treatment and time. The results showed that there was a statistically significant difference of the changes in mean score of the milk volume subject over three time points (F = 420.46, $p < .001$). In addition, the interaction between treatment and time was statistically significant (F = 28.32, $p < .001$) (Table 9). The mean of the milk volume of the three groups is shown in Table 11.

In the STMW, STM and control group, there were statistically significant differences between all three pairwise comparisons of milk volume. This means that the mean milk volume measured at the 3rd time of observation was significantly higher than that at the 1st time and the 2nd time of observations ($p < .001$). The mean milk volume measured at the 2nd time of observation was significantly higher than that of the 1st time of observation ($p < .001$) (Table 11). These results proved hypothesis 2.

Table 9

*Repeated-Measures ANOVA for Comparison of the Milk Volume Among the Southern Thai Traditional Massage and Warm Compression, the Southern Thai Traditional Massage, and the Control Groups (*N = *63)*

Source of Variation	*SS*	*df*	*MS*	*F*	*p*
Between subject					
Within group (error)	1,784.92	60	29.74		
Group	1,351.05	2	675.52	22.70	< .001
Within subject					
Time x within group (error)	646.03	120	5.38		
Time	4,527.24	2	2,263.00	420.46	< .001
Group x time	610.05	4	152.51	28.32	< .001

Table 10

*Multiple Comparisons of the Mean Score of Milk Volume Among Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups (*N = *63)*

Group comparisons	*M* (*SD*)			*MD*	*SE*	*F*	*p*
	STMW group	STM group	Control group				
STMW with STM	12.14 (3.93)	8.25 (3.21)		3.89	0.97	22.70	< .001
STMW with control	12.14 (3.93)		5.64 (3.79)	6.51	0.97		< .001
STM with control		8.25 (3.21)	5.64 (3.79)	2.62	0.97		.009

Note. *MD* = Mean difference.

Figure 5

Mean Scores of the Milk Volume for Three Time Points Among the Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups

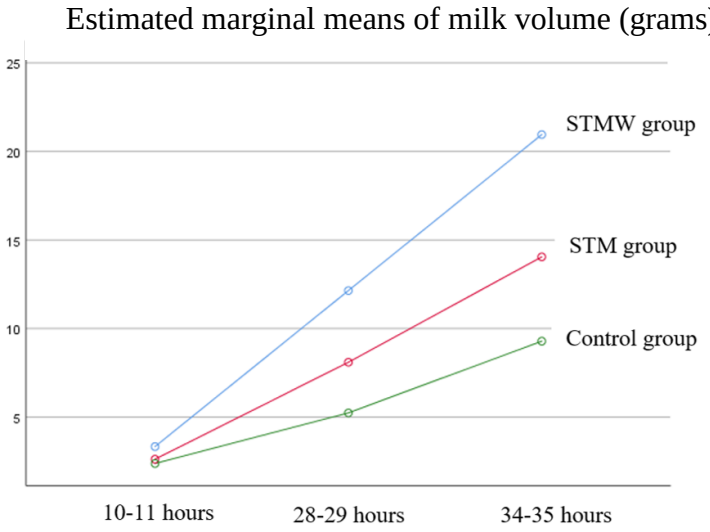


Table 11

*Comparisons of the Mean of Milk Volume in the Southern Thai Traditional Massage and Warm Compression (STMW), Southern Thai Traditional Massage (STM), and Control groups (*N = *63)*

Comparisons	*M* (*SD*)			*MD*	*SE*	*p*
	1st time	2nd time	3rd time			
STMW group						
3rd time and 1st time	3.33 (3.98)	-	20.95 (4.07)	17.61	0.74	< .001
3rd time and 2nd time	-	12.14 (3.73)	20.95 (4.07)	8.81	0.68	< .001
2nd time and 1st time	3.33 (3.98)	12.14 (3.73)	-	8.81	0.76	< .001
STM group						
3rd time and 1st time	2.62 (2.56)	-	14.05 (3.40)	11.42	0.61	< .001
3rd time and 2nd time	-	8.10 (3.70)	14.05 (3.40)	5.95	0.81	< .001
2nd time and 1st time	2.62 (2.56)	8.10 (3.70)	-	5.47	0.76	< .001
Control group						
3rd time and 1st time	2.38 (3.40)	-	9.29 (3.96)	6.90	0.54	< .001
3rd time and 2nd time	-	5.24 (4.02)	9.29 (3.96)	4.04	0.81	< .001
2nd time and 1st time	2.38 (3.40)	5.24 (4.02)	-	2.85	0.65	< .001

Note. MD = Mean difference.

The results of hypothesis 3

The means of the breast engorgement in the STMW, STM, and control groups were 1.67 (*SD* = 0.49), 1.92 (*SD* = 0.47) and 2.22 (*SD* = 0.54), respectively (Table 13).

The repeated-measures ANOVA was used to test the mean score difference of breast engorgement among the STMW group, the STM group, and the control group. The results show that there were statistically significant differences of the mean scores of breast engorgement among the STMW group, STM group and control group ($F = 11.46$, $p < .001$) (Table 12).

The LSD post hoc test of breast engorgement between subjects showed that there were statistically significant differences among the STMW group, STM group and control group. The mean difference for breast engorgement in the STMW group was significantly lower than those in the STM group ($MD = -.25$, $p < .05$) and control group ($MD = -.55$, $p < .001$). The mean for breast engorgement in the STM group was significantly lower than that in the control group ($MD = -.30$, $p = .012$) (Table 13 and Figure 6).

In addition, repeated-measures ANOVA was used for comparing the changes in the mean score of breast engorgement measured over three time points (similar with milk volume) within the STMW, STM, and control groups and identify the interaction between treatment and time. The results revealed that there was a statistically significant difference of the changes in mean score of breast engorgement over three times points ($F = 209.62$, $p < .001$). In addition, the interaction between treatment and time was significant difference ($F = 8.54$, $p < .001$) (Table 12).

In the STMW, STM, and control groups, there were statistically significant differences between all three the multiple pairwise comparisons of breast

engorgement. In the STMW group, the mean of breast engorgement measured at the 1st time of observation was significantly lower than that at the 2nd time of observation (p = .005) and the 3rd time of observation (p < .001), and that at the 2nd time of observation was significantly lower than that at the 3rd time of observation (p < .001). In the STM group, the mean of breast engorgement measured at the 1st time of observation was significantly lower than that at the 2nd time of observation (p = .001) and the 3rd time of observation (p < .001), and that at the 2nd time of observation was significantly lower than that at 3rd time of observation (p < .001). In the control group, the mean of breast engorgement measured at the 1st time of observation was significantly lower than that at the 2nd time of observation (p < .001) and the 3rd time of observation (p < .001), and that at the 2nd time of observation was significantly lower than that at the 3rd time of observation (p < .001) (Table 14). These results supported hypothesis 3.

Table 12

*Repeated-Measures ANOVA for Comparison of the Breast Engorgement Score Among Southern Thai Traditional Massage and Warm Compression, the Southern Thai Traditional Massage, and the Control Groups (*N = *63)*

Source of Variation	*SS*	*df*	*MS*	*F*	*p*
Between subject					
Within group (error)	25.49	60	0.42		
Group	9.74	2	4.87	11.46	< .001
Within subject					
Time x within group (error)	20.50	120	0.17		
Time	71.65	2	35.82	209.62	< .001
Group x time	5.84	4	1.46	8.54	< .001

Table 13

*Multiple comparisons of the mean differences of breast engorgement Among Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups (*N = *63)*

Group comparisons	*M* (*SD*)			*MD*	*SE*	*F*	*p*
	STMW group	STM group	Control group				
STMW with STM	1.67 (0.49)	1.92 (0.47)		-0.25	0.11	11.46	.033
STMW with control	1.67 (0.49)		2.22 (0.54)	-0.55	0.11		< .001
STM with control		1.92 (0.47)	2.22 (0.54)	-0.30	0.11		.012

Note. MD = Mean difference.

