
OBSTETRICS

Nipple Characteristics between Teenage and Adult in Postpartum Period and Success in Breastfeeding at day 3 Postpartum

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ABSTRACT

Objectives: To compare nipple length and diameter between teenage and adult mothers during early postpartum period and their association with success in breastfeeding at day 3 postpartum.

Materials and Methods: A total of 315 nulliparous women, who delivered at Siriraj Hospital between March and October 2016 were enrolled. Study group consisted of 105 teenage mothers and 210 adult mothers were served as a comparison group. Baseline characteristics, obstetric data, maternal and neonatal outcomes were extracted from medical records. Nipple length and diameter were measured. LATCH score was used to evaluate success in breastfeeding at day 3 postpartum, using score of ≥ 7 as a cut off. Comparisons of various characteristics were made between groups. Association between nipple characteristics and LATCH score were evaluated.

Results: Teenage mothers were significantly more likely to be underweight, working as a housewife, and have lower income. While gestational age at delivery was comparable, teenage mothers were significantly more likely to deliver vaginally. Birth weight were significantly lower among teenage mother. Nipples of teenage mothers were significantly shorter and narrower than adult mothers (7.3 ± 2.8 mm vs. 9.6 ± 2.8 mm, $p < 0.001$ and 13.5 ± 1.4 mm vs. 14.2 ± 1.8 mm, $p = 0.002$, respectively). At day 3 postpartum LATCH scores ≥ 7 were comparable between groups (58.1% vs. 55.2%, $p = 0.631$). Nipple length of ≥ 7 mm was significantly associated with success in breastfeeding at day 3 postpartum (LATCH score of ≥ 7) in both teenage (71% vs. 39.5%, $p = 0.002$) and adult (60.4% vs. 13%, $p < 0.001$) mothers.

Conclusion: Teenage nipples had significantly shorter and narrower than adult mothers. Pregnant women with nipple length of ≥ 7 mm on at least one side significantly increased the chance of success in breastfeeding at day 3 postpartum regardless of age group.

Keywords: nipple length, nipple width, teenage pregnancy, breastfeeding.

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ลักษณะของหัวนมในมารดาวัยรุ่นเทียบกับมารดาวัยผู้ใหญ่ในระยะหลังคลอด และความสำเร็จในการให้นมบุตรในวันที่ 3 หลังคลอด

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บทคัดย่อ

วัตถุประสงค์: เพื่อเปรียบเทียบลักษณะของหัวนมในมารดาวัยรุ่น เทียบกับมารดาวัยผู้ใหญ่ในระยะหลังคลอด และศึกษาความสัมพันธ์ของลักษณะของหัวนมกับความสำเร็จในการให้นมบุตรในวันที่ 3 หลังคลอด

วัสดุและวิธีการ: ทำการศึกษาสตวิธีหลังคลอดครรภ์แรกที่ไม่มีข้อห้ามในการให้นมบุตรจำนวน 315 ราย ที่มาคลอดที่โรงพยาบาลศิริราช โดยแบ่งเป็นกลุ่มมารดาวัยรุ่นจำนวน 105 ราย และมารดาวัยผู้ใหญ่จำนวน 210 ราย เทียบรวมรวมข้อมูลทั่วไป ข้อมูลด้านสุขภาพสตรี ข้อมูลการคลอด และผลของการตั้งครรภ์ ทำการตรวจประเมินลักษณะหัวนม โดยใช้ Syringe และไม้บรรทัดที่มีรูกลม ที่มีมาตรวัดในหน่วยมิลลิเมตร วัดขนาดความยาวและความกว้างหัวนมทั้งสองข้างหลังจากได้รับการกระตุ้นหัวนม ระหว่าง 24-48 ชั่วโมงหลังคลอด และทำการประเมินความสำเร็จในการให้นมบุตรด้วย LATCH scores ในวันที่ 3 หลังคลอด โดยใช้จุดตัดที่คะแนน ≥ 7 ทำการเปรียบเทียบข้อมูลทั่วไป และลักษณะของหัวนมระหว่างกลุ่มมารดาวัยรุ่นเทียบกับมารดาวัยผู้ใหญ่ และศึกษาความสัมพันธ์ของลักษณะหัวนมกับความสำเร็จในการให้นมบุตรโดยเปรียบเทียบ LATCH scores ระหว่าง 2 กลุ่ม

