The Correlation of Lactating Women's Breast Size and Breast Milk Production

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ABSTRACT

Objective: To evaluate the correlation between lactating women's breast size and breast milk production.

Methods: 53 normal primiparous women with neither breastfeeding problems nor having drugs that affected milk production who delivered vaginally at Siriraj Hospital, Bangkok, Thailand were enrolled. On the 3rd day after delivery, breast size and breast milk volume were recorded by the same investigator at 3 hr after the last breastfeeding.

Results: The means of breast size and breast milk volume in this study were 13.5 ± 3.7 cm and 47.8 ± 18.3 ml, respectively. Regarding to the Pearson correlation test, breast milk volume had no significant correlation with breast size (r_s= -0.112, $p > 0.05$), but showed a negative correlation with the maternal age (r_s= -0.27, $p < 0.05$).

Conclusion: There is no significant correlation between breast milk volume and breast size. The small breast size woman should be counseled and reassured to get more confidence in breast feeding.

Keywords: Breast feeding; breast milk volume; breast size; correlation

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Humans, the most developed mammal, spend the highest vulnerable period of life during infancy and childhood depending completely on maternal vigilant care in order to survive until reproductive age. Nutrition, the essential nutrient that suits to the human growth is different in each particular period of life. The fetus receives blood supply enriched with nutrients, growth factors, immunity and oxygen from its mother's circulation via the umbilical vessels. To our best knowledge, there is no such food that is comparable to the human breast milk in terms of nutritional value and immunity. Human breast milk contains several important ingredients such as growth factors that promote neonatal growth, and high quality of lipids which are vital to early brain development. In terms of immunization, the specific immunity (secretory immunoglobulin) in breast milk can protect the newborn from gastrointestinal and respiratory tract infections. Skin to skin contact during breastfeeding can directly stimulate mother to infant bonding and also accelerate neonatal neuronal development. As a result, both the intelligence quotient (IQ) and the emotional quotient (EQ) of the newborn have been promoted. Therefore, the World Health Organization (WHO) and UNICEF have set the international policy to encourage exclusive breast feeding for at least 6 months after delivery and continue breast milk feeding up until the second year of life.

The key to the success of breast feeding includes teaching the mother to understand the anatomy of the breast, the physiology of lactation and how to practice the right method of breast feeding. Furthermore, the mother needs to know what may affect breast milk production and how to maintain it for a long time. The correlation between maternal breast size and milk production is one of the most common problems concerning in Asian pregnant women due to their relatively smaller breast size than those of the Westerners.

In 1999, Kent JC and co-workers[1] found that breast volume correlated well with milk production. The study revealed that the average output of 24 hour milk production was 435 ± 20 ml and remained unchanged until 6 months after delivery then significantly decreased after 9 to 12 months. Meanwhile, the breast volume increased by an average of 190 ± 13 ml. and began to decrease after 9 to 12 months and returned to the pre-pregnancy size by the 15th month. The study of Daly SEJ, et al[2] using a computer program to calculate breast size revealed that the total amount of milk existing in the breast did not represent the quantity of milk taken by the infant during breastfeeding. Thus far there has been no study that revealed the correlation between breast size and breast milk production.

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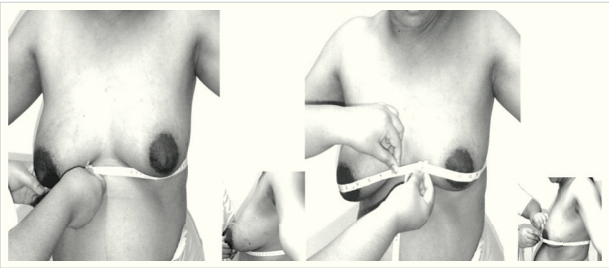

Fig 1. 1A) Underband measurement, 1B) Overbust measurement.

The objective of this research is to find the correlation between the breast size and milk production in the early postpartum period among the Thai population. The data from this study will become useful knowledge for counseling and reassuring the pregnant women who desire to have effective breast feeding for their infants.

