

Relationship Between Exposure To Cigarette Smoke And Age Of First Child With Breast Cancer At A Hospital In Metro City

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ABSTRACT

Breast cancer is the most common type of cancer in women worldwide, including in Indonesia. It occurs due to uncontrolled cell growth in breast tissue, which damages surrounding tissue and spreads to other organs. WHO data from 2022 indicates that 2.3 million women were diagnosed with breast cancer and 670,000 died. The exact cause is unknown, but it often occurs in the milk ducts or lobules. Impacts include physical, mental, and emotional conditions. The purpose of this study was to identify the association between household cigarette smoke exposure and age at first pregnancy with breast cancer in the Oncology Surgery Unit of General Ahmad Yani General Hospital, Metro. This quantitative study used a case-control study design, conducted in the Oncology Surgery Unit of a hospital in Metro City. A sample of 82 women was selected using a consecutive sampling technique, consisting of 41 women with breast cancer and 41 women without breast cancer. Data were collected through interviews and review of necessary medical records using a questionnaire. Data analysis used the chi-square test with a 95% confidence level ($\alpha = 0.05$). The results showed that 31.7% of adult women in the case group had a history of cigarette smoke exposure at home for >26 years. Forty-one percent of adult women in the case group had their first pregnancy aged >35 years. Statistical tests showed a significant association between cigarette smoke exposure and breast cancer incidence ($p = 0.004$ and $OR = 9.054$). Age at first pregnancy >35 years was also significantly associated with breast cancer incidence ($p = 0.002$; $OR = 6.552$). The study concluded that there is a significant association between cigarette smoke exposure and age at first pregnancy >35 years and breast cancer incidence. Breast cancer prevention is important by implementing smoke-free areas at the household level and avoiding pregnancy at risk through education.

Keywords: Breast cancer, cigarette smoke exposure, gestational age

I. INTRODUCTION

Breast cancer is a cancer that originates in the glands, glandular ducts, and supporting tissue of the breast. A number of cells in the breast grow and develop uncontrollably, which is called breast cancer. Tumors that can spread throughout the body or spread to surrounding tissue are called cancer or malignant tumors (Ariani, 2015). These cells can form tumors that can be felt during a physical examination or detected through a mammogram. Breast cancer is more common in women, but it can also occur in men in very small numbers (Ministry of Health, 2019).

In 2022, there were 2.3 million women diagnosed with breast cancer and 670,000 deaths worldwide. Being female is the strongest risk factor for breast cancer. Approximately 99% of breast cancer cases occur in women and 0.5–1% in men (WHO, 2024). According to Globocan data from 2020, the number of new breast cancer cases reached 68,858 (16.6%) of the total 396,914 new cancer cases in Indonesia. Meanwhile, the number of deaths reached more than 22,000 cases (Indonesian Ministry of Health, 2022b). In 2022, Indonesia experienced more than 408,661 new cancer cases with 242,099 deaths, mainly due to breast, cervical, lung, and colorectal cancers. Without intervention, the number of cancer cases in Indonesia is estimated to increase by 63% between 2025 and 2040 (Ministry of Health, 2024b).

The results of cervical and breast examinations in Lampung Province in 2021 from 78,784 (6.5%) found 91 (0.1%) suspected cancers and 553 (0.7%) tumors/lumps (Lampung

Provincial Health Office, 2021). The results of SADANIS examinations in Lampung Province in 2022 from 99,154 (0.1%) found 159 (0.2%) tumors/lumps, 63 (0.1%) suspected breast cancer, while 110 (49.5%) tumors and suspected breast cancer were referred (Lampung Provincial Health Office, 2022). Early detection screening for breast cancer in Lampung Province in 2023 found 229 (0.1%) suspected cancer cases, 278 (0.1%) tumors/lumps, while 295 (58.2%) tumors and suspected breast cancer cases were referred. These figures show an increase in suspected cancer and tumor/lump cases compared to 2022 (Lampung Provincial Health Office, 2023).