ผลการศึกษา: มารดาวัยรุ่นมีน้ำหนักก่อนตั้งครรภ์ต่ำกว่าเกณฑ์ มีอัซีพแม่บ้านมากกว่า และมีรายได้ต่ำกว่า มารดาวัยผู้ใหญ่อย่างมีนัยสำคัญทางสถิติ อายุครรภ์เฉลี่ยเมื่อคลอด ไม่แตกต่างกันระหว่าง 2 กลุ่ม แต่มารดาวัยรุ่นมีอุบัติการณ์ในการคลอดทางช่องคลอดสูงกว่าอย่างมีนัยสำคัญทางสถิติ น้ำหนักทารกแรกคลอดในมารดาวัยรุ่นต่ำกว่ามารดาวัยผู้ใหญ่ อย่างมีนัยสำคัญทางสถิติ พบร้าหัวนมในกลุ่มมารดาวัยรุ่นสั้น และแคบกว่ากลุ่มมารดาวัยผู้ใหญ่อย่างมีนัยสำคัญทางสถิติ (7.3 ± 2.8 มิลลิเมตร และ 9.6 ± 2.8 มิลลิเมตร, $p < 0.001$ และ 13.5 ± 1.4 มิลลิเมตร และ 14.2 ± 1.8 มิลลิเมตร, $p=0.002$ ตามลำดับ) พบร้าค่าคะแนน LATCH scores ≥ 7 ไม่แตกต่างกันระหว่าง 2 กลุ่ม (58.1% และ 55.2%, $p=0.631$) และพบว่าความยาวหัวนม ≥ 7 มม. สัมพันธ์กับความสำเร็จในการให้นมบุตร อย่างมีนัยสำคัญทางสถิติในทั้งกลุ่มวัยรุ่น (71% และ 39.5%, $p=0.002$) และกลุ่มวัยผู้ใหญ่ (60.4% และ 13%, $p < 0.001$)

สรุป: หัวนมของกลุ่มมารดาวัยรุ่นหลังคลอด สั้น และแคบกว่ากลุ่มมารดาวัยผู้ใหญ่อย่างมีนัยสำคัญทางสถิติ และหนูนิ่งตั้งครรภ์ที่มีความยาวหัวนมข้างใดข้างหนึ่ง ≥ 7 มิลลิเมตร เพิ่มโอกาสความสำเร็จในการให้นมบุตรอย่างมีนัยสำคัญทางสถิติทั้งกลุ่มมารดาวัยรุ่นและวัยผู้ใหญ่

คำสำคัญ: ความยาวหัวนม, ความกว้างหัวนม, หนูนิ่งตั้งครรภ์วัยรุ่น, การให้นมบุตร

Introduction

Adolescents involve more than 18% of all Thais⁽¹⁾. The 2014 World Health Statistic indicate that the average global birth rate among 15 to 19 years old is 49 per 1,000 girls⁽²⁾. Teenage pregnancy is an important health issue worldwide. They are at increased risk of developing many complications during pregnancy and childbirth such as pregnancy induced hypertension, anemia, preterm birth, cephalopelvic disproportion, and postpartum breastfeeding problems⁽³⁾.

