Original article

Hormonal images related nursing mothers breast cancer risk in Semarang

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Abstract

Background: A mother who does not breastfeed or unable to breastfeed has a high risk to get breast cancer. Breastfeeding quality in women is influenced by prolactin and oxytocin. The prolactin activates breastmilk production while oxytocin is an important factor in breast milk releasing. Currently, the result of 6-month exclusive breastfeeding program is still below the national target. Therefore, the procedures to assess breastfeeding potential by understanding the hormonal profile should be taken immediately after parturition period. ***Methods:*** The study was conducted to 32 first-day postpartum women in the Semarang City Hospital. The sampling method was a purposive sampling. The blood samples were taken 10 hours after postpartum period. The serum analysis used ELISA techniques to measure the oxytocin, prolactin and beta-endorphin hormones. ***Results*:** The study showed that the breastfeeding mothers are in the age of 15-43 years old. Most of them are working-postpartum-mothers (71.9%). The average oxytocin levels of this sample group is 346 pg/ml, while the average prolactin level in of 245.36 ng/ml, and the average beta-endorphin level is 190.41. There is a correlation between the frequency of breastfeeding with prolactin level ($p = 0.001$). Moreover, there is also a correlation between breast-milk production with the prolactin ($p = 0.005$). Similarly, there is a correlation between beta-endorphin hormone with oxytocin ($p = 0.000$). ***Conclusion*:** Breast cancer risk can be reduced through breastfeeding at the age of less 35 years old. Every breastfeeding mother should regularly release breastmilk through breastfeeding as well as milking.

Keyword: oxytocin; prolactin; beta-endorphin; postpartum mothers; the risk of breast cancer

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Introduction

In 2012, cancer became a leading cause of nearly 8.2 million deaths worldwide. The most prominent causes of cancer deaths include the lung, liver, stomach, colorectal, and breast cancers. GLOBOCAN data show that the incidence of new cases of cancer reached 14,067,894 cases. Most new cases are breast cancer, prostate cancer, and lung cancer, amounting to 43.3%, 30.7%, and 23.1% respectively. Furthermore, the lung and breast cancers were the most leading cause of cancer deaths (after controlled by the age)[1]
The incidence of breast cancer in Central Java as many as 11,511 cases, is the second province in Indonesia with the highest cases[2] Some factors are identified to be the risk factors for breast cancer. A study mentioned that the risk factors for breast cancer include obesity, the age at first birth, breastfeeding history, and the age of menarche[3]. Until 2014, the program of early detection of breast cancer and cervical cancer had been organized in 1,986 public health centers in 304 regencies/cities in 34 provinces throughout Indonesia. The healthcare staffs participating in this program were 430, consisting of the obstetricians & gynecologists of gynecologic oncology, surgeons, general practitioners, and midwives. Meanwhile, the providers in the public health centers were 4,127 people, consisting of 2,671 midwives and 1,456 general practitioners. The screening had been administered in 904,099 people (2.45%). The results revealed that 44,654 people

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(4.94%) were found positive of visual inspection with acetic acid *(IVA),* 1,056 people (1.2 per 1,000) were suspected of cervical cancer, and 2,368 people (2.6 per 1,000) were suspected of breast tumor. Breast cancer is one of the most common cancers which can be detected early for further treatment. The other types of cancers for which an early detection can be carried out include the cervical cancer, colorectal cancer, prostate cancer, liver cancer and lung cancer[4]. In Semarang, the breast cancer cases have reached the number of 4,946. Since the breast cancer can be detected early, the risk factors for this cancer can also be avoided. Breastfeeding is one of the ways which can prevent the risk for breast cancer when it is administered properly and effectively. Therefore, there is a need to provide a hormonal description of the breastfeeding mothers as a preventative action for the prevention of breast cancer risk factors. The length period of breastfeeding which is less than 5 months is also an influential factor (p-value = -0.024) of breast cancer[5].