In Metro City in 2022, 1,614 (0.1%) people underwent SADANIS screening, and 2 (0.1%) suspected breast cancer cases were found (Metro City Health Office, 2022). In Metro City in 2023, out of 5,684 (0.2%) who underwent SADANIS examinations, 31 (50.0%) cases of tumors/lumps suspected of being breast cancer were found (Metro City Health Office, 2023). Based on data obtained from (RSUD Jend. A. Yani Metro, 2024), malignant breast neoplasms or breast cancer ranked first as the most commonly treated disease. There has been a significant increase in the number of breast cancer cases from year to year, namely 1,407 cases in 2020, 1,981 cases in 2021, 2,250 cases in 2022, and reaching 2,714 cases in 2023.

Breast cancer can be caused by non-hereditary gene mutations. For example, if a mutation occurs in a gene called HER2, this mutation can cause breast cancer (Suryani, 2020). Risk factors that can increase the likelihood of developing breast cancer include not breastfeeding, not being married, pregnancy, having your first child after the age of 35, hormonal contraception, obesity, alcohol consumption, exposure to cigarette smoke, and hormone therapy after menopause (Savitri, 2019).

The short-term effects of breast cancer, if not treated properly, can cause physical disorders such as changes in body shape, as well as psychological or mental disorders in breast cancer patients (Kemenkes, 2024a). The long-term effects of breast cancer, if not treated properly, can cause fatigue, cancer recurrence or secondary cancer, dental and oral problems, diabetes, endocrine changes, hypothyroidism, incontinence, infertility, learning and memory problems, lymphedema, nerve pain, organ damage, bone loss, pain, and sexual dysfunction (MD Anderson Cancer Center, 2024).

One of the reasons this disease is deadly is the lack of awareness among patients to undergo early screening, either self-examination or by medical personnel, as the early symptoms are usually Patients are unaware of this disease, so they only realize that they have advanced cancer (Ministry of Health, 2024a).

Based on the results of research by Fadhila et al. (2024), the proportion of active/passive smokers with risky smoking behavior was greater in women diagnosed with breast cancer (case group), namely 47 people (94%) compared to the control group ($p=0.025$), indicating that there is a relationship between smoking behavior and the incidence of breast cancer (OR: 4.947).

II. RESEARCH METHODOLOGY

This type of research is quantitative research, with a case control study design. A case control study is an analytical study that examines the causes of events or incidents retrospectively (Syapitri et al., 2021). In this study, respondents were divided into two groups: the case group consisted of women who had undergone treatment in the

Oncology Surgery Room and were diagnosed with breast cancer as recorded in their medical records, while the control group consisted of women who were not diagnosed with breast cancer. The purpose of this study was to determine the relationship between exposure to cigarette smoke and the age of the first pregnancy with breast cancer in the Oncology Surgery Room of the Metro City Hospital. The case population in this study was all mothers in the Oncology Surgery Room with a total of 2,724 cases of breast cancer. The control population in this study was all mothers treated in the Oncology Surgery Room with a total of 1,441. The sample of the case group in this study was all mothers diagnosed with breast cancer. The control group sample in this study consisted of mothers who were not diagnosed with cancer. Data collection was carried out by recording, measuring, calculating, and noting down the data. Data analysis in this study used the chi-square test. The relationship was sought by looking for correlations (Donsu, 2019). Bivariate analysis was performed to see the relationship between exposure to cigarette smoke and the age of the first pregnancy.

III. RESULT AND DISCUSSION

This study was conducted from January to May 2025 with primary data collection through interviews using questionnaires to a total of 82 respondents consisting of 41 respondents as cases obtained in the Oncology Surgery Room and 41 respondents as controls obtained in the Oncology Surgery Room of a hospital in Metro City.

