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The Use of the Infant Breastfeeding Assessment Tool among High Risk Mothers for the Prediction of Exclusive Breastfeeding for Six Weeks Postpartum

Pawin Puapornpong, M.D.,*
Suttha Hamontri, M.D.,*
Siriwan Srisuwan, M.D.,*
Sukwadee Ketsuwan,**
Sinutchanan Wongin**

** Department of Obstetrics and Gynecology, Faculty of Medicine, Srinakharinwirot University, Nakhon Nayok, Thailand*
*** Obstetric and Gynecology Nursing Department, HRH Princess Maha Chakri Sirindhorn Medical Center, Nakhon Nayok, Thailand*

ABSTRACT

Objectives: To find the cut-off point, sensitivity and specificity of the infant breastfeeding assessment tool to predict breastfeeding among high risk mother during six weeks postpartum.

Materials and Methods: The infant breastfeeding assessment tool was translated to Thai and the validity and reliability was evaluated. Postpartum mothers who delivered at the HRH Princess Maha Chakri Sririndhorn medical center in the Nakhon Nayok province during the period of July 2014 to June 2015 and had high risk for early breastfeeding cessation were included in this study. The mothers and babies were assessed by the infant breastfeeding assessment tool at 16-24 hours postpartum. Following discharge; the exclusive breastfeeding data at the first, second and sixth weeks postpartum was collected by telephone follow-up. The cut-off point, sensitivity and specificity of the infant breastfeeding assessment tool used for exclusive breastfeeding predictions were calculated by the receiver operating characteristic curve.

Results: Three hundred and sixty-one high risk mothers for early breastfeeding cessation; teenage mothers, mothers with cesarean deliveries and obese mothers were recruited in this study. The validity of the infant breastfeeding assessment tool was 93.2%. The Cronbach alpha coefficient was 82.7. The cut-off point to predict exclusive breastfeeding at the first, second and sixth weeks postpartum was determined to be 8 points. The sensitivity and specificity of tests for the first, second and sixth week exclusive breastfeeding predictions were 88.9, 88.9, 90.5% and 72.3, 72.0, 74.6%, respectively. The best prediction accuracy was 73.0 percent at the first week postpartum. The relative risk during six-week postpartum period for early breastfeeding cessation between the mothers and babies who had the infant breastfeeding assessment tool scores of less than and greater than 8 points were 1.7-2.1.

Conclusion: The infant breastfeeding assessment tool can be used for the prediction of exclusive breastfeeding during the first six weeks postpartum. The accuracy of the test was best at the first week postpartum.

Keywords: the infant breastfeeding assessment tool, exclusive breastfeeding, prediction.

Correspondence to: *Pawin Puapornpong, M.D., Department of Obstetrics& Gynecology, Faculty of Medicine, Srinakharinwirot University, 62 Moo 7 Ongkharak, Nakhon Nayok, 26120, Thailand*
E-mail: pawinppp@yahoo.com

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การใช้แบบประเมินการให้นมทารกในมารดากลุ่มเสี่ยง เพื่อทำนายการเลี้ยงลูกด้วยนมแม่ในช่วงหกสัปดาห์หลังคลอด

ภาวิน พัวพรพงษ์, สุทธา หามนตรี, สิริวรรณ ศรีสุวรรณ, สุขวดี เกษสุวรรณ, ศิณัฐชานันท์ วงษ์อินทร์

บทคัดย่อ

วัตถุประสงค์*: เพื่อศึกษาหาจุดตัดของแบบประเมินการให้นมทารกในการทำนายการเลี้ยงลูกด้วยนมแม่อย่างเดียวในช่วงหกสัปดาห์หลังคลอด*