MATERIALS AND METHODS

A cross-sectional study was conducted at Siriraj Hospital with the approval of the institutional ethics committee. A total of 53 women with primipara singleton who had their term deliveries at Siriraj Hospital between August and October 2006 were enrolled. The inclusion criteria consisted of term delivery with healthy infants, maternal age between 15 and 45 years, exclusive breast feeding on demand and no history of smoking or alcohol drinking. The exclusion criteria included any maternal medication which affected the breast milk production such as domperidone, detoclopramide, sulpiride, chlorpromazine, estrogen, levodopa, bromocriptine, pseudoephrindine, cabergoline, alcohol, ergotamine, bupropione, lisuride, diuretics and testosterone.[3] Furthermore, mothers with medical, surgical, obstetric complication or having abnormal nipples, breast engorgement, and separated newborns were also excluded.

After well informed consent, all participants were measured for their breast size with the standard method described by Greenbaum AR[4] and Hasenburg A[5] (Fig 1). Two measurements are made around the thorax with the measuring tape holding firmly but not too tight. The values are rounded up to the next whole number. The first measurement is circumferentially under the breasts at the level of the inframammary fold—the underband (Fig 1A). The second measurement is around the back and breasts at their most prominent point (some advocate with the breasts lifted by their owner to the level at which she desires them to rest in her bra)—the overbust (Fig 1B). The breast size is determined in centimeters using the difference between the overbust and the underband distance. On the 3rd day of postpartum period, all lactating women were measured around the breast size at 3 hr after their last feeding. Mothers who had problem in breast feeding were not enrolled into the study. Breast milk production was then evaluated by collecting breast milk from both sides using the electrical breast pump (Electric Breast Pump SPECTRA2 by UZINMEDICARE CO. Korea 2004). To minimize the inter-observer variation, breast size measurement and breast milk collection were performed by only one researcher using the same quality of instruments.

All measuring data were collected for statistical analysis to assess the correlation between the breast size and milk volume using Pearson's correlation. The demographic information such as education level, income, duration of intended breast feeding, contraception method, used medication, route of delivery, pre-pregnancy breast size and body mass index (BMI) were also examined to identify the relationship with breast milk production.

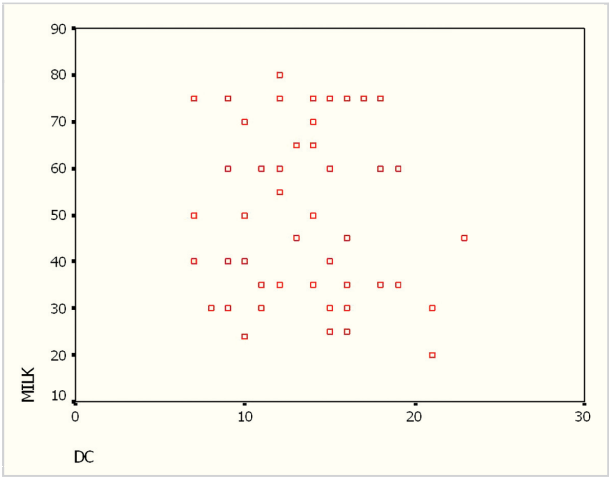

Fig 2. Correlation between breast milk volume and breast size (r_s = - 0.112; p-value = 0.409).

RESULTS

The demographic data revealed that the mean values and ranges of maternal age, gestational age at delivery and infant birth weight were 21.6 ± 4.1 (15-31) years, 38.8 ± 1.3 (37-41) weeks and 2,960 ± 309 grams, respectively (Table 1). The average duration of intended breast feeding was 5.58 (1-12) months. The most common contraception method used was depot medoxypro-gesterone acetate (DMPA) injection. The mean of breast milk collecting time was 64.94 (40-96) hr after delivery. The measurement of breast size and breast milk volume showed the mean values of 13.5 ± 3.7 cm and 47.8 ± 18.3 ml.

