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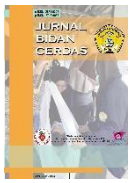

# Bra Usage Duration and Breast Cancer Risk: A Case-Control Study

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**ABSTRACT**

**Introduction**: Breast cancer is a disease feared by most women, with 2.3 million women worldwide being diagnosed with this disease. In 2024, Indonesia will relocate its capital to East Kalimantan Province, which currently has the second-highest (1%) prevalence of breast cancer cases in Indonesia. **Purpose**: Given the increasing prevalence of breast cancer, it is worthwhile to scientifically examine the relationship between the duration of bra usage, age at first bra usage, bra size suitability, and types of bras used in relation to the occurrence of breast cancer. **Method**: The study design used was a case-control study with a 1:1 ratio of 48 respondents (24 cases and 24 controls) selected through purposive sampling. The analysis employed chi-square and odds ratio tests. **Results**: The study revealed that the average age of the respondents was 45.25 years. Furthermore, the variables of bra usage duration (OR=2.333), age at first bra usage, bra size suitability, and bra type (OR=0.639) showed no association with the occurrence of breast cancer (α>0.05). **Conclusion**: This research concludes that there is no association between bra usage and the occurrence of breast cancer in women in East Kalimantan Province. It is suggested to reduce the duration of bra usage to less than 24 hours to minimize the risk factors for breast cancer.



## INTRODUCTION

Breast cancer is the most feared disease among women, second only to cervical cancer (Momenimovahed & Salehiniya, 2019). Even with access to the most advanced treatments available today, there is no guarantee of success in the fight against breast cancer. The fact that we have access to the most effective treatments does not change the reality of the situation. This is because women still pay insufficient attention to the topic of breast cancer, both in terms of prevention and early detection. This is one of the factors contributing to the high mortality rate among women (Grunfeld et al., 2002).

Globally, there are 685,000 deaths from breast cancer, with 2.3 million women being diagnosed with the disease (World Health Organization, 2021). Breast cancer is predominantly experienced in developed countries, with Belgium, the Netherlands, and Luxembourg having the highest number of cases (World Cancer Research Fund International, 2022). However, breast cancer in Indonesia ranks as the most prevalent cancer, accounting for 16.6% of new cases and the second-highest (9.6%) in terms of mortality (Globocan, 2020). The three provinces with the highest incidence of breast cancer are Yogyakarta (2.4%), East Kalimantan (1.0%), and West Sumatra (0.9%) (Nindrea et al., 2020). An interesting issue arises as East Kalimantan Province is set

to become the new capital of Indonesia in 2024, yet it ranks second highest in breast cancer cases.

Various factors contribute to the risk of breast cancer in Indonesia, such as menopausal age, age at first pregnancy, breastfeeding, family history of breast cancer, use of oral contraceptives, smoking history, overweight, obesity, high-fat diet, high-calorie diet, and physical inactivity (Fatmawati, 2019; Nindrea et al., 2020; Purwanti et al., 2021). However, there are online rumors on social media suggesting that bras are a cause of breast cancer (So et al., 2015). The book "Dressed to Kill" claims that women who wear bras for 24 hours a day have a 3 out of 4 chance of developing breast cancer, with a risk 125 times higher than women who never or rarely wear bras (Singer, 2018).

A bra itself is an undergarment that is worn by women on a daily basis. When adolescent girls enter puberty and experience menarche, they start wearing this garment. Considering the increasing prevalence of breast cancer, it is worth scientifically investigating these rumors. Based on this, the objective of this research is to determine the relationship between the duration of bra usage, age at first bra usage, bra size suitability, and types of bras used in relation to the occurrence of breast cancer.