วัสดุและวิธีการ*: ผู้วิจัยได้ทำการแปลแบบประเมินการให้นมทารกเป็นภาษาไทย แล้วทดสอบความตรงโดยใช้ผู้เชี่ยวชาญ และนำแบบประเมินไปทดสอบความเชื่อมั่น จากนั้นนำแบบประเมินการให้นมทารกไปประเมินมารดาครรภ์เดี่ยวหลังคลอดช่วง 16-24 ชั่วโมงที่ศูนย์การแพทย์สมเด็จพระเทพรัตนราชสุดา ฯ สยามบรมราชกุมารีตั้งแต่ปี 2557 ถึง 2558 จำนวนทั้งสิ้น 862 ราย โดยในจำนวนนี้มีมารดาที่มีความเสี่ยงที่จะหยุดให้นมในระยะแรก ได้แก่ มารดาวัยรุ่น มารดาที่ผ่าตัดคลอด และมารดาที่มีภาวะอ้วนจำนวน 361 ราย และติดตามเรื่องการเลี้ยงลูกด้วยนมแม่หลังคลอดที่สัปดาห์ที่ 1, 2 และ 6 ด้วยการใช้โทรศัพท์ เก็บข้อมูลพื้นฐาน ข้อมูลการเลี้ยงลูกด้วยนมแม่อย่างเดียว และนำมาวิเคราะห์ผลโดยใช้กราฟ receiver operating characteristic*

ผลการศึกษา*: พบว่าความตรงของแบบประเมินร้อยละ 93.8 และความเชื่อมั่นของแบบประเมินจากค่าสัมประสิทธิ์ครอนบาคร้อยละ 82.7 แบบประเมินการให้นมทารกมีจุดตัดที่ 8 คะแนน สามารถใช้ทำนายการเลี้ยงลูกด้วยนมแม่อย่างเดียวในช่วงหกสัปดาห์หลังคลอด โดยมีความไวร้อยละ 88.9-90.5 ความจำเพาะ 72.0-74.6 โดยจะมีความถูกต้องในการทำนายสูงที่สุดที่สัปดาห์ที่ 1 (ร้อยละ 73.1) และเมื่อเทียบมารดากลุ่มเสี่ยงที่มีคะแนนจากแบบประเมินการให้นมทารกที่น้อยกว่า 8 จะมีความเสี่ยงในการหยุดการเลี้ยงลูกด้วยนมแม่อย่างเดียวในช่วงหกสัปดาห์สูง 1.7-2.1 เท่าเมื่อเทียบกับมารดาที่มีคะแนนการประเมินการให้นมทารกมากกว่า 8*

สรุป*: แบบประเมินการให้นมทารกสามารถใช้ทำนายการเลี้ยงลูกด้วยนมแม่อย่างเดียวในช่วงหกสัปดาห์ได้ โดยมีจุดตัดที่เหมาะสมคือ 8 คะแนน โดยความถูกต้องของการทำนายจะสูงสุดในสัปดาห์ที่ 1 หลังคลอด*

คำสำคัญ*: แบบประเมินการให้นมทารก, การเลี้ยงลูกด้วยนมแม่อย่างเดียว, การทำนาย*

Introduction

Regarding breastfeeding support, one of the crucial things is breastfeeding assessment. The infant breastfeeding assessment tool is one of the most frequently used and acceptable assessment tools[1-4]. This tool is easily used. The inter-rater reliability continues to score high (91%)[5]. There are four parameters that include; the readiness to feed, rooting, fixating, and suckling patterns. Each parameter has a range of 0-3 points. The total score can total up to 12 points. The interpretation of scores are; the effectiveness of infant feeding is 'good' if the assessment score totals 10-12 points, 'moderate' at 7-9 points and 'poor' at 0-6 points.

The high risks for mothers with early breastfeeding cessation are; mothers with cesarean deliveries, teenage mothers and obese mothers[6-11]. If the health professional could predict early breastfeeding cessation for the high risk mothers, appropiate follow-up with close monitoring and counseling can raise the breastfeeding rates. Assessment tools that could to be used as screening tests will help the health professionals in follow-up planning and improvement of exclusive breastfeeding rates. We were interested in studying the use of the infant breastfeeding assessment tool as a screening test to determine the primary outcomes for the cut-off points, sensitivity and specificity for the exclusive breastfeeding rate predictions at the first, second and the sixth weeks postpartum. The comparisons between the exclusive breastfeeding data for high and low risk groups were evaluated for secondary outcomes.