Data collection was conducted through interviews with respondents, while data processing was performed using computers. The data was then tabulated and analyzed to determine the frequency and percentage in tabular form to see if there was a relationship between the two independent variables and the dependent variable being studied.

Univariate Analysis

The researchers processed the data and conducted univariate analysis using SPSS version 25, with the results shown in the following table:

1. Proportion of Exposure to Cigarette Smoke at Home among Adult Women The proportion found by the researchers with a total of 82 breast cancer cases consisting of 41 breast cancer and 41 non-breast cancer cases is shown in Table 1.

Table 1. Distribution of Cigarette Smoke Exposure in Adult Women

Variabel	Total	
	n	%
Cigarette Smoke Exposure		
Exposed (cigarette smoke exposure > 26 years)	15	18,3
Not Exposed (cigarette smoke exposure ≤ 26 years)	67	81,7
Total	82	100,0

The results of the study in Table 1 show the proportion of cases exposed to cigarette smoke among adult women, with a total of 82 respondents. Respondents

exposed to cigarette smoke accounted for 18.3%, while those not exposed to cigarette smoke at home accounted for 81.7%.

2. Proportion of Age at First Pregnancy in Breast Cancer Incidence in Adult Women The proportion of age at first pregnancy is shown in Table 2.

Table 2. Proportion of First Pregnancy Age among Adult Women

Variabel	Total	
	n	%
Age at First Pregnancy		
High risk (Age at first pregnancy > 35 years)	21	25,6
Low risk (Age at first pregnancy ≤ 35 years)	61	74,4
Total	82	100,0

The results of the study in Table 2 show a total of 82 respondents. Respondents with high-risk ages (first pregnancy age > 35 years) accounted for 25.6%, while those with low-risk ages (first pregnancy age ≤ 35 years) accounted for 74.4%.

b. Bivariate Analysis

Bivariate analysis was performed to identify the relationship between exposure to cigarette smoke at home and age at first pregnancy with the incidence of breast cancer in patients in the Oncology Surgery Room of Jenderal Ahmad Yani Regional General Hospital, Metro City. The relationship between variables was analyzed using the Chi-Square test, and the results will be presented in tabular form to facilitate data interpretation.

Relationship between Exposure to Cigarette Smoke and the Incidence of Breast Cancer in Adult Women

Table 3 discusses the analysis of the relationship between exposure to cigarette smoke at home and the incidence of breast cancer in adult women.

exposure to cigarette smoke	Breast Cancer Incidence						P-value	OR	CI
	Cases		Controls		Total		0,004	9,054	1,891 - 43,338
	n	%	n	%	n	%			
Exposed to cigarette smoke (exposure to cigarette smoke > 26 years)	13	31,7	2	4,9	15	18,3			
Not exposed to cigarette smoke (exposure to cigarette smoke ≤ 26 years)	28	68,3	39	95,1	67	81,7			
Total	41	100	41	100	82	100			

The results of the analysis of the relationship between exposure to cigarette smoke and the incidence of breast cancer show that of 41 cases with breast cancer, 31% were exposed to cigarette smoke, while in the control group, 4.9% were exposed to cigarette smoke. The chi-square test yielded a p-value of 0.004 ($p < 0.05$), so H_a is accepted,

meaning that there is a significant relationship between exposure to cigarette smoke at home and breast cancer. An OR value of 9.054 means that mothers exposed to cigarette smoke for > 26 years have a 9.054 times higher risk of developing breast cancer compared to mothers who are not exposed to cigarette smoke (≤ 26 years).

