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Factors Associated with the Incidence of Breast Cancer in Hospitalized Patients

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ABSTRACT

Introduction: Breast cancer is the most prevalent type of cancer in Indonesia and a leading cause of cancer-related deaths. The annual increase in cases, particularly in the Province of Bangka Belitung Islands, makes this issue important to investigate. Factors such as age, body mass index, and hormonal contraceptive use are known to play a role in the incidence of breast cancer, yet few studies have explored this locally.
Objective: This study aims to determine the factors associated with the incidence of breast cancer based on age, body mass index, and hormonal contraceptive use in the inpatient ward of RSUD Dr. (H.C.) Ir. Soekarno, Bangka Belitung Islands Province, in 2024.
Method: This study employed a case-control design with a total of 176 respondents, consisting of 88 cases and 88 controls, obtained from medical records. The research was conducted from April 7 to May 18, 2025, in the inpatient wards of Class 1 RRD, Class 2 RRD, Class 3 Non-Surgical RRD, and Class 3 Surgical RRD at Dr. (H.C.) Ir. Soekarno Bangka Belitung Regional Hospital. Data collection involved obtaining permission from the Institut Citra Internasional and the hospital, identifying eligible medical records of breast cancer and non-breast cancer female patients, and conducting interviews to complete missing data. Data were then verified using a checklist and analyzed using the Chi-Square and Odds Ratio tests.
Result: The results showed no significant relationship between age and the incidence of breast cancer (p = 1.000). However, there was a significant relationship between body mass index (p= 0.000; OR = 4.956) and hormonal contraceptive use (p = 0.004; OR = 2.571) with the incidence of breast cancer.
Conclusion: In conclusion, excessive body mass index and hormonal contraceptive use are significantly associated with the incidence of breast cancer. This study is important as a basis for education and promotive-preventive interventions to control risk factors.

Keywords: body mass index, breast cancer, hormonal contraceptives

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Introduction

Breast cancer is a cancer that begins with malignant growth of the mammary gland cells, mammary gland ducts, and supporting breast tissue (Alyatul, et al., 2024). According to data from the Global Cancer Observatory (GLOBOCAN) and the International Agency for Research on Cancer (IARC), breast cancer ranks first in the number of cancer cases and is the leading cause of cancer deaths worldwide each year. The prevalence of breast cancer is 2,261,419 cases, with this cancer predominantly affecting women. The incidence rate is 88% higher in developing countries than in developed countries (55.9 and 29.7 per 100,000, respectively), and the mortality rate is 17%. The incidence of this disease is expected to increase worldwide. Breast cancer accounts for the highest percentage of new cases, at 11%, and the percentage of deaths from breast cancer is 6.9% (WHO, 2021).

In 2022, there were 2.3 million women diagnosed with breast cancer and 670,000 deaths worldwide. Breast cancer occurs in every country in women of all ages after puberty, but with rates increasing later in life. Global estimates show significant differences in the burden of breast cancer based on levels of human development. For example, in countries with a very high Human Development Index (HDI), approximately 1 in 12 women will be diagnosed with breast cancer in their lifetime, and 1 in 71 will die from the disease. Conversely, in countries with a low HDI, while only 1 in 27 women will be diagnosed with breast cancer in their lifetime, 1 in 48 will die from it (WHO, 2024).

According to GLOBOCAN (Global Cancer Observatory) data from 2022 published by the International Agency for Research on Cancer (IARC), breast cancer is the cancer with the highest prevalence in Indonesia. There were 66,271 cases, or approximately 30.1% of the total cancer cases in Indonesia. Furthermore, the death rate from breast cancer reached 22,598 cases (WHO, 2022). Worldwide, approximately 2.3 million women are diagnosed with breast cancer each year. In Indonesia, the number of breast cancer sufferers is estimated to increase by approximately 65,000 new cases annually, amounting to 42.1 cases per 100,000 people, with an average mortality rate of 17 per 100,000. Ironically, approximately 70% of cancer patients seek treatment only when the disease has reached a late stage. In fact, according to a 2021 poll, only 1 in 5 female respondents reported ever having visited a doctor for a breast examination. Furthermore, according to the Indonesian Health Insurance (BPJS Kesehatan), in 2022, cancer was the second-highest costly disease after heart disease, amounting to 3.5 trillion rupiah. One in eight women will develop breast cancer during their lifetime (Ministry of Health, 2022). Breast cancer is the most prevalent cancer in the Bangka Belitung Islands Province. According to data compiled by the Bangka Belitung Islands Provincial Health Office, the number of breast cancer cases recorded between 2020 and 2023 reached 281. The annual distribution of cases, based on the Bangka Belitung Islands Provincial Health Profile, is as follows: 68 cases in 2020, 61 cases in 2021, 73 cases in 2022, and 79 cases in 2023. This data shows a significant increase, particularly in the last two years, indicating the need for greater attention to breast cancer prevention, early detection, and management in the region. Effective health strategies are needed to reduce the incidence and impact of this disease on the community (Bangka Belitung Islands Provincial Health Office, 2021-2023).