Figure 6

Mean Scores of Breast Engorgement Among the Southern Thai Traditional Massage and Warm Compression (STMW), the Southern Thai Traditional Massage (STM), and the Control Groups

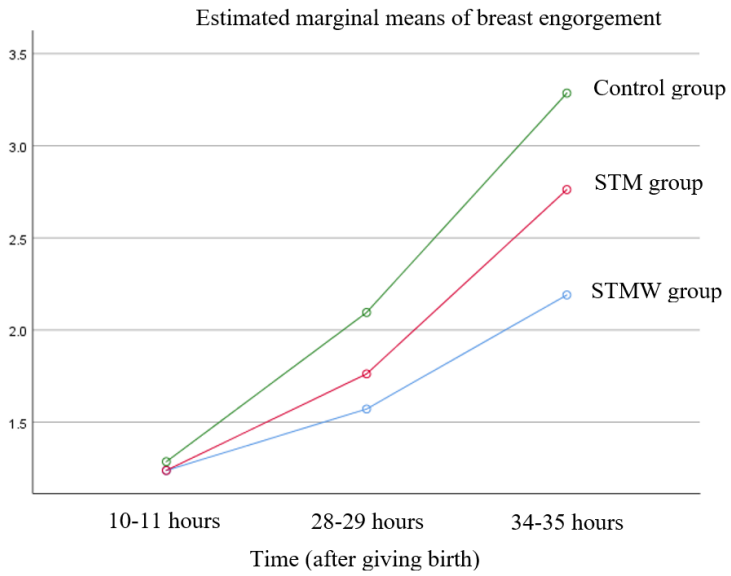


Table 14

*Comparisons of the Mean score of Breast Engorgement in the Southern Thai Traditional Massage and Warm Compression (STMW), Southern Thai Traditional Massage (STM), and control groups (*N = *63)*

Comparisons	*M* (*SD*)			*MD*	*SE*	*p*
	1st time	2nd time	3rd time			
STMW group						
1st time and 2nd time	1.24 (0.44)	1.57 (0.51)	-	-0.33	0.10	.005
1st time and 3rd time	1.24 (0.44)	-	2.19 (0.51)	-0.95	0.11	< .001
2nd time and 3rd time	-	1.57 (0.51)	2.19 (0.51)	-0.61	0.11	< .001
STM group						
1st time and 2nd time	1.24 (0.44)	1.76 (0.54)	-	-0.52	0.13	.001
1st time and 3rd time	1.24 (0.44)	-	2.76 (0.44)	-1.52	0.13	< .001
2nd time and 3rd time	-	1.76 (0.54)	2.76 (0.44)	-1.00	0.15	< .001
Control group						
1st time and 2nd time	1.29 (0.46)	2.10 (0.44)	-	-0.81	0.11	< .001
1st time and 3rd time	1.29 (0.46)	-	3.29 (0.72)	-2.00	0.13	< .001
2nd time and 3rd time	-	2.10 (0.44)	3.29 (0.72)	-1.19	0.14	< .001

Note. MD = Mean difference.

Discussion

Regarding the hypotheses, the results revealed that the first, second, and third hypotheses were supported. Therefore, STMW intervention can promote lactation in terms of the onset of lactation and milk volume, and prevent breast engorgement. There are the reasons that support these hypotheses, which include the characteristics of STMW and the early of receipt and number of times receiving the STMW.

The characteristic of STMW consisted of Southern Thai traditional massage and warm compression. As this massage were performed at each breast 5 minutes, which use the hands to pick or poke at the axillary three times per breast, and to squeeze or press all over the pectoralis major muscle of the breasts area. When the participants were massaged, this stimulated the blood circulation and thoracic intercostal nerve to send a signal to the posterior pituitary gland causing the secretion of oxytocin, which stimulated the milk ejection or letdown reflex, as well as stimulated the anterior pituitary gland to increase prolactin levels promoting lactation (Graham & Montgomery, 2019; Lauwers & Swisher, 2016). In addition, the STMW method is based on the structure of the lymphatic system. This helps to drain the fluid to normal lymph channels, which is an appropriate way to prevent and reduce breast engorgement. In a similar way, the previous studies reported that breast massage helped to reduce engorgement (Krishnaveni, 2014; Witt et al., 2016).

The warm compression also helps to stimulate blood circulation which is useful in increasing the efficiency of milk removal, and activating the letdown reflex (Walker, 2017; Wambach & Riordan, 2016). The application of warm compression on the breast showed efficacy on the onset of lactation and milk volume. These results were consistent with previous studies, warm compression helps to stimulate the onset of lactation or milk volume (Panngam et al., 2015; Phon-ngam & Mankong, 2021;

Wahyuningsih & Liliana, 2019). In addition, previous studies showed that the application of warm compression at breast areas helped to prevent or reduce breast engorgement (Eittah & Ashour, 2019; El-Saidy & Aboushady, 2016; Kaur et al., 2017). Applying breast massage and warm compression showed that these interventions could promote the onset of lactation or the milk volume (Khotsang et al., 2016; Punturat & Boonruen, 2017) and were effective in reducing breast engorgement (Thakur & Bala, 2018).

Regarding the early of receipt and number of times of receiving the STMW, the researcher provided STMW intervention in early postpartum period. This intervention stimulated milk production and milk secretion, as well as the newborn's suckling. Therefore, STMW uses the same principle as initial rapid breastfeeding. Moreover, four times of receiving this intervention helps to stimulate prolactin and oxytocin hormones levels in the blood circulation, which results in promoting the onset of lactation and milk volume. Consistent with previous studies, repeated breast massaging (four time for two days) were able to stimulate milk ejection (Masae et al., 2019) and repeated breast massaging (three time for three days) were able to promote milk secretion (Anusha, 2015). In a similar way, previous studies showed that warm compression applied 3 times a day for 2 days (Eittah & Ashour, 2019) or two times a day for 3 days were able to reduce breast engorgement (Kaur et al., 2017). In addition, breast massage performed twice a day for 3 days could reduce breast engorgement (Yuliati et al., 2017). Warm compression combined with breast massage 3 times a day and continued for 2 days helped to reduce breast engorgement significantly (Thakur & Bala, 2018).

Summary

Using of the Southern Thai traditional massage and the warm compression intervention 4 time points within 2 days after giving birth can promote lactation including shorten the onset of lactation and increase milk volume and prevent breast engorgement in primiparous mothers.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter describes the conclusions, strengths and limitations, and recommendations.

Conclusions of the study

The objectives of the study were to evaluate the effects of Southern Thai traditional massage and warm compression in the early postpartum period on the onset of lactation, milk volume, and breast engorgement among Thai primiparous mothers. The participants were primiparous mothers who met the inclusion criteria and attended the postnatal ward at Hatyai Hospital. A minimized randomization program was used for controlling the confounding variables.

The 63 participants were assigned to STMW, STM, and control groups, there were 21 in each group. The STMW group received 5 minutes of Southern Thai traditional massage and 15 minutes of warm compression for each breast, whereas the STM group received 5 minutes for each breast of Southern Thai traditional massage. Each method was provided 4 time points after giving birth and participants also received routine care. The control group received only routine care.

The results showed that the onset of lactation of the STMW group was significantly earlier than those of the STM and the control group. In addition, the onset of lactation of the STM group was significantly earlier than that in the control group. Furthermore, the results demonstrated that the milk volume of the STMW group was significantly higher than those of the STM group and the control group, and the milk volume of the STM group was significantly higher than that of the control group.

Moreover, the milk volumes at the 3rd time (34-35 hours after giving birth) were significantly higher than those at the 2nd time (28-29 hours after giving birth) and the 1st time (10-11 hours after giving birth), and that at the 2nd time (28-29 hours after giving birth) was significantly higher than that at the 1st time (10-11 hours after giving birth) in each group. Breast engorgement in STMW, STM, and control group increased over time. However, the breast engorgement of the STMW group was significantly lower than that of the STM and the control groups. In addition, the breast engorgement of the STM group was significantly lower than that of the control group.

Recommendations

The Southern Thai traditional massage and warm compression (STMW) intervention and Southern Thai traditional massage (STM) intervention are confirmed for promoting the onset of lactation, milk volume, and for preventing breast engorgement when compared with the control group who received only the usual care. The recommendations are explained as follows:

Nursing practice

STMW will be an alternative technique to apply for stimulating the onset of lactation, milk volume, and prevent breast engorgement effectively, especially, in early postpartum. However, the nurses should be trained for correctly applying this method. Therefore, the researchers will train postpartum nurses in the Southern traditional massage and encourage them to use this massage in postpartum maternal care.

Nursing education

The STMW intervention is an alternative technique in breast massage to promote onset of lactation, milk volume, and prevent breast engorgement for

postpartum mothers. Therefore, it is necessary to integrate this method into the practicum by demonstration, and return-demonstration for nursing students in maternal and infant nursing courses before practicing in postpartum wards so that they can effectively apply this intervention to provide postpartum maternal care.