The World Health Organization (WHO) recommends mothers worldwide to exclusive breastfeed for the child's first 6 months to achieve optimal growth, development and health. Among adolescent mothers, many factors have been related to unsuccessful breastfeeding, such as primiparity and cesarean delivery^(4,5). Maternal age has been reported to be directly associated with the duration of breastfeeding that adolescents have low breastfeeding initiation rates, as well as a short duration of breastfeeding⁽⁶⁾. In a previous review, studies indicated that adolescents breastfeed less often than adults⁽⁷⁾. In addition, teenage mothers were reported to be less likely to breastfeed than older mothers and have a more rapid discontinuation rate^(8,9). A previous study in Thailand have shown that teenage mothers were significantly less likely to achieve successful breastfeeding at day 2 postpartum compared to adult mothers⁽¹⁰⁾.

Among other factors, nipple length has also been related to successful breastfeeding⁽¹¹⁾. Previous studies showed that the rate of successful breastfeeding, measured by LATCH scores, increased with nipple length of ≥ 7 millimeters^(11, 12). Among teenage mothers, it is possible that immature development of breasts and nipples are possibly more common compared to adult mothers. A previous study showed that measurements of nipple-areolar complex were larger among older than younger women⁽¹³⁾. Shorter nipple length among teenage mothers have also been reported among Thai women⁽¹⁰⁾. The problem of shorter

nipple length could further adversely affect the success in breastfeeding among teenagers. However, there is still limited data on the nipple length in teenage mothers as well as their relationship with successful breastfeeding. Therefore, the objectives of this study were to compare nipple characteristics between teenage and adult mothers and to determine the association with success rate of breastfeeding, measured by LATCH scores.

Materials and Methods

An analytic cross-sectional study was conducted between March and October 2016 after approval from the Siriraj institutional review board. The inclusion criteria were singleton, primiparous women who delivered at Siriraj Hospital and agree to participate. Exclusion criteria were women who had contraindications to breastfeeding such as HIV infection. Sample size was determined from pilot study that showed mean nipple length of adult mothers was 9.4 ± 2.8 mm. At 95% confidence level and 80% power with 2:1 control-to-case ratio, and estimated difference of mean nipple length of 1 mm, a total of 105 teenage and 210 adult mothers are required including 10% loss.

After informed consent, a total of 315 postpartum women were enrolled. Study group consisted of 105 teenage mothers and 210 adult mothers were served as a comparison group. Baseline characteristics, obstetric data, and maternal and neonatal outcomes were collected. Nipple length was measured by a plastic syringe with a millimeters scale and nipple width was measured with a round hole's ruler (Fig. 1).

Between 24-48 hours postpartum, each postpartum woman was placed in a sitting position, the nipple was stimulated to an erect state by soft cloth, the nipple length measurement tool was then placed over the nipple, adjusting the inner lip of the tool just to contact the areola and reading the scale (Fig. 2). Nipple width was then measured with a round hole's ruler. Nipple length and width were measured in both breasts and data were recorded

in millimeters.

During admission, all women were advised to exclusive breastfeed their infants. Breastfeeding practice were supported in various aspects individually by well-trained nurses at postpartum ward.

LATCH score was used to determine success in breastfeeding⁽¹⁴⁾. The scoring system was developed by Jensen et al in 1994 by assessing latching on, audible, type of nipple, comfort, and amount of help the mother needs to hold her infant to the breast. The system assigns a numerical score

(0, 1, or 2) for each item. The cut off value for successful breastfeeding was $\geq 7^{(11,14)}$. LATCH score of each mother was assessed by a well-trained nurses at day 3 postpartum before hospital discharge.

Comparisons of various characteristics including nipple length and width were made between groups using Student t test or chi square tests as appropriate. Association between nipple characteristics and LATCH score were evaluated. A p value of < 0.05 was considered statistical significance.