## METHODS

This study utilized a case-control design. The total population of breast cancer patients affiliated with the Cancer Information and Support Center (CISC) in the entire East Kalimantan Province in 2019 was 45 cases. The Lemeshow formula was used to determine the sample size, resulting in a total of 24 respondents for the case group. With a 1:1 ratio, the total sample size became 48 respondents. Purposive sampling was employed to select the samples. The case samples were breast cancer patients affiliated with CISC in East Kalimantan, while the control samples were selected based on age matching from female patients in the internal medicine department of RSUD Abdoel Wahab Sjahranie Samarinda, who exhibited early symptoms such as breast pain. The inclusion criteria for the study were as follows: being diagnosed with breast cancer based on the respondent's acknowledgment of the doctor's diagnosis, being a member of the CISC community, and residing in the cities of Samarinda, Balikpapan, and Tenggarong. The exclusion criteria for the case samples were unwillingness or inability to communicate due to their health condition. The secondary data collection instrument utilized CISC membership cards, while the primary data collection involved respondent acknowledgment and a questionnaire consisting of respondent characteristics and questions regarding bra usage duration, age at first bra usage, bra size suitability, and types of bras used.

The operational definitions and objective criteria of this study can be seen in Table 1 below.

Table 1. Operational Definition and Objective Criteria

| Variables | Operational Definition | Measurement Tool | Objective Criteria |
|---|---|---|---|
| Breast Cancer | A cancerous disease originating from the glands, ducts, and supportive tissues of the breast, excluding breast skin, characterized by the presence of lumps, concave skin, nipple | CISC membership and questionnaire | 1. Breast cancer<br>2. Not breast cancer<br>(Arafah & Notobroto, 2018) |

| Variables | Operational Definition | Measurement Tool | Objective Criteria |
|---|---|---|---|
| | retraction or deviation, and pain, tenderness, or special bleeding from the nipple. | | |
| Duration of Bra Usage | The length of time spent wearing a bra per day | Questionnaire | 1. ≥ 24 hours<br>2. < 24 hours<br>(Singer, 2018) |
| Age at first bra usage | Information about the time of initial bra usage | Questionnaire | 1. < 12 years old<br>2. ≥ 12 years old<br>(Chen et al., 2015) |
| Bra Size Suitability | The appropriateness of the bra size based on the breast shape | Questionnaire | 1. Suitable<br>2. Oversized<br>(Hsieh & Trichopoulos, 1991) |
| Type of bra | Categorization of bras based on the material used for manufacturing | Questionnaire | 1. Wired<br>2. Non-wired<br>(So et al., 2015) |

The analysis used in this study employed univariate analysis by calculating frequencies, followed by bivariate analysis using the chi-square test and odds ratio.

## RESULT

The average age of the respondents was 45.25 years, with the highest age group falling within the range of 46-50 years (12.5%). More than half of the breast cancer patients had a college education level (33.3%), while the majority of non-breast cancer respondents had a high school education level (35.4%). The majority of the respondents were homemakers, with 23% being breast cancer patients and 35.4% being non-breast cancer respondents. The highest number of respondents came from Samarinda City, with 29.2% in the case group and 50% in the control group.

Table 2. Characteristics of Respondents (n=48)

| Variable | Case | | Control | | Mean |
|---|---|---|---|---|---|
| | n | % | n | % | |
| **Age (years)** | | | | | 45.25 |
| 31-35 | 2 | 4.2 | 2 | 4.2 | |
| 36-40 | 4 | 8.3 | 4 | 8.3 | |
| 41-45 | 5 | 10.4 | 5 | 10.4 | |
| 46-50 | 6 | 12.5 | 6 | 12.5 | |
| 51-55 | 4 | 8.3 | 4 | 8.3 | |
| 56-60 | 1 | 2.1 | 1 | 2.1 | |
| 61-65 | 2 | 4.2 | 2 | 4.2 | |
| **Education** | | | | | |
| Junior High School | 0 | 0 | 1 | 2.1 | |
| Senior High School | 8 | 16.7 | 17 | 35.4 | |
| College | 16 | 33.3 | 6 | 12.5 | |
| **Occupation** | | | | | |
| Civil servant | 4 | 8.3 | 1 | 2.1 | |
| Private sector | 5 | 10.4 | 5 | 10.4 | |
| Enterpreneur | 4 | 8.3 | 1 | 2.1 | |
| Housewife | 11 | 23.0 | 17 | 35.4 | |

| Variable | Case | | Control | | Mean |
|---|---|---|---|---|---|
| | n | % | n | % | |
| **Address** | | | | | |
| Tenggarong | 6 | 12.5 | 0 | 0 | |
| Balikpapan | 4 | 8.3 | 0 | 0 | |
| Samarinda | 14 | 29.2 | 24 | 50.0 | |