Based on data from the Medical Records of Dr. (H.C.) Ir. Soekarno Regional Hospital, Bangka Belitung Islands Province, the number of breast cancer patients shows a significant increase each year. In 2022, there were 30 cases of breast cancer recorded with 2 deaths. This number increased drastically to 80 cases with 15 deaths in 2023, and in 2024, the number of cases recorded reached 88 cases with 15 deaths (Medical Records of Dr. (H.C.) Ir. Soekarno Bangka Belitung Regional Hospital, 2022–2024).

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Although the exact cause is unknown, hormonal contraceptive use is a risk factor that can increase the incidence of breast cancer in Indonesia. Contraceptive use in Indonesia is above the ASEAN average, with 8.5% of women using contraceptives aged 15-49 years in 2012. The most commonly used contraceptive method is hormonal contraceptives, which contain the hormones estrogen and progesterone (Avisha et al., 2024). Based on a study by Avisha et al. (2024) entitled "Risk Factors of Hormonal Contraceptive Use in Breast Cancer Incidence at Dr. Soetomo General Hospital, Surabaya," the Chi-square statistical test yielded a P-value of 0.036 with a p-value <0.05, indicating a statistically significant association between hormonal contraceptive use and breast cancer incidence.

Based on a preliminary study conducted on February 1, 2025, on patients diagnosed with breast cancer at Dr. (H.C.) Ir. A survey of 10 breast cancer patients at Dr. Soekarno General Hospital, Bangka Belitung, found that 8 (80%) of the respondents were over 40 years old when diagnosed, 6 (60%) had a BMI of over 25 kg/m² (overweight), and 8 (80%) had a history of hormonal contraceptive use, such as birth control pills, monthly and three-month injections, and implants. The average history of use was over 5 years, with various side effects, such as irregular menstruation and drastic weight gain. Based on this background, the researchers conducted a study on factors associated with breast cancer incidence at Dr. (H.C.) Ir. Soekarno General Hospital, Bangka Belitung Islands Province.

Objective

This study aims to determine the factors associated with the incidence of breast cancer based on age, body mass index, and hormonal contraceptive use in the inpatient ward of RSUD Dr. (H.C.) Ir. Soekarno, Bangka Belitung Islands Province, in 2024.

Method

This study used a case-control design with a total sample of 176 respondents (88 cases and 88 controls) obtained from medical records. This study was conducted on April 7, 2025, to May 18, 2025, in the inpatient ward of class 1 RRD, class 2 RRD, class 3 Non-Surgical RRD and class 3 Surgical RRD of Dr. (H.C.) Ir. Soekarno Bangka Belitung Regional Hospital. The data collection process includes the researcher submitting a request for data collection permission to the Institut Citra Internasional campus institution, the researcher submitting a request for data collection permission in the Medical Records of breast cancer patients and female patients without breast cancer in the Inpatient Room of Dr. (H.C.) Ir. Soekarno Bangka Belitung Regional Hospital, the researcher identified medical records according to the sample inclusion criteria, namely medical records of breast cancer patients and female patients without breast cancer in the Inpatient Room of Dr. (H.C.) Ir. Soekarno Bangka Belitung Regional Hospital. Soekarno Bangka Belitung with a sample size of 88 people each, Researchers conducted interviews with breast cancer patients and non-breast cancer patients treated in RRD class 1, RRD class 2, RRD class 3 Non-Surgical and RRD class 3 Surgical RSUD Dr (H.C.) Ir. Soekarno Bangka Belitung, whose variable data was not found in the Hospital SIMRS, Conducting an evaluation or checking the checklist whether it has been filled in completely. Data were analyzed using the Chi-Square and Odds Ratio tests.