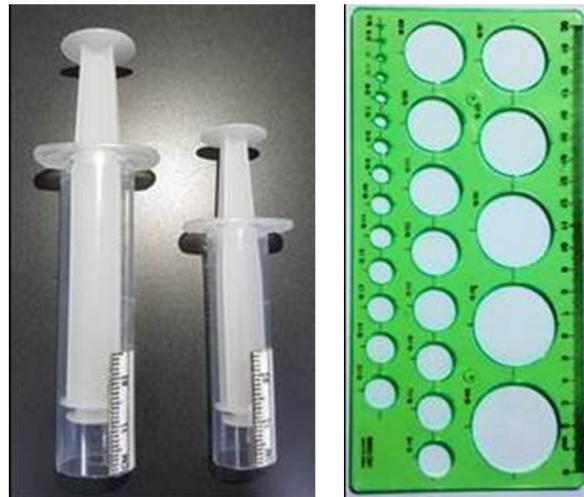


Fig. 1. Plastic syringe with a millimeters scale and round hole's ruler used to measure nipple length and width.



Fig. 2. Measurement of nipple length.

Results

A total of 315 women were enrolled, including 105 teenage and 210 adult mothers. Comparison of various baseline characteristics between the 2 groups are shown in Table 1. Mean age of teenage mothers was 17.5 years while it was 26.8 years in adult mothers ($p < 0.001$). Teenage mothers had significantly lower BMI and more likely to be underweight (37.1% vs. 19.5%, $p < 0.001$). Table 2 shows comparison of delivery characteristics between the 2 groups. Gestational age at delivery were comparable at 38.5 weeks. Teenage mothers were significantly more likely to deliver vaginally than adult mothers (79% vs. 58.6%, $p < 0.001$). Birth weight was significantly lower among teenage than adult mothers (2491.3 vs. 3034 g, $p = 0.045$)

but without clinical significance. Newborn sex and rate of birth asphyxia were comparable between the 2 groups.

Table 3 shows comparison of nipple characteristics between the 2 groups. Nipple length and width were significantly lower among teenage compared to adult mothers with the mean nipple lengths of 7.3 ± 2.8 and 9.6 ± 2.8 mm, respectively, $p < 0.001$. Mean nipple width were 13.5 ± 1.4 and 14.2 ± 1.8 mm respectively, $p < 0.001$. Teenage mothers were significantly less likely to have nipple length of ≥ 7 mm compared to adult mothers ($p < 0.001$). Successful breastfeeding as defined by LATCH scores ≥ 7 were comparable between the 2 groups (58.1% vs. 55.2%, $p = 0.631$).

Table 1. Comparison of baseline characteristics between 2 groups.

| Characteristics | Teenage | Adult | p value |
|--|----------------|----------------|---------|
| | (N = 105) | (N = 210) | |
| Mean maternal age \pm SD (years) | 17.5 ± 1.4 | 26.8 ± 4.9 | < 0.001 |
| Mean BMI \pm SD (kg/m^2) | 20.3 ± 3.6 | 22.2 ± 4.6 | < 0.001 |
| | N (%) | N (%) | |
| BMI category | | | < 0.001 |
| Underweight | 39 (37.1%) | 41 (19.5%) | |
| Normal | 53 (50.5%) | 117 (55.7%) | |
| Overweight and obesity | 13 (12.4%) | 52 (24.8%) | |
| Occupation | | | < 0.001 |
| Employee | 26 (24.8%) | 137 (65.2%) | |
| Housewife | 60 (57.1%) | 43 (20.5%) | |
| Others | 19 (18.1%) | 30 (14.3%) | |
| Income | | | < 0.001 |
| ≤ 20000 THB | 94 (89.5%) | 107 (51%) | |
| > 20000 THB | 11 (10.5%) | 103 (49%) | |

BMI: body mass index, SD: standard deviation

Table 2. Comparison of delivery characteristics between 2 groups.