The length of breastfeeding depends on the mother's ability to produce and secrete the milk. The production and secretion of the milk are influenced by the oxytocin and prolactin hormones. Letdown reflex is a response of the nervous system that causes the breast milk producing cells contract so that the milk inside is squeezed out, flows along the milk duct, and comes out through the nipples. The letdown reflex will work only if given a command from the oxytocin hormone. A high level of oxytocin hormone maximizes the amount of breast milk reservoir[6]. The oxytocin hormone is released when the mother is in a relaxed condition.

Methods

This study employed a cross-sectional design and was conducted on the first day of post-partum mothers who gave birth in the hospital. The samples were taken during one month by the purposive sampling, and 32 respondents from the hospitals in Semarang city and Semarang regency were recruited. A blood sampling of 3 ml was administered from the respondents 10 hours after the birth. The blood samples were then centrifuged to take the serum, which would be further analyzed by using the ELISA technique to examine the level of prolactin, oxytocin, and beta-endorphin. The participants were requested to fill out the questionnaires about the demographics and other characteristics such as the start of breastfeeding, and the frequency of breastfeeding.

The numerical and categorical data were respectively presented in the mean score and the frequency distribution. The relationships between the breastfeeding characteristics (breastfeeding frequency, breast milk secretion) and the prolactin, oxytocin, and beta-endorphin hormones were tested using the Spearman test. Furthermore, the relationships between the early initiation of breastfeeding and the prolactin, oxytocin, and beta-endorphin were analyzed using Kendall's tau test.

Data collection is done after obtaining ethical approval from the Ethics Committee of Faculty of Medicine Diponegoro University - Kariadi Hospital with number 712/EC/FK-RSDK/2016. Respondents were given an explanation of the purpose of research and involvement in research as well as approval in the study proved to provide a signature.

Results

The results describe the characteristics of respondents, including the demographic data and other characteristics of the post-partum mothers. In addition, they also explain the hormonal condition and the relationships between the breastfeeding characteristics and the hormonal conditions of breastfeeding.

Table 1. Characteristics of respondents the first day postpartum mothers in hospitals in Semarang in 2016 (n = 32)

Characteristics	N (%)	Mean (min-max)
Education		
Elementary school	4 (12.5%)	
Junior high school	12 (37.5%)	
Senior high school	15 (46.9%)	
University	1 (3.1%)	
Employment		
Unemployed	23 (71.9%)	
Employed	9 (28.1%)	
Type of birth		
Vaginam	21 (65.6%)	
Sectio Caesarea	11 (34.4%)	
Age		27,46(15-43)
Number of Birth		1,75(1-4)
Breastfeeding frequency (first 10 hours)		1 (0-5)
Start of breastfeeding (hour after birth)		42,56(0-72)

The youngest age of the respondents was 15, and the oldest was 43. The oldest age of first birth was 38. The hormonal description of the postpartum mothers on the first day is seen in figures 1, 2, and 3.

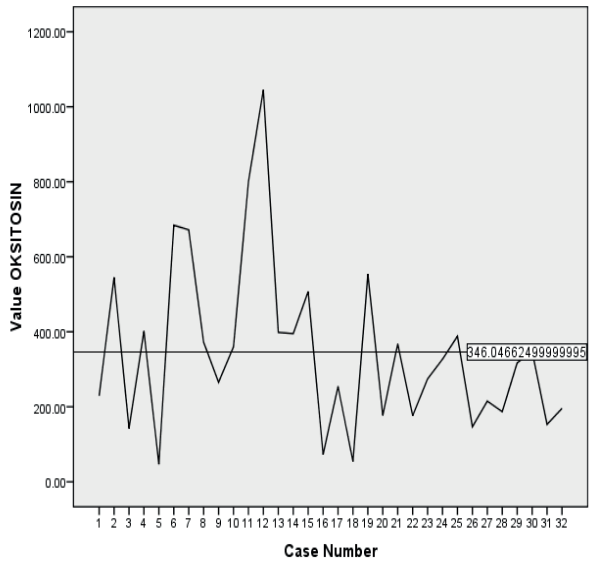

Figure 1. Hormonal description of the first day postpartum mothers in hospitals in Semarang in 2016 (n = 32)