The Relationship Between Age at First Pregnancy and Breast Cancer Incidence in Adult Women

Table 4 discusses the analysis of the relationship between age at first pregnancy and breast cancer incidence in adult women.

exposure to cigarette smoke	Breast Cancer Incidence						P-value	OR	CI
	Cases		Controls		Total		0,002	552 21,846	1,965-
	n	%	n	%	n	%			
Exposed to cigarette smoke (exposure to cigarette smoke > 35 years)	17	41,5	4	9,8	21	25,6			
Not exposed to cigarette smoke (exposure to cigarette smoke ≤ 35 years)	24	58,5	37	90,2	61	74,4			
Total	41	100	41	100	82	100			

The results of the study in Table 4, which analyzed the relationship between the age of pregnancy with the first child and the incidence of breast cancer, show that of the 41 cases with breast cancer, 41.5% had a risky pregnancy age of > 35 years, while in the control group, 25.6% had a risky pregnancy age of > 35 years. The chi-square test yielded a p-value of 0.002 ($p < 0.05$), so H_a is accepted, meaning that there is a significant relationship between exposure to cigarette smoke at home and breast cancer. An OR value of 6.552 means that mothers who had their first pregnancy with breast cancer, showing 41 cases of breast cancer, 41.5% of whom were at risk of pregnancy > 35 years of age, had a 6.552 times higher risk of developing breast cancer compared to those who were not at risk of pregnancy (≤ 35 years of age).

The discussion of the research findings includes the results of descriptive analysis, including factors such as exposure to cigarette smoke at home and age at first pregnancy. In addition, it discusses several factors, namely exposure to cigarette smoke at home and age at first pregnancy, which are associated with the incidence of breast cancer in adult women in the Oncology Surgery Room of a hospital in Metro City.

1. **Proportion of Exposure to Cigarette Smoke and the Incidence of Breast Cancer in Adult Women**, This study found that 15 respondents or 18.3% of those with breast cancer were exposed to cigarette smoke, while 67 respondents or 81.7% were not exposed to cigarette smoke at home.

The results of this study are higher than those of a study conducted by Suciawati (2015) on factors associated with breast cancer incidence in the general hospital area of Tangerang Regency, Banten Province, which obtained results from 65 respondents with breast cancer, with more than a quarter (90.8%) of respondents exposed to secondhand smoke. This study is in line with the research conducted by Fadhila et al. (2024) on the analysis of factors associated with breast cancer in women at the Bintang Ki Maja Clinic in Lampung, which obtained results from 50 respondents with breast cancer, 94% of whom had a history of passive exposure to cigarette smoke. A study with lower results was conducted by He et al. (2022) The relationship between tobacco and breast cancer incidence: A systematic review and meta-analysis of observational studies. *Frontiers in Oncology*, analyzed 77 studies with a proportion of 59.2% of studies stating that passive exposure to cigarette smoke increases the risk of breast cancer.

Variations in results were found when compared to Suciawati's (2015) study on factors associated with breast cancer incidence in the general hospital area of Tangerang Regency, Banten Province, which showed a cigarette smoke exposure rate of more than 90.8%, and Fadhila et al. (2024) on the Analysis of Factors Associated with Breast Cancer in Women at the Bintang Ki Maja Clinic in Lampung (94%), whereas in this study (31.7%) in the case group with exposure criteria >26 years. These differences in results may be due to differences in regional characteristics, population, and exposure limits used. This study only involved 82 respondents at Metro City Hospital. This study set the limit for exposure to cigarette smoke at home at >26 years, while the two previous studies did not specify the duration of exposure, so the coverage of respondents included in the exposed category was broader. Differences in regional coverage, population size, and exposure criteria may be the reason why the results in this study appear lower than in previous studies.