| Characteristics | Teenage (N = 105) | Adult (N = 210) | p value |
|-----------------------------|----------------------|--------------------|---------|
| GA at delivery ± SD (weeks) | 38.4 ± 1.5 | 38.5 ± 1.3 | 0.75 |
| Route of delivery | | | < 0.001 |
| Vaginal delivery | 83 (79%) | 123 (58.6) | |
| Cesarean delivery | 22 (21%) | 87 (41.4) | |
| Newborn sex | | | 0.72 |
| Male | 52 (49.5%) | 108 (51.7%) | |
| Female | 53 (50.5%) | 101 (48.3%) | |
| Birth weight ± SD (g) | 2941.3 ± 346.6 | 3034 ± 402.4 | 0.045 |
| APGAR at 1 min | | | 0.724 |
| < 7 | 5 (4.8%) | 12 (5.7%) | |
| ≥ 7 | 100 (95.2%) | 198 (94.3%) | |

GA: gestational age, SD: standard deviation

Table 3. Comparison of nipple characteristics and LATCH score between 2 groups.

| Characteristics | Teenage (N = 105) | Adult (N = 210) | p value |
|-------------------------------|----------------------|--------------------|---------|
| Right nipple length ± SD (mm) | 7.4 ± 2.9 | 9.6 ± 3.0 | < 0.001 |
| Left nipple length ± SD (mm) | 7.2 ± 2.8 | 9.6 ± 2.9 | < 0.001 |
| Mean nipple length ± SD (mm) | 7.3 ± 2.8 | 9.6 ± 2.8 | < 0.001 |
| Right nipple length ≥ 7 mm | 57 (54.3%) | 182 (86.7%) | < 0.001 |
| Left nipple length ≥ 7 mm | 59 (56.2%) | 180 (85.7%) | < 0.001 |
| Mean nipple length ≥ 7 mm | 54 (51.4%) | 181 (86.2%) | < 0.001 |
| Any nipple length ≥ 7 mm | 62 (59%) | 187 (89%) | < 0.001 |
| Right nipple width ± SD (mm) | 13.6 ± 1.5 | 14.2 ± 1.7 | < 0.001 |
| Left nipple width ± SD (mm) | 13.5 ± 1.4 | 14.1 ± 2.0 | 0.009 |
| Mean nipple width ± SD (mm) | 13.5 ± 1.4 | 14.2 ± 1.8 | 0.002 |
| LATCH score ≥ 7 | 61 (58.1%) | 116 (55.2%) | 0.631 |

SD: standard deviation

Relationship between nipple length and successful breastfeeding at day 3 postpartum is shown in Table 4. For all women, nipple length of ≥ 7 mm significantly increased the success in

breastfeeding at postpartum day 3 (63.1% vs. 30.3%, $p < 0.001$). Similar associations were also observed in both teenage and adult mothers (71% vs. 39.5%, $p = 0.001$ and 60.4% vs. 13%, $p < 0.001$, respectively).

Table 4. Relationship between nipple length and LATCH scores.

| Characteristics | LATCH score ≥ 7 | LATCH score < 7 | p value |
|---------------------|----------------------|-------------------|---------|
| All women | | | |
| Any nipple length | | | < 0.001 |
| ≥ 7 mm (N=249) | 157 (63.1%) | 92 (36.9%) | |
| < 7 mm (N=66) | 20 (30.3%) | 46 (69.7%) | |
| Teenage | | | |
| Any nipple length | | | 0.001 |
| ≥ 7 mm (N=62) | 44 (71%) | 18 (29%) | |
| < 7 mm (N=43) | 17 (39.5%) | 26 (60.5%) | |
| Adult | | | |
| Any nipple length | | | < 0.001 |
| ≥ 7 mm (N=187) | 113 (60.4%) | 74 (39.6%) | |
| < 7 mm (N=23) | 3 (13%) | 20 (87%) | |

Discussion

Breastfeeding problems are more common in teenage mothers. Maternal age has been reported to be directly associated with the duration of breastfeeding⁽⁶⁾. Many previous studies have demonstrated that teenage mothers were less likely to breastfeed than older mothers and have a more rapid discontinuation rate⁽⁷⁻⁹⁾. A previous study in Thailand have shown that teenage mothers were significantly less likely to achieve successful breastfeeding at day 2 postpartum compared to adult mothers⁽¹⁰⁾.