Table 3. Bivariate Analysis of Variables (n=48)

| Variable | Breast cancer | | Not breast cancer | | P value | OR |
|---|---|---|---|---|---|---|
| | n | % | n | % | | |
| **Duration of Bra Usage** | | | | | 0.248 | 2.333 |
| ≥24 hours | 14 | 58.3 | 9 | 37.5 | | |
| <24 hours | 10 | 41.7 | 15 | 62.5 | | |
| **Age at first bra usage** | | | | | 0.050 | N/A |
| <12 years old | 5 | 20.8 | 0 | 0.0 | | |
| ≥12 years old | 19 | 79.2 | 24 | 100.0 | | |
| **Bra Size Suitability** | | | | | 1.000 | N/A |
| Suitable | 23 | 95.8 | 24 | 100.0 | | |
| Oversized | 1 | 4.2 | 0 | 0.0 | | |
| **Type of bra** | | | | | 0.739 | 0.639 |
| Wired | 5 | 20.8 | 7 | 29.2 | | |
| Non-wired | 19 | 79.2 | 17 | 70.8 | | |

In this study, an analysis was conducted to determine whether there is a relationship between several factors related to bra usage and the occurrence of breast cancer in women. The results of the study showed that there is no significant relationship between the duration of bra usage within 24 hours and the occurrence of breast cancer. Although the prevalence of breast cancer was higher in women who used bras for 24 hours (58.3%) compared to those who used bras for less than 24 hours (41.7%), the analysis results indicated that this difference is not statistically significant.

Furthermore, the study also evaluated the relationship between the age of first bra usage and the occurrence of breast cancer. The results showed that there is no significant relationship between the age of first bra usage and the occurrence of breast cancer. Although the prevalence of breast cancer was higher in women who first used bras at the age of ≥12 years (79.2%) compared to those who used bras at an age <12 years (20.8%), the analysis results indicated that this difference is not statistically significant.

Additionally, the variable of bra size suitability was also evaluated in this study. The results showed that there is no significant relationship between bra size suitability and the occurrence of breast cancer. Although the prevalence of breast cancer was higher in women who used bras that matched their breast size (95.8%) compared to those who used bras larger than their breast size (4.2%), the analysis results indicated that this difference is not statistically significant.

Lastly, the study also examined the relationship between the type of bra used and the occurrence of breast cancer. The results showed that there is no significant relationship between the type of bra and the occurrence of breast cancer. Although the prevalence of breast cancer was higher in women who used wire-free bras (79.2%)

compared to those who used underwire bras (20.8%), the analysis results indicated that this difference is not statistically significant. However, it is known that women who use wire-free bras have a 0.639 times greater risk compared to those who use underwire bras.

## DISCUSSION

The findings of this study reaffirm that bras are not a risk factor for breast cancer. This is in line with research that states that there is no relationship between bra usage and breast cancer, especially in terms of bra usage aspects, including cup size, average number of hours worn per day, and age of regular bra usage initiation (Chen et al., 2015). This is further supported by research that states that there is no difference in the occurrence of acute skin toxicity in women with breast cancer who use bras or do not use bras (Thongkhao et al., 2019).

Bras serve as support for women's breasts. This is to maintain the firmness of the breast shape, preventing sagging due to gravity, aging, and increased body fat (Naviri, 2016). The introduction of bras in Indonesia began in the early 19th century during the Dutch colonial era, referred to as "kutang," and it was taught to girls from a young age. Later, due to the influence of Islam and Javanese and Malay cultures, women were required to wear bras as part of their cultural norms (Woodrich, 2013). This is the reason why Indonesian women wear bras for a duration of ≥ 24 hours, including while sleeping, and only take them off briefly after bathing before putting them on again. Sleeping in a bra is currently a personal choice for women. However, in this case, the duration of bra usage is not a cause of breast cancer.