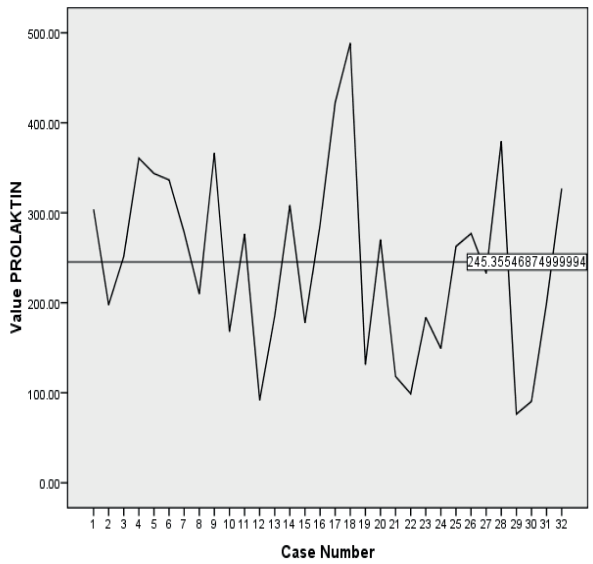

Figure 2. The level of prolactin in the first day postpartum mothers in hospitals in Semarang in 2016 (n = 32)

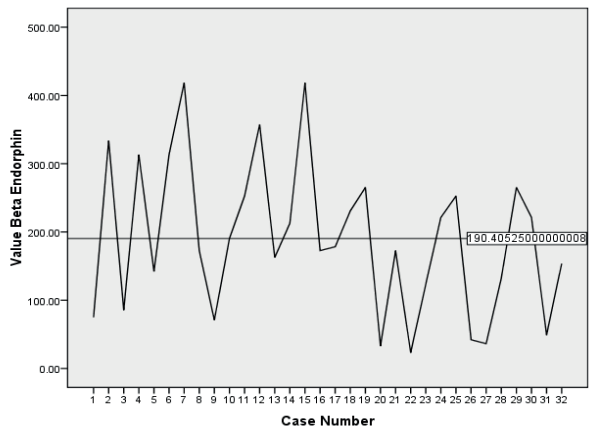

Figure 3. The level of beta-endorphin in the first day postpartum mothers in hospitals in Semarang in 2016 (n = 32)

Breastfeeding characteristics	Oxytocin (r;p value)	Prolactin (r; p value)	Beta Endorphin (r; p value)
Frequency of breastfeeding	0,140; 0,443	0,575; 0,001	0,212; 0,245
Breast milk secretion	-0,105; 0,568	-0,486; 0,005	-0,207; 0,255
Early initiation of breastfeeding	0,084; 0,572	-0,174; 0,243	-0,113; 0,451

There was a significant relationship between the hormones of beta-endorphin and oxytocin with a p-value of 0.000. The relationship between the oxytocin and prolactin obtained a p-value of 0.097.

Discussion

Relationship between the characteristics of postpartum mothers and the breast cancer risks the age of the postpartum mothers ranged from 15 to 43, while the age of first birth ranged from 15 to 38. This indicates a late period of early menarche and menopause. The age of menarche age and first birth is a significant factor in the incidence of breast cancer[3]. Mothers, who gave first birth at the age of more than 30, are at risk of breast cancer due to a high level of estrogen exposure[7]. The age and family history are the highest risk factors for the breast cancer incidence[8]. This is also congruent with a study on the relationship between family history and the risk factor for breast cancer in Semarang[9].