Previous studies showed that nipple length was a strong predictor to determine the successful achievement of breastfeeding at day 3 postpartum. Nipple length of ≥ 7 mm has been reported to facilitate successful breastfeeding^(6,7). The results of this study showed that teenage had significantly shorter nipple length compared to adult mothers. A previous study showed that measurements of nipple-areolar complex

were larger among older than younger women but teenage women were not included in such study⁽¹³⁾. Shorter nipple length among teenage mothers have also been reported among Thai women but without statistical significance⁽¹⁰⁾. There has been no study that specifically aimed to compare nipple characteristics between teenage and adult mothers. In this study, only 59% of teenage mothers had nipple length of ≥ 7 mm compared to 89% among adult mothers. Although there was a report that nipple length and width, and areolar width increase as pregnancy progresses⁽¹⁵⁾, it is possible that maturity of nipple among teenagers is still inadequate in terms of breastfeeding readiness compared to adult mothers.

In terms of successful breastfeeding as assessed by LATCH scores, there was no significant difference between teenage and adult mothers at day 3 postpartum (58.1% vs. 55.2%, $p = 0.631$). However, further analysis showed that nipple length of ≥ 7 mm

significantly increased breastfeeding success in all mothers, teenage, and adult mothers (63.1% vs. 30.3%, $p < 0.001$; 71% vs. 39.5%, $p = 0.001$; and 60.4% vs. 13%, $p < 0.001$, respectively). This supports that nipple length is an important factor for early success in breastfeeding regardless of age group.

As shorter nipple length was more common in teenage mothers. This issue should be emphasized in clinical practice that all pregnant women should receive breast and nipple examination during antenatal care. Correction of short nipple length should be initiated during pregnancy to better prepare the women for breastfeeding and enhance the success. Women with short nipple should be offered a tool to improve their nipple length. For women with non-protractile nipple, breast shell and Hoffman's exercise have been evaluated for nipple corrections but the results did not show significant benefits^(16,17). On the other hand, a more recent study showed that breast cup has been evaluated for its success⁽¹⁸⁾. However, benefits of these tools on short nipple should be further evaluated.

Other factors significantly associated with successful breastfeeding among adolescent mothers included intention to breastfeed, prenatal classes attendance, higher socio-economic status, having spontaneous vaginal delivery, and not having any preexisting health problems or obstetrical complications^(6,19). A previous study reported that only knowledge of the benefits of breastfeeding was not sufficient to result in breastfeeding⁽⁸⁾.

Some limitations of this study needs to be addressed. Evaluation for successful breastfeeding by LATCH scores was subjective and the nurses who evaluated the scores were not blinded for mother's age and nipple length. However, LATCH scores evaluation is used routinely in our institution that nurses in postpartum ward are familiar and have experiences in the evaluation. Some of the women in both groups might have some advice on nipple preparation and correction during their antenatal care and could confound the postpartum nipple characteristics. In terms of successful breastfeeding, long-term rates of exclusive breastfeeding were not evaluated and there were other factors related

to breastfeeding that might be unmeasurable, such as infant's factors (e.g., suckling), technic (e.g., latching on), psychological factors, social support, knowledge, etc. In addition, there might be limited power in subgroup analysis. Further, large studies are still needed to evaluate the long-term effect of short nipple on breastfeeding. Tools for nipple corrections during antenatal care should also be further evaluated for their benefits.

Conclusion

Teenage had significantly shorter and narrower nipples than adult mothers. Nipple length of ≥ 7 mm was significantly more common among adult than teenage mothers. Pregnant women with nipple length of ≥ 7 mm on at least one side significantly increased the chance of success in breastfeeding at day 3 postpartum regardless of age group.

Potential conflicts of interest

The authors declare no conflict of interest.

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