2. **Proportion of First Pregnancies in the Oncology Surgery Room at Jenderal Ahmad Yani Regional General Hospital, Metro City.** This study found that the age of pregnancy at risk (> 35 years) in the first child of respondents with breast cancer was 21 people or 25.6%, while those with pregnancy age not at risk ($\leq$ 35 years) were 61 people or 74.4%. The results of this study are higher than those of a study conducted by Siagian et al. (2021) at Haji Adam Malik Hospital in Medan with the same design, which found that 51.1% of 45 respondents had breast cancer. Respondents who had a first pregnancy age > 35 years. A study with higher results was conducted by Listyawardhani et al. (2018) at Dr. Moewardi Hospital in Surakarta, Central Java, with the same design, which found that one-third (59.6%) of 100 respondents with breast cancer had a first pregnancy age > 35 years. This study is consistent with the study by Rianti et al. (2012) at Dharmais Cancer Hospital in Jakarta, which used the same design and found that of 98 respondents with breast cancer, half (42%) had a first pregnancy age > 35 years. The variation in this study is lower than the results of Siagian et al. (2021) at 51.1% and Listyawardhani et al. (2018) at 59.6%. When compared to the study by Siagian et al. (2021), which showed that the age of first pregnancy was a dominant risk factor in premenopausal women, and the study by Listyawardhani et al. (2018),

which found that the age of first pregnancy ≥ 30 years was significantly associated with breast cancer (OR = 3.01; $p = 0.023$). In this study, the proportion of first pregnancy age > 35 years in the case group was only half (41.5%), although it still showed a significant association ($p = 0.002$; OR = 6.552). This difference in results may be due to differences in sample size, population criteria, pregnancy age limits, and research location. The study by Siagian et al. (2021) involved 90 premenopausal women, Listyawardhani et al. (2018) used 200 respondents with broader variables, while this study only involved 82 adult women without menopause restrictions and used the category of pregnancy age > 35 years. Therefore, differences in population characteristics, sample size, and pregnancy age criteria are likely to be the cause of lower results compared to previous studies. This research shows that reproductive health education is needed to raise awareness among women of childbearing age about the risks of first pregnancy at an undesirable age. Prevention can be achieved through premarital counseling, preconception checkups, and strengthening family planning programs that encourage pregnancy at a safe reproductive age.

3. **Analysis of the Relationship between Exposure to Secondhand Smoke at Home and the Incidence of Breast Cancer in Adult Women.**

This study found a significant association between exposure to cigarette smoke at home and the incidence of breast cancer (p -value 0.004). Adult women exposed to cigarette smoke at home for > 26 years had a 9.054 times higher risk of developing breast cancer compared to mothers exposed to cigarette smoke for ≤ 26 years (OR 9.054).

Exposure to cigarette smoke in the home environment refers to an individual's exposure to smoke from active smokers. Cigarette smoke contains more than 7,000 chemicals. A total of 250 of these substances are harmful. A total of 70 substances are carcinogenic. Cigarette smoke consists of approximately 5,000 compounds. Most of them are toxic. These compounds have the potential to damage body cells (Indonesian Ministry of Health, 2022a).

This study supports and is consistent with the results of Fadhila et al. (2024) on the Analysis of Factors Associated with Breast Cancer in Women at the Bintang Ki Maja Clinic in Lampung. The results show that smoking behavior has a significant relationship with the incidence of breast cancer, where passive female smokers have a risk of approximately 4.947 times higher of developing breast cancer, with results ($p = 0.025$ and OR = 4.947). Consistency was also seen in the study by He et al. (2022), The relationship between tobacco and breast cancer incidence: A systematic review and meta-analysis of observational studies. *Frontiers in Oncology*, which in its systematic review and meta-analysis concluded that exposure to secondhand smoke is significantly correlated with breast cancer, found that women exposed to secondhand smoke have a risk approximately 1.17 times higher of developing breast cancer, with results ($p < 0.001$; OR = 1.17). Furthermore, Suciawati's (2015) study on factors associated with the incidence of breast cancer in the general hospital area of Tangerang Regency, Banten Province, also reinforced these findings, showing that women exposed to secondhand smoke had a risk approximately 3.766 times higher of developing breast cancer,

with results ($p < 0.009$; OR = 3.766). However, the main difference lies in the magnitude of the risk (odds ratio), where this study shows a much higher OR. This may be due to the duration of exposure.