Materials and Methods

This study is a diagnostic test. The infant breastfeeding assessment tool was translated to Thai. The validity test was evaluated by four breastfeeding specialists following the translation. The reliability test was evaluated from twenty cases from a pilot study. The infant breastfeeding assessment tool was then used for breastfeeding assessment in the singleton postpartum women who delivered without complications. Two nurses, who had passed an infant breastfeeding assessment tool training program that had included two hours of lecture and two hours of practice, were the infant breastfeeding assessment tool auditors. The nurses assessed the mothers and infants at 16-24 hours postpartum. The demographic data and factors that had effects on exclusive breastfeeding, blood loss and nipple lengths were recorded[12]. Following discharge, telephone follow-ups were used for collecting breastfeeding data at six weeks postpartum. The mothers' and infants' data were categorized into high and low risk groups. The high risk group included the mothers delivering by cesarean section, teen and obese mothers. The remaining cases were classified into the low risk group. The data of the high risk group were evaluated for the primary outcomes by the receiver operating characteristic (ROC) curve, the cut-off point, the sensitivity and specificity for the breastfeeding predictions done at the first, second and sixth weeks postpartum. The exclusive breastfeeding data of the low risk group were compared with that of the high risk group for the secondary outcomes.

This study was done in the Nakhon Nayok province which is a rural area in the central part of Thailand. The data was collected during the period from July, 2014 to June, 2015 at the HRH Princess Maha Chakri Sririndhorn Medical Center which has a 'baby friendly' hospital policy. A routine practice in the postpartum ward is breastfeeding education. The one-hour course in breastfeeding includes latching and is taught on the first day postpartum. One nurse teaches a group of 3-5 mothers. The mothers are encouraged to stimulate their infants to feed 8-12 times per day. At the second day postpartum, the mothers and infants are discharged if they had shown no complications. Prior to discharge, the mother's telephone number is confirmed and the breastfeeding-recording notebook is given to the mother with an explanation of the "breastfeeding type" definition, postpartum symptoms and complications which may require further clinical counseling.

Singleton postpartum women who have delivered without complications (i.e. multiple pregnancies, preeclampsia, antepartum hemorrhage and preterm

labor) and who intend to breastfeed for at least six months were recruited. Their infants had birth weights of more than 2,500 grams and were without complications. The mothers suffered no acute postpartum hemorrhages and had no contraindications to breastfeeding. This included any mothers who were HIV positive.

Mothers whose infants were diagnosed with galactosemia were excluded from this study.

Before the study, we had collected data from twenty cases of a previous pilot study and that was done and has analyzed the sensitivity and specificity of the infant breastfeeding assessment tool. The sensitivity and specificity were 0.80 and 0.70, respectively. We set a value of 6% as an acceptable error of sensitivity. The rate of exclusive breastfeeding was 52% and the p value was at 0.05. The calculated a sample size of 328 cases[13]. The subjects were summed with an additional 15% for data loss. The total samples collected were 361.

Infant breastfeeding assessment tool

The infant breastfeeding assessment tool has been translated into a Thai version. The parameters were assessed and these include; readiness to feed, rooting, fixing, and sucking patterns. The criteria of the "readiness to feed" scores; three if the infant starts to feed readily without effort; two if the infant needs mild stimulation to begin feeding; one if infant needs more stimulation to rouse and begin feeding; zero if the infant cannot be aroused. The criteria of 'rooting' scores have been set as; three if the infant roots effectively at once, two if the infant needs some coaxing, prompting or encouragement, one if the infant roots poorly even with coaxing, zero if the infant does not attempt to root. The criteria of 'fixing' scores are; three if the infant feeds immediately, two if the infant takes 3-10 minutes to start, one when the infant takes over 10 minutes to start, zero if the infant does not feed. The criteria of 'sucking pattern' scores have been set as; three if the infant sucks well on both breasts, two if the infant sucks intermittently but needs encouragement, one if the infant sucks weakly or sucks intermittent for short periods, zero if the infant does not suck. The infant breastfeeding assessment scores have a possible total of 12 points.

