

Differences in Estradiol Hormone Levels Based on the First Pregnant Age in Breast Cancer Women and Non Breast Cancer

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ABSTRACT

The incidence of breast cancer in Indonesia reached 58,256 and was ranked first in 2018. Estrogen has an important role in breast cancer carcinogenesis, especially through the interaction of 17 β -Estradiol. The purpose of this study was to determine the difference in average hormone levels based on the age of pregnant women with their first child after postmenopausal women with breast cancer and not breast cancer in Padang. This study was conducted on 36 postmenopausal women with breast cancer and 36 postmenopausal women without breast cancer at RST Reksodiwiryo TK III and RSK Bedah Ropanasuri from April to June 2019. Examination of estradiol hormone levels was carried out at the Biomedical Laboratory of Andalas University, Data were analyzed by T-test independent. The results showed that there was no significant difference between the mean estradiol hormone levels of pregnant women with their first child aged 30 years and <30 years of age in postmenopausal women with breast cancer (84.54 vs 45.10 pg/ml, $p > 0.05$) and not there is a significant difference between the mean levels of the hormone estradiol in pregnant women with their first child aged 30 years and <30 years in postmenopausal women without breast cancer (48.92 vs 49.18 pg/ml, $p > 0.34$). The conclusion of this study is that there is no difference in the average level of the hormone estradiol based on the age of pregnant women with their first child in postmenopausal women with breast cancer and not breast cancer in Padang.

Keywords: *Estradiol, Breast Cancer, First Pregnant Age*

1. INTRODUCTION

Breast cancer is the highest cause of cancer incidence in Indonesia, which is as many as 58,256 events. Nationally there was a 1.4 percent or an estimated 347,792 incidence of cancer in Indonesia in all age groups in 2013. Statistics from the Dharmais Cancer Hospital of Jakarta have shown that breast cancer ranked first over the past ten years to 2016. West Sumatra province with an overall incidence of cancer of 8,560 patients, with an incidence of breast cancer of 2,285 cases (27%) [1,2]

Many breast cancers occur in people aged 50 years or older. When we grow older, we will increase the risk of breast cancer. Besides age, reproductive factors such as nullipara, older age when giving birth to a first child, use of exogenous hormones, and family history of breast cancer also increase the risk of breast cancer. In fact, the prevalence of breast cancer such as alcohol consumption, lack of physical activity and postmenopausal obesity also impacts behavior. Although there is no clarity about the exact mechanism of causing these causes, these activities

tend to involve hormonal mechanisms because many of them have a hormonal connection [3,4].

The correlation between ovarian steroid hormones and the risk of breast cancer could be mediated by two mechanisms. Next, the genotoxic-reproductive production process of estrogen—DNA by the reaction of quinone estrogen catechol with DNA is stated to be mutagenic and carcinogenic (estrone and estradiol). Third, the pathway can also have reinforcing effects of estrogen and progesterone, possibly by breast cancer stem cells, on cell proliferation in the breast [5]

High levels of estrogen and long estrogen use raise the risk of breast cancer. Estrogen has a total of two important roles in breast cancer carcinogenesis. The function of the ER (estrogen receptor α , ER α) is through the 17- β estradiol interaction that causes normal breast tissue proliferation and is the primary form of estrogen which causes gene mutations and free radicals that can damaged DNA [6]

In carcinogenesis for breast cancer, estradiol has a significant role to play in affecting estradiol toxicity as a risk factor for breast cancer. This includes age, race, genetic factors, food and alcohol, diets and obesity, early

menarche endogenous hormonal causes, infertile and non-breastfeeding women and early menopause. The use of estrogen replacement therapy and the long-term use of oral contraceptives have been exogenous hormone causes [6]

2. METHODS

The purpose of this study was to determine the difference in average hormone levels based on the age of pregnant women with their first child after postmenopausal women with breast cancer and not breast cancer in Padang.

This study was conducted on 36 postmenopausal women with breast cancer and 36 postmenopausal women without breast cancer at RST Reksodiwiryo TK III and RSK Bedah Ropanasuri from April to June 2019. Examination of estradiol hormone levels was carried out at the Biomedical Laboratory of Andalas University, Data were analyzed by T-test independent.

3. RESULT AND DISCUSSION

Table 1. Table Differences in estradiol levels based on first Pregnant age in breast cancer woman

First Pregnant Age	Mean	Levels Estradiol Median (Minimum-Maksimum)	p value
≥30 Tahun	25,50	84,54 (32,39-139,022)	0,075
< 30 Tahun	17,10	45,10 (1,426-209,979)	

Table 2. Differences in estradiol levels based on first Pregnant age in non breast cancer woman

First Pregnant Age	n	Levels Estradiol (Mean ± SD)	p value
≥30 Tahun	6	48,92 ±17,71	0,340
< 30 Tahun	30	49,18 ±27,46	

Median maximum minimum estradiol levels in the breast cancer group with the age of the first child ≥30 years 84.54 (32.39-139,022) pg/ml higher compared to the age of the first child's pregnant woman < 30 years 45.10 (1,426-209,979). Meanwhile, man Whitney's statistical test results show there was no significant association between the age of the first child's pregnant woman and the levels of the hormone estradiol in the breast cancer group (p> 0.05).