The parity, which is more than three, becomes one of the factors which can reduce the risk of breast cancer[10], as seen in the characteristics of mothers in Semarang who gave birth to a fourth child. In contrast to this study the dominant risk factors for breast cancer in women were the age of over than 40, the use of oral contraceptives and menopause[11].

Relationship between hormonal condition of breastfeeding mothers and the breast cancer risks

Breastfeeding of fewer than five months is a risk factor for breast cancer[5]. The length period of breastfeeding is associated with the receptor of estrogen-progesterone in a woman's body[12]. The balance of estrogen-progesterone receptor is indicated by the balance period of pregnant and lactating women. Breastfeeding becomes a strategy to reduce the risk of breast cancer, with a relative risk reduction of 12-29%[13].

The ability of mothers to breastfeed their baby for more than five months is influenced by the prolactin and oxytocin hormones. Furthermore, oxytocin is also related to the anxiety and depression of the breastfeeding mothers that affects the length and

intensity of breastfeeding itself[14]. The present findings show that the levels of hormones in the postpartum mothers gave an effect on the psychological condition of the mothers.

The mean of prolactin hormone showed a normal range of 245.35 ng/ml. This reduces the risk of breast cancer since the mother has the potentials to produce the sufficient milk. The prolactin can induce the formation of Disabled 2 (Dab 2), which functions to suppress the breast cancer[15]. Some mothers in Semarang have the prolactin level of 76.37ng/ml, which means lower than the normal value of 95 ng/ml. These mothers are at the risk of breast cancer unless the intervention of improving the hormone level is done.

The production of prolactin in mothers with section caesarean delivery was found to be higher than that of the normal delivery[16]. The significant increase of the prolactin level occurred in the second to fourth week after the delivery[17].

The oxytocin hormone showed the mean of 340 pg/ml and indicated a normal range for breastfeeding mothers. The oxytocin is associated with the estrogen and progesterone cycles which affect the breast sensitivity[18]. The balance of this hormonal cycle reduces the risk of breast cancer.

Beta-endorphin is a hormone variant which affects the feeling of pleasure and stimulates the oxytocin[19]. The present finding showed that the average level of the beta-endorphin hormone was 190.4 ng/ml. This hormone enhances the immune system so that it decreases the risk for breast cancer[20].

The production of prolactin works in line with the stimulation of nipple such as through breastfeeding. More stimulation will increase the production of prolactin[21]. This is congruent with the present findings that the frequency of breastfeeding is associated with the production of prolactin.

The starting of breast milk secretion is related to the prolactin hormone as indicated by the results of Spearman correlation test, which obtained a p-value of 0.005. However, the success of early initiation of breastfeeding in the first hour showed no significant relationship. The earlier breastfeeding will stimulate the early secretion of breast milk so that the milk production will also be increased. The smooth secretion of breast milk can reduce the incidence of clogged breast milk, and in the long term, it can also decrease the risk of breast cancer.

Conclusion

The breast cancer risks can be minimized through the breastfeeding practice at the age of less than 35. Every breastfeeding mother should regularly release their breast milk both by breastfeeding or milking activities.

It is advisable that women should avoid having their first pregnancy at their risky age, and arrange their pregnancy at the age range of 20-35. Furthermore, it is also recommended that the women should balance the estrogen and progesterone hormones in their body, as well as the prolactin and oxytocin by following the pregnancy, delivery, breastfeeding and non-pregnancy cycles.

Aknowlegdment

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Conflict of interest: None declared