The outcomes of this study were to determine the rates of exclusive breastfeeding and breastfeeding. Exclusive breastfeeding is defined as no other food or drink (including water) other than breast milk. This includes milk expressed. The infant is able to receive drops and syrups of vitamins, minerals, medicine and other oral rehydration salt (ORS).

The exclusive breastfeeding rate data at the first, second and sixth weeks postpartum were collected by follow-up via the telephone. The mother was taught to record breastfeedings and any fluids or foods given to the infant in a breastfeeding notebook that was given to the mother prior to discharge. Exclusive breastfeeding results were collected from the mother consistent with the established definitions.

This study has been approved by The Ethics committee of the Srinakharinwirot University, Faculty of Medicine.

Statistical analysis

Demographic data were reported in means and percentages. We have analyzed the validity by a breastfeeding specialist's assessment of the infant breastfeeding assessment tool. The reliability was calculated as a Cronbach's coefficient. A cut-off point and ROC curve have been used to predict the exclusive breastfeeding rates at the first, second and sixth weeks postpartum. The comparison of exclusive breastfeeding rates between both the high and low risk groups were analyzed using the chi-square. The comparison of exclusive breastfeeding rates between the infants who had the infant breastfeeding assessment tool scores, greater and less than the cut-off point of 8, were analyzed by chi-square, relative risk and a 95% confidence interval. A p value of less than 0.05 was considered statistically significant. Statistical analysis was performed using SPSS, IBM Singapore Pte. Ltd (Registration No.1975-01566-C).

Results

The validity and reliability of the infant breastfeeding assessment tool were 93.8% and

82.7%, respectively. The number of postpartum women that had enrolled in our research project totaled 862. There were no mothers whose infants were diagnosed with galactosemia. High risk mothers totaled 361 cases (41.9%). The details of the demographic data of the high risk group are shown in Table 1. In the high risk group, the percentage of the mothers with cesarean sections, teenage mothers and obese mothers were 83.7, 25.2 and 34.4, respectively.

Table 1. The demographic data of the high risk group.

The mother and infant's data	Mean and percentage
The number of cases	361
the teenage mother n (%)	91 (25.2)
the mother with cesarean delivery n (%)	302 (83.7)
the obese mother n (%)	124 (34.4)
Age (year)	25.5 ± 6.5
Para n (%)	
primipara	165 (45.7)
multipara	196 (54.3)
Gestational age (weeks)	38.9 ± 1.1
Mode of delivery n (%)	
vagina delivery	59 (16.3)
cesarean delivery	302 (83.7)
Nipple length (centimeter)	1.0 ± 0.3
Blood loss (millimeter)	622.6 ± 255.4
Body mass index (kg/m2)	26.2 ± 12.8
Birth weight (gram)	3,086.0 ± 501.8

The exclusive breastfeeding rates for the high risk group were 74.2, 68.5 and 51.9% at the first, second and sixth weeks postpartum, respectively. When the exclusive breastfeeding rates of the high risk group were compared with the low risk group, there were statistically significant differences. The details are shown in Table 2.

Table 2. The comparison of the exclusive breastfeeding rates between the high and low risk groups at the first, second and sixth week postpartum.