Nursing research

The STMW intervention can promote lactation and prevent breast engorgement in early postpartum period. In further studies, the intervention should be modified to train mothers or significant persons (husband, mother, or female relative) to perform the STMW. The STMW intervention should be conducted with another population, such as mothers after cesarean section, preterm mothers, mothers with insufficient breast milk, etc. In addition, further research should employ a blind method in order to validate the result and solve the limitation of unconscious bias.

Strengths and Limitations of the study

Strengths

A randomized controlled trial was used for testing the Southern Thai traditional massage and warm compression (STMW). In addition, minimized randomization was used to assign the participants into the STMW, STM, or control groups for controlling the confounding variables. Another strength of this study is that the STMW intervention was applied within 2 days after giving birth to promote the onset of lactation, milk volume, and prevent breast engorgement. Furthermore, the STMW intervention is consistent with the cultural context of the Southern Thailand.

Limitations

Since this STMW procedure might take time (approximately 25 minutes and the intervention is applied four times after giving birth), it may interrupt some

routine care. It may not be practical for the nurses to apply in practice. This could be a limitation for the application of the STMW intervention. In addition, nurses who plan to use the STM need to be trained in using this massage before providing care. Moreover, only the researcher conducted the intervention and collected the data. This may have led to unconscious bias and might have had an effect on the obtained data.

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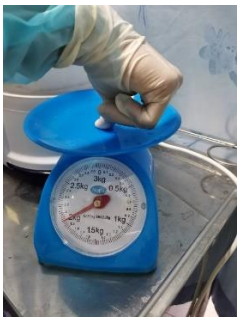
APPENDICES

APPENDIX A

The Process and Techniques of Southern Thai Traditional Massage and Warm Compression Intervention

The Process and Techniques of Southern Thai Traditional Massage and Warm Compression Intervention

In this study, the process and techniques of Southern Thai traditional massage include two steps and warm compression. Before starting this program, the participants were lying on a bed and arms beside the body. In addition, the researcher checked fingers weight. The researcher started massage on the breast.



Southern Thai traditional massage

The first step

The researcher's position: Standing

Primiparous mother's position: Lying on a bed

Massage's area: Milk line at axillary process

Massage's technique: Picking or poking technique

Procedure: Used the index finger, middle finger, ring finger, and little finger placed above the axillary process and the thumb is placed below the axillary process. After then, the thumb pick or poke the milk line three times per breast.

Right breast of participant

Left breast of participant

The second step

The researcher's position: Standing

Primiparous mother's position: Lying on a bed

Massage's area: All over the pectoralis major muscle of the breasts

Massage's technique: Squeezing or pressing technique

Procedure: The researcher massages continuously from the first step by using the index finger, middle finger, ring finger, and little finger, the researcher will squeeze or press (into the nipple) all over the pectoralis major muscle at both sides of the breasts.

Right breast of participant

Left breast of participant

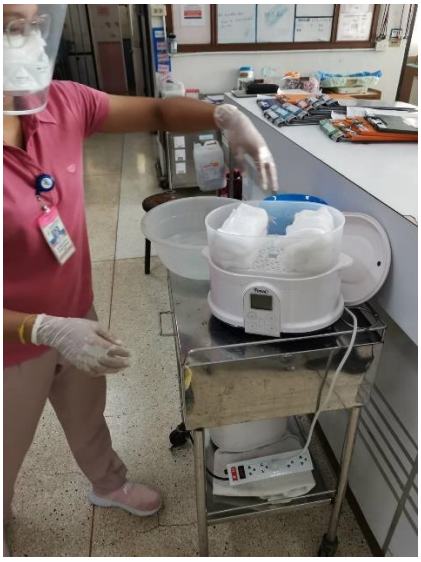
Warm compression

The first step

The researcher's position: Standing

Primiparous mother's position: Lying on a bed

Procedure: Four towels soaked in room temperature water and twisted until damp. Then, the towels will be steam in electric steamer at a temperature of around 43-46 ˚C



The Second step

The researcher's position: Standing

Primiparous mother's position: Lying on a bed

Warm compresses' area: All over the pectoralis major muscle of the breasts

Procedure: The towels are used to cover the breast by using one towel per breast. After this, the towel is replaced with another towel that has been steaming in electric steamer and then used to cover the breast is the same way on above.

APPENDIX B

Assumption for ANOVA and Repeated-Measures ANOVA

Assumption for ANOVA and Repeated-Measures ANOVA

1. The sampling distribution in normally distributed

In this study, sixty-three participants were recruited. Skewness and kurtosis analysis were used to decide normality data. The result reported that the skewness and kurtosis of the STMW, the STM, or the control groups were in the normal range of normality data ±1.96 (Polit & Beck, 2017) or Skewness |3|, Kurtosis |10| (Kline, 2016) (Table 15). Therefore, these data met the assumption, and they were applied for following analysis of ANOVA.

2. The data are independent

The data inducted from three groups independently; the STMW, STM, and control groups. The sample of variables of onset of lactation, milk volume, and breast engorgement consisted of the STMW group = 21, STM group = 21, and control groups = 21. So, the data met the assumption.

3. Data are measured at least at the interval level

All variables in this study were measured on interval or ratio scale. So, the data met the assumption.

Table 15

*Comparisons of Normality Test of each Variable using Skewness and Kurtosis, Standard Error of Skewness and Kurtosis and Skewness and Kurtosis Value (*N = *63)*

Variables	*SE* of skewness			*SE* of Kurtosis			Skewness value			Kurtosis value		
	STMW group	STM group	Control group	STMW group	STM group	Control group	STMW group	STM group	Control group	STMW group	STM group	Control group
	n = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21
Age of participants	0.38	0.36	0.84	-1.03	-1.54	-0.20	0.76	0.72	1.68	-1.06	-1.58	-0.20
Religion	0.76	-0.10	-0.31	-1.58	-2.21	-2.12	1.52	-0.20	-0.62	-1.62	-2.27	-2.28
Education level	-0.48	-0.42	-0.24	-0.62	-1.18	-0.50	-0.96	-0.84	-0.48	-0.63	-1.21	-0.51
Occupation	-0.62	-0.20	-0.76	-1.31	-1.44	-1.09	-1.24	-0.04	-1.52	1.34	-1.48	-1.12
Family incomes per month	0.48	0.49	0.60	-0.38	-0.80	-0.17	0.96	0.99	1.20	-0.39	-0.83	-0.18
BMI of mother before pregnancy	0.42	1.25	1.48	-0.97	2.21	2.27	0.83	2.50	2.96	-0.99	2.27	2.34
Birth weight of newborn	-0.23	0.64	0.09	-1.14	0.51	-0.90	-0.46	1.28	0.18	-1.17	0.53	-0.93
Duration of the labor phase	0.33	0.39	0.31	-0.93	0.36	-0.48	0.66	0.78	0.62	-0.95	0.37	-0.49
Quantity of oxytocin received (unit)	-0.20	0.21	0.27	-0.37	1.54	-0.72	-0.40	0.42	0.54	-0.38	1.59	-0.74

Note. SE = Standard error, *SE* of skewness = 0.50, *SE* of skewness = 0.97, STMW = Southern Thai traditional massage and warm compression, STM = Southern Thai traditional massage, BMI = body mass index.

Table 15

*Comparisons of Normality Test of Each Variable using Skewness and Kurtosis, Standard Error of Skewness and Kurtosis and Skewness and Kurtosis Value (*N = *63) (continued)*

Variables	*SE* of skewness			*SE* of Kurtosis			Skewness value			Kurtosis value		
	STMW group	STM group	Control group	STMW group	STM group	Control group	STMW group	STM group	Control group	STMW group	STM group	Control group
	n = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21	*n* = 21
Onset of lactation	0.31	0.45	-0.50	-0.22	0.84	-1.37	0.62	0.91	-0.99	-0.22	0.86	-1.40
Milk volume time 1	1.36	-0.10	1.15	2.37	-2.21	0.26	2.72	-0.20	2.30	2.44	-2.27	0.27
Milk volume time 2	-0.13	-0.04	0.55	-0.09	-0.01	0.33	-0.26	-0.08	1.10	-0.10	-0.01	0.34
Milk volume time 3	-0.38	0.25	0.94	2.34	-0.65	1.33	-0.76	0.50	1.88	2.40	-0.66	1.36
Breast engorgement time 1	1.33	1.33	1.02	-0.28	-0.28	-1.06	2.66	2.66	2.04	-0.28	-0.28	-1.09
Breast engorgement time 2	-0.31	-0.20	0.59	-2.12	0.03	2.91	-0.62	-0.40	1.18	-2.18	0.03	3.00
Breast engorgement time 3	0.36	-1.33	-0.50	0.60	-0.28	-0.80	0.72	-2.66	-1.00	0.62	-0.28	-0.82

Note. SE = Standard error, *SE* of skewness = 0.50, *SE* of skewness = 0.97, STMW = Southern Thai traditional massage and warm compression, STM = Southern Thai traditional massage, BMI = body mass index.