References

1. WHO IA for R on C (IARC) /. GLOBOCAN 2012: Estimated cancer incidence, mortality, and prevalence worldwide in 2012 [Internet]. 2012. Available from: http://globocan.iarc.fr/Pages/fact_sheets_population.aspx
2. Badan Pusat Statistik, Badan Koordinasi Keluarga Berencanan Nasional, Departemen Kesehatan, Macro International. Survei Demografi dan Kesehatan Indonesia 2012. Sdki. 2013;16.
3. Anggorowati L. Faktor Risiko Kanker Payudara Wanita. J Kesehat Masy. 2013;8(2):121–6.
4. Kemenkes RI. Riset Kesehatan Dasar (RISKESDAS). Jakarta: Litbang Kemenkes RI; 2013.
5. Rini Indrati, Henry Setyawan DH. Faktor Faktor Risiko yang Berpengaruh terhadap Kejadian Kanker Payudara Wanita. 2005;1–8.
6. Riordan, J. Wambach K. Breastfeeding and Human Lactation. 4th ed. Canada: Jones and Barlett LLC; 2010.
7. Clemons M. Hormonal and genetic risk. Surg [Internet]. Royal College of Surgeons of Edinburgh and Royal College of Surgeons in Ireland; 2003;1(1):23–31. Available from: http://dx.doi.org/10.1016/S1479-666X(03)80005-7
8. França-botelho AC, Ferreira MC, Luzia J, França EL, Honório-França AC. MINI-REVIEW Breastfeeding and its Relationship with Reduction of Breast Cancer : A Review. 2012;13:5327–32.
9. Yulianti I. Faktor-faktor Risiko Kanker Payudara. 2016.
10. Shinde S et. al. Higher Parity and Shorter Breastfeeding Duration Asspciation with Triple-Negative Phenotype of Breast Cancer. Cancer. 2010;November(1):4933–43.
11. Sihombing M, Saparudin AN. Faktor Risiko Tumor Payudara Pada Perempuan Umur 25-65 Tahun di Lima Kelurahan kecamatan Bogor Tengah. Pus Teknol Kesehat dan Epidemiol Klin Badan Penelit dan Pengembangan, Kementeri Kesehat RI. 2014;1(Faktor Risiko Tumor Payudara Pada Perempuan Umur 25-65 Tahun di Lima Kelurahan kecamatan Bogor Tengah):10.
12. Islami F, Liu Y, Jemal A, Zhou J, Weiderpass E, Colditz G, et al. Breastfeeding and breast cancer risk by receptor status-a systematic review and meta-analysis. Ann Oncol. 2015;26(12):2398–407.
13. Marisa Weiss, Ying Liu, Paolo Boffetta, Graham Colditz, Ahmedin Jemel FI. Association between breastfeeding and breast cancer risk by receptor status: A meta-analysis. Cancer Res 2015. 2015;75(9 suppl):5–13.
14. Alison M. Stuebe, Karen Grewen and SM-B. Association Between Maternal Mood and Oxytocin Response to Breastfeeding. J Women's Heal. 2013;22(4):352–61.
15. Tao W, Moore R, Smith ER, Xu XX. Hormonal induction and roles of disabled-2 in lactation and involution. PLoS One. 2014;9(10).
16. Stimülan T, Şeklinin D, İle E. Breastfeeding Relationship Between Prolactin , Thyroid Stimulating Hormon Levels and Mode of Delivery Mode of Delivery and Breastfeeding. 2014;264–70.
17. Chatterton RT, Hill PD, Aldag JC, Hodges KR, Belknap SM, Zinaman MJ. Relation of plasma oxytocin and prolactin concentrations to milk production in mothers of preterm infants: Influence of stress. J Clin Endocrinol Metab. 2000;85(10):3661–8.
18. Dellovade TL, Zhu YS, Pfaff DW. Thyroid hormones and estrogen affect oxytocin gene expression in hypothalamic neurons. J Neuroendocrinol. 1999;11(14):1–10.
19. Morhenn V, Beavin LE, Zak PJ. Massage increases oxytocin and reduces adrenocorticotropin hormone in humans. Altern Ther Health Med. 2012;18:11–8.
20. Zhang C, Murugan S, Boyadjieva N, Jabbar S, Shrivastava P, Sarkar DK. Beta-endorphin cell therapy for cancer prevention. Cancer Prev Res. 2015;8(1):56–67.
21. Breastfeeding THE, Book A. How the breast works. 2002;(Williams 1992).