In the non-breast cancer group, the average level of the hormone estradiol in pregnant women of the first child aged ≥30 years 48.92 ±17.71 pg / ml while in

pregnant women the first child aged < 30 years was slightly higher than 49.18 ±27.46 pg/ml. Independent T-test results showed no significant association between the age of the first child's pregnant woman and estradiol levels in the non-breast cancer group (p>0.05).

This study found 3 women with breast cancer who worked and pregnant at the age of ≥ 30 years, and 4 women who did not work and were pregnant at the age of ≥ 30 years. Women who work as well as heavy work pressures can affect stress, so it can disrupt the hormonal balance of women of reproductive age.

The study is similar to a 2003 study conducted by Lamar et al, which examined 133 postmenopausal women, not breast cancer. She said there was no significant association between the age at birth of her first child and her levels of the hormone estradiol. Estradiol in pregnant women of the first child age < 30 years 41.6 pmol / liter and age ≥30 years 47.1 pmol/liter with a value of p> 0.05 [7].

During pregnancy, prolactin will be heavily secreted, and is influenced by other hormones such as estrogen, progesterone, human placenta lactogen (HPL), and cortisol to stimulate breast growth. This can cause breast tissue to differentiate rapidly and rapid proliferation of the breast epithelium The risk of breast cancer will be reduced in pregnancy and high parity by up to half of the risk of women who have never given birth to a child [6],[8].

According to the researchers' analysis, women who are pregnant at the age of ≥ 30 years can increase the risk of breast cancer due to prolonged exposure to the hormone estrogen in these women. After pregnancy, the risk of breast cancer will be reduced if the woman breastfeeds her baby because breastfeeding will suppress the production of estrogen by the hormone prolactin. The risk of breast cancer in pregnant women at the age of ≥ 30 years can be prevented one of them with regular checks done to health workers to detect early breast cancer.

4. CONCLUSIONS & SUGGESTIONS

The study showed no association of hormone estradiol levels with the age of the first child in breast cancer mothers and not breast cancer. Nevertheless, the theory states that the longer the hormone estrogen circulates in a person's body in high levels can increase the risk of breast cancer. This will be more risky if long hormone exposure factors come into play, such as the age of menarche < 12 years and the age of menopause ≥ 50 years. Nevertheless, breast cancer can be prevented by doing conscious (check the breast yourself) and sadanis (clinical breast check) to health care workers.

AUTHORS' CONTRIBUTIONS

The author's contributions in this study include preliminary surveys, proposal makers, licensing administrators, conducting research data collection

activities, conducting data analysis, making reports, and making research manuscripts for publication.

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REFERENCES

- [1] International Agency for Research on Cancer. (2018). Latest global cancer data : Cancer burden rises to 18 . 1 million new cases and 9 . 6 million cancer deaths in 2018 Latest global cancer data : Cancer burden rises to 18 . 1 million new cases and 9.6 million cancer deaths in 2018, (September), 13-15, 2018, Retrieved from http://www.iarc.fr/en/mediacentre/pr/2018/pdfs/pr263_E.pdf
- [2] Kemenkes. Riset Kesehatan Dasar 2013. Diakses tanggal 12 September 2018, 2013, www.depkes.go.id/resources/download/genera/Hasil%20Risikesdas%202013.pdf
- [3] Kementrian Kesehatan RI Pusat Data dan Informasi Kesehatan. Bulan Peduli Kanker Payudara. Infodatin Kanker, 2016.
- [4] H. Oh, Eliassen, A.H. Beck, A.H. Rosner, B. Schnitt, S. J. Collins, L.C. Tamimi, R.M, Breast cancer risk factors in relation to estrogen receptor, progesterone receptor, insulin-like growth factor-1 receptor, and Ki67 expression in normal breast tissue. *Npj Breast Cancer*, 2017, Doi: 10.1038/s41523-017-0041-7
- [5] J. Lovett, L. Chima, M.A. Wexler, J.K. Arslanian, K.J. Friedman, A.B. Yousif, C.B. & Strassmann, B. I, Oral contraceptives cause evolutionarily novel increases in hormone exposure. *Evolution, Medicine, and Public Health*, 2017, pp. 97–108. Doi: 10.1093/emph/eox009
- [6] I.H. Abdulkareem, Aetio-pathogenesis of breast cancer. *Nigerian Medical Journal* Vol 54, 2013, pp.371–376. Issue 6. Doi: 10.4103/0300-1652.126284
- [7] C.A. Lamar, J.F. Dorgan, Longcope, F.Z. Stanczyk, R.T. Falk & H.E. Stephenson, Serum sex hormones and breast cancer risk factors in postmenopausal women. *Cancer Epidemiology Biomarkers and Prevention*, 12(4), 380–383, 2003.
- [8] F.Z. Laamiri, A. Bouayad, N. Hasswane, S. Ahid, Risk Factors for Breast Cancer of Different Age Groups : Moroccan Data. *Journal of Obstetrics and Gynecology*, 2015, pp. 79–87. Doi: 10.4236/ojog.2015.52011