4. The variances need to be fairly similar (homogeneity of variances)

Levene's test and Mauchly's test of sphericity was conducted to examine the variance of data for ANOVA. The result of Levene's test of the onset of lactation variable met the assumption for test of equality of variances (Table 16). In addition, the Box's test for equality of covariance matrices is not significant (Table 17), which means that repeated measures ANOVA can be used. After that, the researcher looked at sphericity. The Mauchly's test of sphericity concluded the variable of milk volume and breast engorgement for equality of variances test. All variables met the assumption (Table 18).

Table 16

*Levene's Test for Equality of Variances of Onset of Lactation (*N = *63)*

Variables	*p*
Onset of lactation	.83

Table 17

*Box's Test Equality of Covariance Matrices on Milk Volume and Breast Engorgement (*N = *63)*

Variables	Box's test equality of covariance matrices				
	Box's	*F*	*df1*	*df2*	*p*
Milk volume	8.84	0.68	12	17,446.15	.77
Breast engorgement	11.81	0.91	12	17,446.15	.53

Table 18

*Mauchly's Test of Sphericity on Milk Volume and Breast Engorgement (*N = *63)*

Variables	Mauchly's test of sphericity		*df*	*p*	Epsilon
	Mauchly's	Chi-Square			Huyn Feldt
Milk volume	0.95	2.98	2	.22	1.00
Breast engorgement	0.96	2.38	2	.30	1.00

APPENDIX C

Instruments for Data Collection

Demographic Data Form

ID……

Description: This form requires the personal information and the birth history by interviews from the postpartum mother and information from patient medical records

Part 1: Personal information

1. Age……..…..years (Date/Month/Year of birth……) _____

2. Religion……. _____

O 1. Buddhist

O 2. Christian

O 3. Islam

O 4. Other (specify)…….…..

3. Marital status……. _____

O 1. Single

O 2. Married

O 3. Widowed/Divorced/Separated

4. Family characteristics…….. _____

O 1. Nuclear family

O 2. Extended family

5. Education level……. _____

O 1. ≥ Grade 6

O 2. Grade 7-9

O 3. Grade 10-12/Divorced

O 4. Bachelor or higher

6. Occupation……... _____

O 1. Private employee

O 2. Self-employed

O 3. Trader

O 4. Agriculturist

O 5. Other (specify)…….…….

7. Family income per month……..……baht _____

8. Sufficiency of income……. _____

O 1. Enough

O 2. Not enough

9. BMI before pregnancy…….……kg/m^2 _____

10. Exclusive breastfeeding intentions…….. _____

O 1. Yes……Year……Months

O 2. No

Part 2: Birth history

1. Date…..…..Month……..Year……of birth _____

Time…….…….of birth

2. The duration of the first phase of labor……...…….. _____

……hours…….……..minute

The duration of the second phase of labor…… _____

……hours…….……..minute

The duration of the third phase of labor…… _____

……hours…….……..minute

3. The duration of receiving oxytocin……..……. _____

……hours…….……..minute

4. Complications of mother during labor and postpartum…… _____

O Yes (specify)…….

O No

5. Complications of newborn during labor and postpartum.… _____

O Yes (specify)…….

O No

6. Apgar score of newborn at 1 minute....…....., _____

at 5 minutes…..……., and at 10 minutes…….…….

7. Birth weight of newborn……...gram _____

8. The first time the newborn breastfed the mother's breast…. _____

in labor room…….

O 1. No because……

O 2. Yes within 30 minute after giving birth

O 3. Yes within 31 minute to 1 hour after giving birth

O 4. Yes after 1 hour after giving birth

9. Medication received during labor and postpartum period…… _____

(Type, dose, period of time)…….…...……...

Labor period……...

Postpartum period……..

แบบบันทึกข้อมูลประชากร

รหัส.....

คำชี้แจง: แบบบันทึกนี้ต้องการสอบถามข้อมูลส่วนบุคคลและข้อมูลทางสูติศาสตร์ โดยสัมภาษณ์จากมารดาหลังคลอดครรภ์แรกและศึกษาข้อมูลจากเวชระเบียนผู้ป่วย

ส่วนที่ 1: ข้อมูลส่วนบุคคล

1. อายุ.....ปี (วัน/เดือน/ปีเกิด.....) _____

2. ศาสนา..... _____

O 1. พุทธ

O 2. คริสต์

O 3. อิสลาม

O 4. อื่นๆ (ระบุ).....

3. สถานภาพสมรส..... _____

O 1. โสด

O 2. สมรส

O 3. หม้าย/หย่า/แยก

4. ลักษณะครอบครัว..... _____

O 1. ครอบครัวเดี่ยว

O 2. ครอบครัวขยาย

5. ระดับการศึกษา..... _____

O 1. มากกว่าหรือเท่ากับชั้นประถมศึกษาปีที่ 6

O 2. มัธยมศึกษาปีที่ 1-3

O 3. มัธยมศึกษาปีที่ 4-6 หรือเทียบเท่า

O 4. ปริญญาตรีหรือสูงกว่า

6. อาชีพ..... _____

O 1. พนักงานเอกชน

O 2. ธุรกิจส่วนตัว

O 3. ค้าขาย

O 4. เกษตรกร

O 5. อื่นๆ (ระบุ).....

7. รายได้ของครอบครัวต่อเดือน.....บาท _____

8. ความเพียงพอของรายได้..... _____

O 1. เพียงพอ

O 2. ไม่เพียงพอ

9. ดัชนีมวลกายก่อนการตั้งครรภ์.....กิโลกรัม/ตารางเมตร _____

10. ความตั้งใจในการเลี้ยงลูกด้วยนมแม่อย่างเดียว..... _____

O 1. ตั้งใจเลี้ยงลูกด้วยนมแม่อย่างเดียว.....ปี.....เดือน

O 2. ไม่ตั้งใจเลี้ยงลูกด้วยนมแม่อย่างเดียว

ส่วนที่ 2: ข้อมูลทางสูติศาสตร์

1. วัน.....เดือน.....ปี.....ที่คลอด _____

เวลาที่คลอด.....

2. ระยะเวลาของระยะที่หนึ่งของการคลอด..... _____

.....ชั่วโมง.....นาที

3. ระยะเวลาของระยะที่สองของการคลอด.....

.....ชั่วโมง.....นาที _____

4. ระยะเวลาของระยะที่สามของการคลอด..... _____

.....ชั่วโมง.....นาที

5. ระยะเวลาของการได้รับออกซิโตซิน..... _____

.....ชั่วโมง.....นาที

6. ภาวะแทรกซ้อนของมารดาในระยะคลอดและหลังคลอด..... _____

O มี (ระบุ).....

O ไม่มี

7. ภาวะแทรกซ้อนของทารกในระยะคลอดและหลังคลอด..... _____

O มี (ระบุ).....

O ไม่มี

8. คะแนน Apgar ของทารก ณ นาทีที่ 1..... _____

ณ นาทีที่ 5.....

9. น้ำหนักแรกคลอดของทารก.....กรัม _____

10. การให้ทารกดูดนมมารดาครั้งแรกในห้องคลอด..... _____

O ทารกไม่ได้ดูดนมมารดา เพราะ.....

O ทารกได้ดูดนมมารดาภายใน 30 นาทีหลังคลอด

O ทารกได้ดูดนมมารดาภายใน 31 นาที- 1 ชั่วโมงหลังคลอด

O ทารกได้ดูดนมมารดาหลัง 1 ชั่วโมงหลังคลอด

11. ยาที่มารดาได้รับในระยะคลอดและหลังคลอด (ชนิด, ขนาด, ระยะเวลา) _____

1. ระยะคลอด.....

2. ระยะหลังคลอด.....

Onset of Lactation Form

Description: This form requires an evaluation of the range of time after giving birth until the onset of lactation. The researcher will observe and interview the primiparous mothers about any signs and symptoms of an increase in milk volume after giving birth, which is counted from birth time until the mother has a feeling of breast enlargement, swelling, stiffness, and heaviness including the milk flowing out.