The time to collect data	The number of samples		Exclusive breastfeeding rate		p value
	High risk group	Low risk group	High risk group	Low risk group	
1st week	357	499	265 (74.2)	422 (84.6)	$p < 0.001$
2nd week	356	497	244 (68.5)	382 (76.9)	$p < 0.007$
6th week	349	490	181 (51.9)	291 (59.4)	$p < 0.03$

When the data was analyzed by the ROC curve, the cut-off point of the infant breastfeeding assessment tool's score was 8 points at the first, second and sixth weeks postpartum. At the first week postpartum, the accuracy of the test was 73.1 and the sensitive and specificity were 88.9% and

72.3%, respectively. The area under curve was 0.66. At the second week postpartum, the accuracy of the test was 69.7 and the sensitive and specificity were 88.9% and 72.0%, respectively. The area under curve was 0.68. At the sixth week postpartum, the accuracy of the test was 59.3 and the sensitive and specificity were 90.5% and 74.6%, respectively. The area under curve was 0.65. The sensitivity and specificity of breastfeeding prediction at six weeks postpartum were 90.7% and 18.8%, respectively. The area under curve was 0.88. The ROC curves of the exclusive breastfeeding predictions at the first, second and sixth weeks are shown in figures 1, 2 and 3.

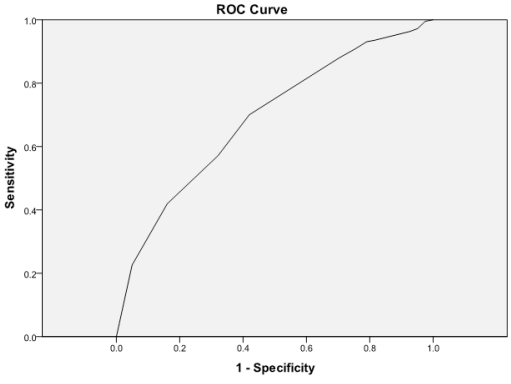

Fig. 1. The ROC curve of the exclusive breastfeeding prediction at the first week postpartum

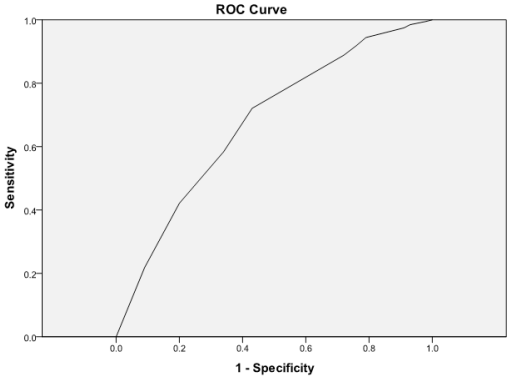

Fig. 2. The ROC curve of the exclusive breastfeeding prediction at the second week postpartum

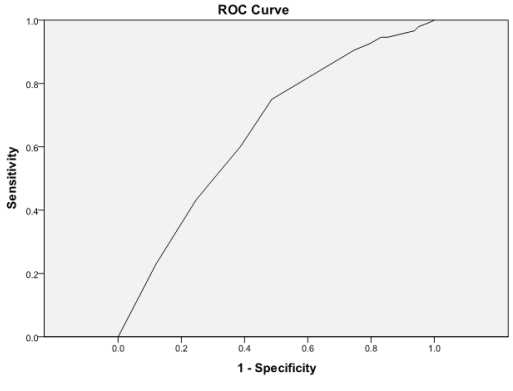

Fig. 3. The ROC curve of the exclusive breastfeeding prediction at the sixth week postpartum

We have categorized the high risk mothers into two groups using the cut-off point of 8 in the infant breastfeeding assessment tool. When exclusive breastfeeding data was compared between the two groups, the mothers who had scored less than 8 had a relative risk of early breastfeeding cessation at 2.1 times more than the mothers with the score of greater than 8 at the first week postpartum. There were 2.0 and 1.7 times of a relative risk at the second and sixth week postpartum, respectively. The details of relative risks are shown in Table 3.

Table 3. The relative risks of early breastfeeding cessation between the mothers who had an infant breastfeeding score more or less than 8 at the first, second and sixth week postpartum.