Another study claims that bras are associated with breast cancer through a meta-analysis that shows that wearing a bra while sleeping can increase the risk of breast cancer by 1.3 times. In addition, wearing a bra for more than 12 hours per day increases the risk of breast cancer by 1.08 (So et al., 2015). However, it is not known exactly how wearing a bra can cause breast cancer. The explanation obtained is based on speculation or possibilities that the disease can develop through direct or indirect pathways. The hypothesis of a direct cause is that bras, as the only item of clothing that compresses the entire covered organ, can cause disease through the production of radial scar tissue. Radial scar tissue in the breast is a proliferative hyperplastic lesion associated with an increased risk of breast cancer. Radial scar lesions in the breast are common breast disorders. These lesions have been associated with persistent breast ischemia, followed by progressive infarction of breast tissue (Rios et al., 2016).

Meanwhile, the indirect hypothesis involves the inhibition of chemical activity as a cause of breast cancer. This is because the mammary glands are the only structures in a woman's body that can migrate in all directions. When women wear bras, which restrict the movement of the mammary glands, it can impair the glands' ability to function and regulate body temperature. More than 88 percent of breast drainage occurs through the lymph nodes located in the axilla. In other words, the axillary lymph nodes are responsible for drainage. When antigens, or foreign substances, enter the body, antigenic materials and cells mediating the inflammatory response produced by local immune activity at the aggression site are collected by all lymphatic channels. These components are then transferred into the lymph flow. Antigenic substances and cells help moderate the inflammatory response caused by local immune system activity at the attack site. This is because the antigenic materials and cells mediate the inflammatory response, which explains why everything is as it is. Lymphatic vessels are known as "super information highways" because of the information they carry and the fact that lymph contains a lot of information about the local inflammatory situation

in the upstream drainage area. This is because there is information included in the lymph. Lymph contains this information. Bras with long and tight intensity can externally restrict and potentially obstruct the flow, which can hinder lymphatic drainage and cause the accumulation of potentially harmful chemicals in the breast. If the flow is obstructed, lymphatic drainage is impeded, and potentially harmful chemicals accumulate (Rios et al., 2016).

Meanwhile, 63% of teenage girls in Indonesia still believe that wearing a bra for more than 12 hours can cause breast cancer (Simangunsong, 2018). The exact causes of breast cancer in each individual are still unknown. However, many studies state that most breast cancers develop from acquired (non-inherited) genetic changes that have not yet been identified (American Cancer Society, 2022).

It is important for the public to have a better understanding of the risk factors for breast cancer, such as genetic factors like BRCA1, BRCA2, PTEN (Cowden syndrome), and TP53 (Li-Fraumeni syndrome), family history of breast cancer, exposure to ionizing radiation, hormonal and reproductive factors, prolonged estrogen hormone therapy, age, obesity, and alcohol consumption. It is also important to be aware of protective factors in breast cancer prevention, such as breastfeeding for 12 months, which can reduce the risk of breast cancer. Additionally, physical activity is a protective factor in reducing the risk of breast cancer (Gross, 2000).

The author acknowledges that there are still limitations, such as a limited sample size. Therefore, further research with a larger sample size of cases and controls, accompanied by a better study design, is highly necessary. Furthermore, it is important to re-examine other risk factors that contribute to East Kalimantan Province ranking second nationally with the highest number of breast cancer patients.

## CONCLUSION AND RECOMMENDATION

Conclusion in this study confirms that bras are not a cause of breast cancer in women in East Kalimantan. However, wearing bras for ≥ 24 hours has a 2.333 times greater risk of developing breast cancer compared to wearing bras for <24 hours. Therefore, it is recommended for women to reduce the duration of bra usage, such as removing bras during sleep, as a preventive measure to reduce the risk of breast cancer. The findings of this study also debunk the myth that wearing bras can cause breast cancer. Hence, it is important to provide communication, information, and health education to the public in order to enhance knowledge and understanding of breast cancer.

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