The method for evaluating the onset of lactation: The researcher will assess for signs and symptoms of the mother have a feeling of breasts enlargement, swelling, stiffness, and heaviness including the milk flowing out.

Signs and symptom of onset of lactation / Time at evaluation		1. The mother feels enlargement, swelling, stiffness, and heaviness in her breasts. Feeling of tingling pain in the breast. There is milk flowing out	2. There is milk flowing out from the breast on the opposite side that newborn breastfed on	3. There is milk flowing out from newborn's mouth while breastfeeding	4. Hearing the newborn swallowing milk
At 3 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 6 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 9 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 12 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have

Signs and symptom of onset of lactation / Time at evaluation		1. The mother feels enlargement, swelling, stiffness, and heaviness in her breasts. Feeling of tingling pain in the breast. There is milk flowing out	2. There is milk flowing out from the breast on the opposite side that newborn breastfed on	3. There is milk flowing out from newborn's mouth while breastfeeding	4. Hearing the newborn swallowing milk
At 15 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 18 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 21 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 24 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 27 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 30 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 33 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 36 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 39 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have

Signs and symptom of onset of lactation / Time at evaluation		1. The mother feels enlargement, swelling, stiffness, and heaviness in her breasts. Feeling of tingling pain in the breast. There is milk flowing out	2. There is milk flowing out from the breast on the opposite side that newborn breastfed on	3. There is milk flowing out from newborn's mouth while breastfeeding	4. Hearing the newborn swallowing milk
At 42 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have
At 45 hours after giving birth	_____ a.m. or p.m.	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have	☐ No ☐ Have

แบบบันทึกระยะเวลาการมาของน้ำนมเต็มเต้า

คำชี้แจง: แบบบันทึกนี้ต้องการทราบระยะเวลาการมีน้ำนมเต็มเต้า โดยการสังเกตของผู้วิจัยและสัมภาษณ์มารดาหลังคลอดเพื่อประเมินเกี่ยวกับเวลา อาการและอาการแสดงและเวลาที่เริ่มมีน้ำนมเต็มเต้า ซึ่งเป็นแบบประเมินของกนกวรรณ โคตรสังข์ (2558) การประเมินอาการและอาการแสดงที่บ่งบอกถึงการมาของน้ำนมเต็มเต้า ดังรายละเอียดต่อไปนี้

อาการแสดงน้ำนมเต็มเต้า / **เวลาประเมิน**		**1. รู้สึกเต้านมขยายใหญ่ บวม ตึง หนักมากขึ้น รู้สึกเจ็บแปลบภายในเต้านม และมีน้ำนมไหลซึมออกมา**	**2. มีน้ำนมไหลจากเต้านมอีกข้างขณะที่ลูกดูด**	**3. มีน้ำนมไหลจากปากลูกขณะที่ดูดนม**	**4. ได้ยินเสียงกลืนน้ำนมของลูก**
3 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
6 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
9 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
12 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
15 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
18 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
21 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
24 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
27 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
30 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี

อาการแสดงน้ำนมเต็มเต้า เวลาประเมิน		1. รู้สึกเต้านมขยายใหญ่ บวม ตึง หนักมากขึ้น รู้สึกเจ็บแปลบภายในเต้านม และมีน้ำนมไหลซึมออกมา	2. มีน้ำนมไหลจากเต้านมอีกข้างขณะที่ลูกดูด	3. มีน้ำนมไหลจากปากลูกขณะที่ดูดนม	4. ได้ยินเสียงกลืนน้ำนมของลูก
33 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี
36 ชั่วโมงหลังคลอด	เวลา_____น.	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี	☐ ไม่มี ☐ มี

Milk Volume Form

Description: This form requires an evaluation of the milk volume by the researcher will assess the weight of the newborn and diaper before and after breastfeeding (grams).

Time at evaluation after finishing intervention	Date/Month/Year and Time	Weight of newborn and diaper before breastfeeding (gram)	Time (minute)			Weight of newborn and diaper after breastfeeding (gram)	Newborn's weight gain after breastfeeding (gram)
			Newborn starts get breastfeeding	Newborn finishes breastfeeding	Duration newborn breastfeeding		
At 10-11 hours after giving birth	Date____ Month_____ Year_____ Time_____ a.m. or p.m.						
At 28-29 hours after giving birth	Date____ Month_____ Year_____ Time_____ a.m. or p.m.						
At 34-35 hours after giving birth	Date____ Month_____ Year_____ Time_____ a.m. or p.m.						

แบบบันทึกปริมาณน้ำนม

คำชี้แจง แบบบันทึกนี้ต้องการประเมินปริมาณน้ำนมของมารดาหลังคลอดครรภ์แรก โดยผู้วิจัยจะใช้วิธีการประเมินน้ำหนักทารกและผ้าอ้อมสำเร็จรูปก่อนและหลังทารกดูดนมแม่ (กรัม)

เวลาประเมินหลังได้รับกิจกรรมทางการพยาบาล	**วัน/เดือน/ปี เวลา**	**น้ำหนักทารกและผ้าอ้อมสำเร็จรูปก่อนให้ทารกกินนมแม่ (กรัม)**	**เวลา (นาที)**							**น้ำหนักทารกและผ้าอ้อมสำเร็จรูปหลังทารกกินนมแม่ (กรัม)**	**น้ำหนักทารกที่เพิ่มขึ้นหลังการเลี้ยงลูกด้วยนมแม่ (กรัม)**
			เวลาที่ทารกเริ่มกินนมแม่		**เวลาที่ทารกกินนมแม่เสร็จสิ้น**		**ระยะเวลาที่ทารกกินนมมารดา**				
			เต้านมด้าน.....	**เต้านมด้าน.....**	**เต้านมด้าน.....**	**เต้านมด้าน.....**	**เต้านมด้าน.....**	**เต้านมด้าน.....**	**รวมทั้งสองด้าน**		
- ณ เวลา 10-11 ชั่วโมงหลังคลอด	วัน/เดือน/ปี_____ เวลา____น.										
- ณ เวลา 28-29 ชั่วโมงหลังคลอด	วัน/เดือน/ปี_____ เวลา____น.										

เวลาประเมินหลังได้รับกิจกรรมทางการพยาบาล	วัน/เดือน/ปี เวลา	น้ำหนักทารกและผ้าอ้อมสำเร็จรูปก่อนให้ทารกกินนมแม่ (กรัม)	เวลา (นาที)							น้ำหนักทารกและผ้าอ้อมสำเร็จรูปหลังทารกกินนมแม่ (กรัม)	น้ำหนักทารกที่เพิ่มขึ้นหลังการเลี้ยงลูกด้วยนมแม่ (กรัม)
			เวลาที่ทารกเริ่มกินนมแม่		เวลาที่ทารกกินนมแม่เสร็จสิ้น		ระยะเวลาที่ทารกกินนมมารดา				
			เต้านมด้าน.....	เต้านมด้าน.....	เต้านมด้าน.....	เต้านมด้าน.....	เต้านมด้าน.....	เต้านมด้าน.....	รวมทั้งสองด้าน		
- ณ เวลา 34-35 ชั่วโมงหลังคลอด	วัน/เดือน/ปี_____ เวลา____น.										

Breast Engorgement Scale

Description: This form requires an evaluation of the breast engorgement of the primiparous mothers. The researcher will observe and evaluate the breast engorgement by touching the mother's breast area and rate according to the assessment criteria as follows:

1 score = soft, no change

2 scores = slight change

3 scores = firm, non-tender

4 scores = firm, beginning tenderness

5 scores = firm tender

6 scores = very firm, very tender

The breast engorgement score / Time at evaluating	1 score	2 scores	3 scores	4 scores	5 scores	6 scores
After finishing intervention at 10-11 hours after giving birth						
After finishing intervention at 28-29 hours after giving birth						
After finishing intervention at 34-35 hours after giving birth						

Note. 1 to 2 score means there is no breast engorgement, 3 score means that there are early signs and symptoms of breast engorgement, 4 to 6 score means there are signs and symptoms of breast engorgement.