The time to collect data	The relative risk of early breastfeeding cessation between groups that scored IBFAT less and more than 8	95% confidence interval
1st week	2.1	1.5-3.0
2nd week	2.0	1.5-2.7
6th week	1.7	1.4-2.1

IBFAT= infant breastfeeding assessment tool

Discussion

From the demographic data of the mothers and infants, the mothers with cesarean deliveries were in the high risk group (83.7%). The data was compatible with the cesarean section rate that had a tendency to rise[14]. Cesarean section deliveries had negative effects on exclusive breastfeeding. The comparison of exclusive breastfeeding rates between low and high risk mothers have found that there were statistically significant differences at the first, second and sixth weeks postpartum in this study.

The cut-off point for exclusive breastfeeding predictions at the first, second and sixth weeks postpartum were at 8 points. The sensitivity of the test was high (88.9-90.5%). The best accuracy of the test was found at the first week postpartum (73.1%). The accuracy of the tests decreased over time and it was lowest at the sixth week. The application of the infant breastfeeding assessment tool was its use as a screening tool and it could be used for the prediction of exclusive breastfeeding in the first few weeks. As the few early weeks of postpartum are known as the golden weeks for the breastfeeding support, in a study from Furman et al, the summary scores of the infant breastfeeding assessment tool had significantly correlated with breast milk intake volume ($r = 0.651$, $p < 0.001$)[1]. If the scores were low, the mothers and infants may have some problems with low milk intake volumes. Similarly, in the cases where the infant breastfeeding assessment tool scores were less than 8, the mothers have shown 2.1 times for a relative risk of early breastfeeding cessation. It is necessary for the health professional to have close follow-ups, effective breastfeeding counseling and support plans. This may help the mothers in the continuation of exclusive breastfeeding.

In this study, we have chosen to study the infant breastfeeding assessment tool as a screening test for early breastfeeding cessation in high risk mothers (mothers with cesarean deliveries, teenage mothers and obese mothers). The high risk mothers' incidence of early breastfeeding cessation was higher than seen in the low risk mothers. As a result, the screening test among high risk mothers was beneficent and likely to be cost-effective. However, the cost-effectiveness research of this test should be further evaluated.

When the breastfeeding predictions of the

infant breastfeeding assessment scores are compared with LATCH scores, the sensitivity and specificity of the LATCH scores for breastfeeding predictions were 75.0 and 63.2% at the sixth week postpartum as taken from the study of Kumar et al[15]. The sensitivity and specificity of LATCH scores were less than that of the sensitivity and specificity of the infant breastfeeding assessment tool. The sensitivity and specificity of infant breastfeeding assessment tool were 90.5 and 74.6, respectively. The positive and significant correlations between the LATCH scores and the infant breastfeeding assessment tool scores were described by a study done by Altuntas et al[2]. However, the outcomes and sample characteristics of the studies had shown some differences; the breastfeeding outcome was evaluated in the study of Kumar et al[15], but the exclusive breastfeeding was evaluated in this study. The sample characteristic was of normal postpartum women in the study of Kumar et al, but the sample characteristic in this study regards high risk mothers for early breastfeeding cessation. The use of LATCH scores for exclusive breastfeeding prediction in high risk mothers is likely consistent to the infant breastfeeding assessment scores.

The strength of this study was the explanation of the definition of exclusive breastfeeding, daily-recorded infant feeding advice and the mother's telephone number that had been confirmed prior to the mother's discharge. The percentage of the mother's contact at the sixth week was high (96.7%). However, the factors which identified the high risk group in this study were solely the mothers' factors. The study in the group of infants' factors including preterm and low birth weight should be further examined.

Conclusion

The infant breastfeeding assessment tool can be used as screening test for exclusive breastfeeding predictions. The cut-off point has been set as 8 points. The sensitivity and specificity of test during six-week postpartum period were 88.9-90.5 and 72.0-74.6, respectively.

Acknowledgments

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Potential conflicts of interest

The authors declare no conflict of interest.

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