4. Analysis of the Relationship between Age at First Pregnancy and Breast Cancer Incidence in Adult Women.

The results of the study show a significant relationship between the age of the first pregnancy and the incidence of breast cancer (p -value 0.002). Women who had their first pregnancy at > 35 years of age had a 6.552 times higher risk of developing breast cancer compared to women who had their first pregnancy at ≤ 35 years of age (OR 6.552).

First pregnancy age above 35 years may increase the risk of breast cancer due to the decreased protective effect of pregnancy on breast tissue (Bachtiar, 2022). Age at first pregnancy is an important factor influencing breast cancer risk, with women who experience their first full-term pregnancy at over 35 years of age tending to have a significantly increased risk (Simatupang et al., 2024: 24). The protective effect of pregnancy against breast cancer decreases with increasing age at first pregnancy (Sanjaya, 2025: 55). This situation can increase women's exposure to reproductive hormones and the risk of breast cancer (Gani et al., 2022). The longer breast cells remain in types I and II (immaturity), the more susceptible they are to possible mutations from carcinogenic precursor compounds. The first pregnancy is a time of exposure to estrogen due to ovarian cycle function (Tirtawati, 2014).

Moewardi Surakarta Regional General Hospital, which reported a significant association between first pregnancy age and breast cancer. Women with a first pregnancy at age > 35 years had a p -value of 0.023 and a 3.01-fold increased risk of breast cancer ($p < 0.023$; OR = 3.01). In addition, research by Rianti et al. (2012) on Factors Associated with Breast Cancer Risk in Women at Dharmais Cancer Hospital in Jakarta reinforced this finding, with statistically significant results showing that women who experienced their first pregnancy at > 35 years of age had a 2.33 times higher risk of developing breast cancer ($p = 0.04$; OR = 2.33). The differences in odds ratios between this study and previous studies may be due to variations in population characteristics and sample sizes. Overall, the direction of the relationship found remains consistent, namely that older age at first pregnancy increases the risk of breast cancer.

This study shows that the age of first pregnancy is an important risk factor for breast cancer. The results can be used for education and promotional policies, such as encouraging pregnancy planning during reproductive age and early detection efforts for breast cancer.

IV. CONCLUSION

Based on the results of research conducted on "The Relationship between Exposure to Cigarette Smoke and Age at First Pregnancy with Breast Cancer in the Oncology Surgery Room of Jenderal Ahmad Yani Regional General Hospital, Metro City," the researchers drew the following conclusions:

1. The proportion of exposure to cigarette smoke at home among adult women with breast cancer was 18.3% for those exposed to cigarette smoke at home and 81.7% for those not exposed to cigarette smoke at home. Respondents with a high-risk age (first pregnancy age > 35 years) accounted for 25.6%, while those with a low-risk age (first pregnancy age ≤ 35 years) accounted for 74.4%.
2. here is a relationship between exposure to cigarette smoke at home and the incidence of breast cancer in adult women (p-value = 0.004). Women who have been exposed to cigarette smoke for > 26 years have a 9.054 times higher risk of developing breast cancer compared to women who have been exposed for ≤ 26 years. There is a correlation between the age of first pregnancy and the incidence of breast cancer in adult women (p-value = 0.002). Women who experience their first pregnancy at an age of > 35 years have a 6.552 times higher risk of developing breast cancer compared to women who experience their first pregnancy at an age of ≤ 35 years.

RECOMMENDATIONS

1. For Health Workers , One of the efforts that can be made is to educate the public about the dangers of long-term exposure to cigarette smoke, both as active and passive smokers. It is important to convey information about the risks of advanced age at first pregnancy (>35 years) for breast cancer.
2. For Future Researchers, Future researchers are encouraged to expand on this study by incorporating additional relevant variables, such as genetic factors, lifestyle, or the public's level of knowledge about early detection of breast cancer, to obtain a more comprehensive picture.

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