แบบวัดอาการคัดตึงเต้านม

คำชี้แจง: แบบวัดนี้ใช้ในการประเมินอาการคัดตึงเต้านมของมารดาหลังคลอดครรภ์แรก โดยใช้เครื่องมือ six-point breast engorgement ของฮิลล์และฮิวเมนนิค (Hill & Humenick, 1994) ซึ่งแปลเป็นภาษาไทยโดยปัณฑิตา ศรีจันทร์ดร (2554) ผู้วิจัยจะสังเกตและประเมินการคัดตึงเต้านม โดยการสัมผัสที่บริเวณเต้านมของมารดาและพิจารณาจากคะแนน ดังนี้

1 คะแนน = เต้านมนุ่ม ไม่มีการเปลี่ยนแปลง

2 คะแนน = เต้านมเปลี่ยนแปลงเล็กน้อย

3 คะแนน = เต้านมคัดตึง กดไม่เจ็บ

4 คะแนน = เต้านมคัดตึง กดเจ็บเล็กน้อย

5 คะแนน = เต้านมคัดตึง กดเจ็บ

6 คะแนน = เต้านมคัดตึงมาก กดเจ็บมาก

การคัดตึงเต้านม / **เวลาประเมิน**	**วัน/เดือน/ปี**	**เวลา**	**1 คะแนน**	**2 คะแนน**	**3 คะแนน**	**4 คะแนน**	**5 คะแนน**	**6 คะแนน**
หลังได้รับกิจกรรมทางการพยาบาล ณ เวลา 10-11 ชั่วโมงหลังคลอด		เวลา_____น.						
หลังได้รับกิจกรรมทางการพยาบาล ณ เวลา 28-29 ชั่วโมงหลังคลอด		เวลา_____น.						
หลังได้รับกิจกรรมทางการพยาบาล ณ เวลา 34-35 ชั่วโมงหลังคลอด		เวลา_____น.						

หมายเหตุ 1 คะแนน และ 2 คะแนน หมายถึง ไม่มีอาการคัดตึงเต้านม, 3 คะแนน หมายถึง มีอาการคัดตึงเต้านมระยะแรก, 4 คะแนนถึง 6 คะแนน หมายถึง มีอาการคัดตึงเต้านมระยะหลัง

Record Form for Promoting Breastfeeding in the Postpartum Period

Description: This form is used to record the routine care received from professional nurses or breastfeeding specialist nurses. The researcher or participant will record these data.

Nursing care activities for promoting breastfeeding	Receiving nursing care from the routine or standard care		Day 1 Date_____ Month_____ Year_____			Day 2 Date_____ Month_____ Year_____		
	Receive	Not receive	Start	End	Note	Start	End	Note
Teaching breastfeeding massage								
Breast massage by nurse/nursing student/ nursing lecturer								
Breast massage by self								
Warm compression								
Others_____								

แบบบันทึกการส่งเสริมการเลี้ยงลูกด้วยนมแม่ที่ตึกหลังคลอด

คำชี้แจง: แบบบันทึกนี้เพื่อบันทึกการพยาบาลตามปกติหรือมาตรฐานที่มารดาหลังคลอดครรภ์แรกได้รับจากพยาบาลวิชาชีพหรือพยาบาลชำนาญการด้านการส่งเสริมการเลี้ยงลูกด้วยนมแม่ โดยผู้วิจัยหรือผู้เข้าร่วมวิจัยเป็นผู้บันทึกข้อมูล

กิจกรรมการพยาบาลสำหรับการส่งเสริมการเลี้ยงลูกด้วยนมแม่ตามปกติหรือมาตรฐาน	การได้รับการดูแลทางการพยาบาลตามปกติหรือมาตรฐาน		วันที่ 1 วันที่_____เดือน_____ พ.ศ._____			วันที่ 2 วันที่_____เดือน_____ พ.ศ._____		
	ได้รับ	ไม่ได้รับ	เวลาที่เริ่ม	เวลาที่เสร็จสิ้น	หมายเหตุ	เวลาที่เริ่ม	เวลาที่เสร็จสิ้น	หมายเหตุ
การสอนการนวดเพื่อส่งเสริมการเลี้ยงลูกด้วยนมแม่								
การนวดเต้านมโดยพยาบาล/นักศึกษาพยาบาล/อาจารย์พยาบาล								
การนวดเต้านมด้วยตนเอง								
การประคบอุ่น								
อื่นๆ_____								

APPENDIX D

Informed Consent Form

Informed Consent Form

My name is Chudanut Khoonphet, Ph.D. Candidate in Nursing Science (international program), Faculty of Nursing at Prince of Songkla University. I am conducting a research project named "Effects of Southern Thai traditional massage and warm compression in the early postpartum on lactation and breast engorgement among primiparous mothers" The purpose of the study is to evaluate the effects of Southern Thai traditional massage and warm compression in the early postpartum period on lactation and breast engorgement among Thai primiparous mothers. The results will help to solve the problems related to lactation (delayed onset of lactation, insufficient milk volume) and breast engorgement.

In this study, you will be randomly assigned to the Southern Thai traditional massage and warm compression group, or the Southern Thai traditional massage group, or the control group. If you are in the Southern Thai traditional massage and warm compression group, you will receive the program consisting of Southern Thai traditional massage and warm compression at 4 time points which are 4-5 hours, 10-11 hours, 28-29 hours, and 34-35 hours after giving birth. If you are in the Southern Thai traditional massage group, you will receive the program consisting of Southern Thai traditional massage at 4 time points which are 4-5 hours, 10-11 hours, 28-29 hours, and 34-35 hours after giving birth. If you are in the control group, you will receive the routine care in the postpartum period. The outcomes measurement will be assessed at 10-11 hours, 28-29 hours, and 34-35 hours after receiving intervention in all groups.

The advantages of participation in this study are 1) participants will receive massage and warm compresses to promote lactation (onset of lactation and milk volume) and prevent breast engorgement. 2) The interventions of this study will help other postpartum mothers to solve the problems related to delayed onset of lactation,

insufficient milk volume, and breast engorgement. The disadvantages of participation in this study was the control group not initially receive this intervention. In order to solve this problem, after finishing this research if you have the desire to get the full intervention, the researcher will be happy to arrange the program after the experiment. Participation in this study is not harmful to your health. However, if you are in danger, you will receive immediate assistance.

You are a very important person in this research. I would like your voluntary participation in the study. You can agree or deny to participate. If you agree, you will need to sign informed consent as evidence. After that, I would like you to fill in a form with your personal information and join the group activities to which you have been allocated. In addition, all information obtained from the research will be kept confidential. The results of this study will be presented generally, and will not show your name. In addition, the data will be only used in this research and destroyed at the end of the research.

You have the right to cancel or withdraw from this research at any time, as required. This will not affect you or any persons involved. During the data collection, if you have any questions you can always ask the researcher or contact me at 085-6406912. I would like to thank you for your cooperation in this research.

.....
( )
Researcher
(Date).....

Certified that the study has been explained to me, I have read the inform consent of the research project and I am delighted to join the research program.

.....
( )
Participant
(Date).....

ใบพิทักษ์สิทธิ์ผู้เข้าร่วมโครงการวิจัย

ข้าพเจ้านางสาวชุดาณัฏฐ์ ขุนเพชร นักศึกษาปริญญาเอก สาขาวิชาพยาบาลศาสตร์ (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์ ดำเนินการโครงการวิจัยชื่อ “ผลของการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นในระยะแรกหลังคลอดต่อการหลั่งน้ำนมและการคัดตึงเต้านมในมารดาครรภ์แรก” โดยมีวัตถุประสงค์เพื่อประเมินผลของการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นในระยะแรกหลังคลอดต่อการหลั่งน้ำนมและการคัดตึงเต้านมในมารดาครรภ์แรก ซึ่งประโยชน์ที่คาดว่าจะได้รับจากการวิจัยครั้งนี้ คือ ได้ทางเลือกในการดูแลทางการพยาบาลเพื่อแก้ไขปัญหาความล่าช้าของน้ำนมเต็มเต้า ความไม่เพียงพอของน้ำนมและการคัดตึงเต้านม

ในการศึกษาครั้งนี้ ท่านจะถูกสุ่มเข้าสู่กลุ่มการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นหรือกลุ่มการนวดพื้นบ้านไทยภาคใต้หรือกลุ่มควบคุม ถ้าท่านถูกสุ่มเข้าสู่กลุ่มการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่น ท่านจะได้รับโปรแกรมการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่น 4 ครั้ง คือ 4-5 ชั่วโมง, 10-11 ชั่วโมง, 28-29 ชั่วโมง และ 34-35 ชั่วโมงหลังคลอด ถ้าท่านถูกสุ่มเข้ากลุ่มการนวดพื้นบ้านไทยภาคใต้ ท่านจะได้รับโปรแกรมการนวดพื้นบ้านไทยภาคใต้ 4 ครั้ง คือ 4-5 ชั่วโมง, 10-11 ชั่วโมง, 28-29 ชั่วโมง และ 34-35 ชั่วโมงหลังคลอด ถ้าท่านถูกสุ่มเข้ากลุ่มควบคุม ท่านจะได้รับการพยาบาลตามปกติของตึกหลังคลอด การประเมินผลการวิจัยของทุกกลุ่มจะดำเนินการหลังได้รับกิจกรรมการแทรกแซงทางการพยาบาลเมื่อเวลา 10-11 ชั่วโมง, 28-29 ชั่วโมง และ 34-35 ชั่วโมงหลังคลอด