The statistical analysis showed no correlation between the breast size and milk volume (correlation coefficient -0.112, p=0.409; Table 2). Regarding other factors including chest circumference, overbust circumference and BMI, none correlated well with breast milk volume with the correlation coefficient values of 0.226 (p=0.104), 0.143 (p=0.306) and 0.234 (p= 0.126), respectively. However, the maternal age significantly correlates with the breast milk volume (correlation coefficient -0.247, p=0.047)

To study whether there was any difference in breast-feeding adequacy among the participants; they were therefore classified into bigbreast size (>15 cm) and small breast size (≤15 cm) groups. Breastfeeding adequacy was determined based on the neonatal daily calorie requirement. The data showed that there were 31 bigbreast and 21 small breasts of lactating women and the adequacy was similar in both groups with 70-80% of achievement. (Table 3)

TABLE 1. Demographic data of all lactating women (N = 53).

Characteristic Data	Mean (± SD)
Maternal Age (years)	21.60 ± 4.18
Gestational age (weeks)	38.83 ± 1.34
Infant birth weight (grams)	2,960.00 ± 309.5
Time of data collection (hours after delivery)	64.9 ± 13.7
Duration of intended breast feeding (months)	5.52
Breast size (cm)	13.5 ± 3.7
Breast milk volume (ml)	49 ± 18

TABLE 2. Correlation between maternal factors and milk volume.

Factors	Pearson correlation	Significant (2- tailed)
Breast size	-0.112	0.409
Chest circumference	0.226	0.104
Nipple size	0.143	0.306
BMI	0.234	0.126
Maternal age	-0.274	0.047

TABLE 3. Adequacy of breastfeeding between big and small breast size mothers[a].

Group	Adequate	Inadequate
Big breast[b] (31)	23 (74.2%)	8 (25.8%)
Small breast[c] (22)	19 (86.4%)	3 (13.6%)

a Adequacy of breastfeeding was calculated from daily requirement of the newborn

b Big breast is defined when the size is > 15 cm (cup DD)

c small breast is defined when the size is ≤ 15 cm.

DISCUSSION

Regarding the breast size measurement, there are many techniques which have been proposed for instance 3-D computed evaluation[6], photographs of the Moire topographs and 3D coordinates of transverse section through the breast.[7] However, the aforementioned methods are quite sophisticated, which required special expensive equipment and medical personnel. Furthermore, the patients are unable to assess their breast size by themselves. To make it more practical, the technique used in this study was derived from the method recommended by Greenbaum AR, et al.[4] In the study, post mammoplasty patients had simply evaluated their breast size by calculating the difference between the overburst and underband diameter. Although the obtained value did not represent the actual volume of the breast but it was in fact comprehensive, reproducible and practical in the real situation.

The study from Neville[8] showed that breast milk production was minimal on the 1st and 2nd day and reached the maximum on day 5 then remained unchanged thereafter. However, the length of stay in our hospital is about 3-4 days by average. Hence, the breast milk volume evaluation was conducted on the 3rd or 4th day after delivery in this research. Concerning the method of breast milk collection, Neville and coworkers[8] used the test–weighing procedure which involved determining the difference between the pre and post feeding weight of the infant. Nonetheless, the value may vary depending on the ability of the newborns to suck from their maternal breasts. Thus, the electrical breast pump was applied to evaluate the milk production. In this study, breastfeeding adequacy that may affect milk production has been also analyzed with the similar achievement in both small and large breast groups.

The main outcome clearly showed no correlation between the breast size and milk production. Anatomically, each mature mammary gland contains 15-20 lobes that radiate from the nipple and are separated from one another by varying amounts of fat. Each lobe is composed of several lobules, which are made up of large numbers of alveoli. The aleveolar secretory epithelium synthesizes and is responsible for breast milk production. In fact, breast size depends on the quantity of adipose tissue adjacent to the breast parenchyma without any influence to the milk production. This information is extremely helpful for reassuring the pregnant women with small breast size to have more confidence in breast feeding.[9]

Interestingly, maternal age had a negative effect on the breast milk volume. Therefore, counseling in elderly mothers needs to inform of the risk factors that may effect milk production including the frequency and duration of the breast feeding, maternal nutrition and relaxation. Due to the time constraint, the further investigation should focus on the milk production rate in the advanced maternal age group.

In conclusion, breast milk production showed no correlation with breast size but presented negative correlation with maternal age. Despite having small breast size, the data is helpful for reassuring the pregnant women to have more confidence in breast feeding.

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