ข้อดีของการเข้าร่วมการวิจัยในครั้งนี้ ได้แก่ 1) ผู้เข้าร่วมวิจัยจะได้รับการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นเพื่อส่งเสริมการหลั่งน้ำนม (การมีน้ำนมเต็มเต้าและปริมาณน้ำนม) และป้องกันการคัดตึงเต้านม 2) กิจกรรมทางการพยาบาลในการวิจัยนี้จะช่วยมารดาหลังคลอดรายอื่นในการแก้ไขปัญหาความล่าช้าของน้ำนมเต็มเต้า ความไม่เพียงพอของน้ำนม และการคัดตึงเต้านม ข้อเสียของการเข้าร่วมการวิจัยในครั้งนี้ ได้แก่ ผลข้างเคียงหรืออันตรายที่อาจเกิดขึ้นจากการเข้าร่วมโครงการ ผู้เข้าร่วมอาจจะได้รับความไม่สุขสบายจากการนวดหรือเกิดการระคายเคืองผิวหนังบริเวณเต้านมจากการประคบอุ่น เพื่อแก้ไขปัญหานี้ผู้วิจัยจะสอบถามความสุขสบายของผู้เข้าร่วม นอกจากนี้กลุ่มควบคุมจะไม่ได้รับกิจกรรมการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นในระหว่างการวิจัย หากผู้เข้าร่วมในกลุ่มควบคุมปรารถนาที่จะได้รับกิจกรรมการพยาบาลของการวิจัยครั้งนี้ ผู้วิจัยจะทำการนวดพื้นบ้านไทยภาคใต้และการประคบอุ่นหลังเสร็จสิ้นโครงการการวิจัย การ

เข้าร่วมการวิจัยครั้งนี้จะไม่เป็นอันตรายต่อสุขภาพของผู้เข้าร่วมวิจัย อย่างไรก็ตามกรณีผู้เข้าร่วมวิจัยได้รับอันตรายจะได้รับการดูแลและช่วยเหลือทันที

ท่านเป็นบุคคลที่สำคัญมากสำหรับโครงการวิจัยในครั้งนี้ ผู้วิจัยจึงใคร่ขอความสมัครใจจากท่านในการเข้าร่วมการวิจัย ท่านมีสิทธิจะตอบรับหรือปฏิเสธการเข้าร่วมวิจัยตามความสมัครใจ หากท่านตอบรับเข้าร่วมวิจัยในครั้งนี้ กรุณาลงชื่อยินยอมเข้าร่วมการวิจัย หลังจากนั้นผู้วิจัยจะสัมภาษณ์ข้อมูลส่วนบุคคลและท่านจะได้รับการพยาบาลตามกลุ่มที่ท่านได้รับการสุ่ม ข้อมูลทั้งหมดของผู้เข้าร่วมจะถูกปกปิดเป็นความลับ ผลการวิจัยจะถูกนำเสนอในภาพรวมเพื่อใช้ในการเผยแพร่ให้เกิดประโยชน์ในทางวิชาการ โดยไม่แสดงชื่อของท่าน ข้อมูลทั้งหมดของท่านจะใช้ในโครงการวิจัยนี้เท่านั้นและจะถูกทำลายเมื่อเสร็จสิ้นการวิจัย

ถึงแม้ว่าท่านจะยินยอมเข้าร่วมการวิจัยในครั้งนี้แล้วก็ตาม แต่ท่านสามารถยกเลิกหรือถอนตัวจากการวิจัยครั้งนี้ได้ตลอดเวลา โดยไม่มีผลกระทบใดๆ ต่อท่านหรือบุคคลที่เกี่ยวข้อง ในช่วงของการเก็บข้อมูล หากท่านมีคำถามหรือข้อสงสัย ท่านสามารถสอบถามข้อมูลเพิ่มเติมได้จากผู้วิจัยหรือติดต่อที่หมายเลขโทรศัพท์ 085-6406912 ผู้วิจัยของขอบคุณในความร่วมมือของท่านในการวิจัยครั้งนี้

.....

( )

ผู้วิจัย

วัน.....เดือน.....ปี.....

ข้าพเจ้าขอรับรองว่า ข้าพเจ้าได้รับการอธิบายและอ่านข้อมูลในใบพิทักษ์สิทธิ์อย่างละเอียด ข้าพเจ้ามีความสมัครใจยินยอมเข้าร่วมโครงการวิจัยในครั้งนี้

.....

( )

ผู้เข้าร่วมวิจัย

วัน.....เดือน.....ปี.....

APPENDIX E

List of Experts for Content Validity of Southern Thai Traditional Massage and Warm Compression Program

List of Three Experts' Name

Name	Expertise
รศ. ดร. ศศิกานต์ กาละ	อาจารย์ สาขาวิชาการพยาบาลมารดา ทารก และการผดุงครรภ์ คณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์
อาจารย์กชกร สุขจันทร์ อินทนูจิตร	อาจารย์วิชาชีพการแพทย์แผนไทย คณะการแพทย์แผนไทย มหาวิทยาลัยสงขลานครินทร์
ผศ. ดร. เกศริน มณีนูน	อาจารย์วิชาการ คณะการแพทย์แผนไทย มหาวิทยาลัยสงขลานครินทร์

APPENDIX F

Training Massage

ใบอนุญาตเลขที่ สข ๒.๑๐/๒๕๕๒ เลขที่ ๐๗๐/๒๕๖๓

โรงเรียนส่งเสริมสุขภาพแผนไทย

๖๐ ถนนราษฎร์อุทิศ ตำบลหาดใหญ่ อำเภอหาดใหญ่ จังหวัดสงขลา ๙๐๑๑๐

ประกาศนียบัตรฉบับนี้ให้ไว้เพื่อแสดงว่า

นางสาว ชุดาณัฏฐ์ ขุนเพชร

ได้ผ่านการฝึกอบรมหลักสูตร นวดไทยเพื่อสุขภาพ ๑๕๐ ชั่วโมง

ระหว่างวันที่ ๑๙ สิงหาคม ๒๕๖๓ – ๒๔ ตุลาคม พุทธศักราช ๒๕๖๓

ให้ไว้ ณ วันที่ ๒๔ ตุลาคม พุทธศักราช ๒๕๖๓

ขอให้มีความสุข มีความเจริญก้าวหน้าในวิชาชีพต่อไป

(นายประเสริฐ สังขกุล)
ผู้บริหารโรงเรียน

ใบอนุญาตเลขที่ สข ๒.๑๐/๒๕๕๒ เลขที่ ๐๐๑/๒๕๖๓

โรงเรียนส่งเสริมสุขภาพแผนไทย

๖๐ ถนนราษฎร์อุทิศ ตำบลหาดใหญ่ อำเภอหาดใหญ่ จังหวัดสงขลา ๙๐๑๑๐

ประกาศนียบัตรฉบับนี้ให้ไว้เพื่อแสดงว่า

นางสาว ชุดาณัฏฐ์ ขุนเพชร

ได้ผ่านการฝึกอบรมหลักสูตร การดูแลสุขภาพและความงามสตรีหลังเรือนไฟ ๑๕๐ ชั่วโมง

ระหว่างวันที่ ๒๔ กรกฎาคม ๒๕๖๓ – ๒๗ สิงหาคม พุทธศักราช ๒๕๖๓

ให้ไว้ ณ วันที่ ๒๗ สิงหาคม พุทธศักราช ๒๕๖๓

ขอให้มีความสุข มีความเจริญก้าวหน้าในวิชาชีพต่อไป

(นายประเสริฐ สังขกุล)
ผู้บริหารโรงเรียน

ที่ อว 6801.05/1555

คณะพยาบาลศาสตร์
มหาวิทยาลัยสงขลานครินทร์
ถ.กาญจนวณิชย์
อ.หาดใหญ่ จ.สงขลา 90110

29 กรกฎาคม 2563

เรื่อง ขอเรียนเชิญเป็นวิทยากรสอนนวดพื้นบ้านภาคใต้เพื่อประกอบการทำวิทยานิพนธ์

เรียน นางไสหนับ อิแอ

ด้วยนางสาวชุดาณัฏฐ์ ขุนเพชร รหัสนักศึกษา 6110430009 นักศึกษาหลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (นานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์ ได้วางแผนดำเนินการทำวิทยานิพนธ์ เรื่อง "Effects of Southern Traditional Massage and Warm Compresses in the Early Postpartum on Onset of Lactation, Milk Volume, and Breast Engorgement Among Primiparous Mothers" โดยมีรองศาสตราจารย์ ดร.โสเพ็ญ ชูนวล เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ ซึ่งในกระบวนการดำเนินการทำวิทยานิพนธ์ นักศึกษาต้องมีความเข้าใจเกี่ยวกับการนวดพื้นบ้านภาคใต้ โดยเฉพาะการนวดกระตุ้นน้ำนมเพื่อประกอบการทำวิทยานิพนธ์

คณะพยาบาลศาสตร์ พิจารณาแล้วเห็นว่าท่าน ซึ่งเป็นโต๊ะบิแด ผู้มีความรู้ และมีประสบการณ์ในการดูแลสตรีตั้งครรภ์และมารดาหลังคลอดตามแบบฉบับการนวดพื้นบ้านภาคใต้ของมุสลิมมากกว่า 10 ปี จึงขอเรียนเชิญท่านเป็นวิทยากรสอนการนวดพื้นบ้านภาคใต้ในการดูแลมารดาหลังคลอด โดยเฉพาะการนวดกระตุ้นน้ำนมทั้งภาคทฤษฎีและภาคปฏิบัติให้กับนางสาวชุดาณัฏฐ์ ขุนเพชร ทั้งนี้หากมีข้อสงสัย โปรดติดต่อนางสาวชุดาณัฏฐ์ ขุนเพชร โทรศัพท์มือถือ 085-6406912 หรือ E-mail: chudanut_khoonphet@hotmail.com

จึงเรียนมาเพื่อโปรดพิจารณาให้ความอนุเคราะห์ด้วย จะเป็นพระคุณยิ่ง

(ผู้ช่วยศาสตราจารย์ ดร.จารุวรรณ กฤตย์ประชา)
รองคณบดีฝ่ายวิชาการ วิจัยและนวัตกรรม ปฏิบัติการแทน
คณบดีคณะพยาบาลศาสตร์

สำนักงานเลขานุการ
โทรศัพท์ 0 7428 6455
โทรสาร 0 7428 6421



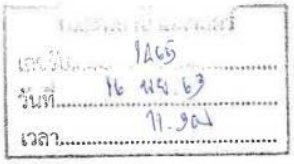





APPENDIX G

Permission to Use Instrument for Outcome Measures

Permission to Use Instrument for Outcome Measures



ที่ อว ๘๓๙๓(๒๕)/ ๓๘๕๗

บัณฑิตวิทยาลัย มหาวิทยาลัยเชียงใหม่
๒๓๙ ถนนห้วยแก้ว ตำบลสุเทพ
อำเภอเมืองเชียงใหม่ ๕๐๒๐๐

๑๖ พฤศจิกายน ๒๕๖๓

เรื่อง อนุญาตให้ใช้เครื่องมือวิจัย

เรียน คณบดีคณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์

อ้างถึง หนังสือ ที่ อว ๖๘๑๐๕/๒๒๕๓ ลงวันที่ ๑๙ ตุลาคม ๒๕๖๓

ตามที่ นางสาวชุดาณัฏฐ์ ขุนเพชร นักศึกษาหลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (นานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์ ซึ่งเป็นผู้วิจัย เรื่อง "Effects of Southern Thai Traditional Massage and Warm Compresses in the Early Postpartum on Onset of Lactation, Milk Volume, and Breast Engorgement Among Primiparous Mothers " มีความประสงค์จะขออนุญาตนำเครื่องมือวิจัยในวิทยานิพนธ์ของ นางสาวปัณฑิตา ศรีจันทร์ดร ไปใช้ในงานวิจัยนั้น

บัณฑิตวิทยาลัย มหาวิทยาลัยเชียงใหม่ พิจารณาแล้วไม่ขัดข้อง และยินดีอนุญาต ให้นำเครื่องมือดังกล่าวไปใช้ประโยชน์ในการศึกษาวิจัยได้

จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ

(รองศาสตราจารย์ ดร.อภิชาต โสภาแดง)
รองคณบดี ปฏิบัติการแทน
คณบดีบัณฑิตวิทยาลัย

งานบริการการศึกษา
โทร. ๐-๕๓๙๔-๒๔๐๘
โทรสาร. ๐-๕๓๙๔-๒๔๓๕

ที่ อว ๘๑๓๗/ ๘๑๔

มหาวิทยาลัยบูรพา
๑๖๙ ถ.ลงหาดบางแสน ต.แสนสุข
อ.เมือง จ.ชลบุรี ๒๐๑๓๑

๓ พฤศจิกายน ๒๕๖๓

เรื่อง อนุญาตให้ใช้เครื่องมือวิจัย

เรียน คณบดีคณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์

อ้างถึงหนังสือที่ อว ๖๘๑๐๕/๒๒๕๔ ลงวันที่ ๑๙ ตุลาคม พ.ศ. ๒๕๖๓ เรื่อง ขออนุญาตใช้เครื่องมือวิจัย โดยนางสาวชุดาณัฏฐ์ ขุนเพชร นิสิตหลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (นานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์ ได้ขอใช้เครื่องมือวิจัย “แบบบันทึกระยะเวลาการมาของน้ำนมเต็มเต้า” จากวิทยานิพนธ์เรื่อง “ผลของโปรแกรมการกระตุ้นการหลั่งของน้ำนมต่อระยะเวลาการเริ่มไหลของน้ำนม ระยะเวลาการมาของน้ำนมเต็มเต้า และการรับรู้ความสามารถในการเลี้ยงลูกด้วยนมแม่ในมารดาหลังผ่าตัดคลอดบุตรทางหน้าท้อง” ของคุณกนกวรรณ โคตรสังข์ หลักสูตรพยาบาลศาสตรมหาบัณฑิต สาขาวิชาการผดุงครรภ์ขั้นสูง คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา พ.ศ. ๒๕๕๘ โดยมี รองศาสตราจารย์ ดร.ศิริวรรณ แสงอินทร์ เป็นอาจารย์ที่ปรึกษาหลักและผู้ช่วยศาสตราจารย์ ดร.อุษา เชื้อหอม เป็นอาจารย์ที่ปรึกษาร่วม เพื่อนำไปใช้ในการทำวิทยานิพนธ์เรื่อง “Effects of Southern Thai Traditional Massage and Warm Compresses in the Early Postpartum on Onset of Lactation, Milk Volume, and Breast Engorgement Among Primiparous Mother” โดยมีรองศาสตราจารย์ ดร.โสเพ็ญ ชูนวล เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์หลัก ตามความทราบแล้วนั้น

ในการนี้ มหาวิทยาลัยบูรพา โดยบัณฑิตวิทยาลัยอนุญาตให้ นางสาวชุดาณัฏฐ์ ขุนเพชร ใช้เครื่องมือวิจัยดังกล่าวได้

ทั้งนี้ขอให้อ้างอิงวิทยานิพนธ์ของนิสิตดังกล่าวด้วย รวมถึงจัดส่ง “แบบฟอร์มรับรองการใช้ประโยชน์จากผลงานวิจัยหรืองานสร้างสรรค์” มายังบัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา ที่ E-mail: grd.buu@go.buu.ac.th (สามารถดาวน์โหลดแบบฟอร์มได้ที่ http://grd.buu.ac.th/wordpress/?page_id=3717)

จึงเรียนมาเพื่อโปรดทราบและดำเนินการต่อไปด้วย

ขอแสดงความนับถือ

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List of Publication and Proceeding

Khoonphet, C., & Kala, S. (2019).The Experience of Breastfeeding Intention among Adolescent Mothers. *Princess of Naradhiwas University Journal, 11*(2), 1-11.

Kala, S., & Khoonphet, C. (2017). Experience in Promoting Breastfeeding of Registered Nurses Working in Postpartum Units. *Princess of Naradhiwas University Journal, 9*(3), 1-11.