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Result

Table 1. The Relationship of Age to Factors Associated with Breast Cancer

Age	Breast cancer incidence						ρ value	OR
	Yes		No		Total			
	n	%	n	%	n	%		
At risk	74	84.1	74	84.1	148	100	1.000	1.000
Not At risk	14	15.9	14	15.9	28	100		

Table 1. shows that 74 respondents of the same age group (84.1%) experienced breast cancer. Meanwhile, 14 respondents of the same age group (15.9%) did not experience breast cancer. The results of the Chi-Square Statistical Test obtained a p-value of 1.000 > α (0.05), so H0 is accepted. It is concluded that there is no significant relationship between age and the incidence of breast cancer at Dr. (H.C.) Ir. Soekarno Bangka Belitung Regional General Hospital in 2024.

Table 2. Relationship of Body Mass Index to Factors Associated with Breast Cancer

BMI	Breast cancer incidence						ρ value	OR
	Yes		Yes		Total			
	n	%	n	%	n	%		
At risk	59	67.0	29	30.7	88	100	0.000	4.596
Not At risk	27	33.0	61	69.3	88	100		

Table 2 shows that respondents with a high Body Mass Index (BMI) were at higher risk of breast cancer, 59 people (67.0%) compared to those without breast cancer. Meanwhile, respondents with a Body Mass Index (BMI) that was not at risk were significantly less likely to experience breast cancer, with 61 respondents (69.3%) experiencing breast cancer compared to those who did.

The Chi-Square Statistical Test results yielded a p-value of 0.000 < α (0.05), thus rejecting H0. Therefore, it was concluded that there was a significant relationship between BMI and breast cancer incidence at Dr. (H.C.) Ir. Soekarno Bangka Belitung Regional Hospital in 2024. Further analysis yielded an Odds Ratio (OR) of 4.956 (95% CI: 2.437-8.871), meaning that respondents with a BMI > 25.1 kg/m² had a 4.956 times greater risk of developing breast cancer than respondents with a BMI ≤ 25.0 kg/m².

Table 3. Relationship of Hormonal Contraceptive Use with Breast Cancer

Contraception	Breast cancer incidence						ρ value	OR
	Yes		Yes		Total			
	n	%	n	%	n	%		
At risk	60	68.2	40	45.5	88	100	0.004	2.571
Not At risk	28	31.8	48	54.5	88	100		

Table 3 above shows that respondents who used hormonal contraception (at risk) experienced a higher incidence of breast cancer, 60 people (68.2%) compared to those who did not use hormonal contraception. Meanwhile, respondents who did not use hormonal contraception (not at risk) did not experience a higher incidence, 48 people (54.5%) compared

to those who experienced breast cancer. The Chi-Square Statistical Test results obtained a p-value of 0.004 < α (0.05), thus H0 was rejected. Therefore, it was concluded that there was a significant relationship between hormonal contraceptive use and breast cancer incidence at Dr. (H.C.) Ir. Soekarno Bangka Belitung Regional Hospital in 2024.

Further analysis yielded an Odds Ratio (OR) of 2.571 (95% CI: 1.391 - 4.753), meaning that respondents who used hormonal contraceptives had a 2.571 times greater risk of developing breast cancer compared to respondents who did not use hormonal contraceptives.

Discussion

According to the researchers' assumptions, this difference in results is likely due to the equal distribution of respondents aged >40 years in the case and control groups, namely 74 individuals (84.1% each). Similarly, in the ≤40 age group, the number of respondents was also equal in both groups, namely 14 individuals (15.9%). These findings indicate that in this study, age did not significantly influence the incidence of breast cancer. These results indicate that age, particularly in the age group >40 years, was not a significant differentiating factor between the group with breast cancer (cases) and those without (controls). The majority of respondents in this study were indeed in the age range >40 years, resulting in a relatively balanced age distribution across the two groups.

According to the researchers, this may be due to the characteristics of the respondent population, the majority of whom were considered vulnerable to breast cancer. However, although age is a risk factor widely mentioned in the literature, this study did not demonstrate a direct contribution to the difference in breast cancer incidence between the two groups. It is likely that other risk factors are more influential in triggering breast cancer in respondents, such as a family history of breast cancer, suboptimal breastfeeding patterns, age at menarche, post-menopause, and lifestyle and nutritional factors. These factors have the potential to be more dominant and influence the findings of this study.

According to the researchers' assumption, Body Mass Index (BMI) is an indicator that reflects a person's nutritional status and body fat levels. When a person has a BMI above the normal limit, specifically more than 25.1 kg/m², the individual is categorized as overweight or obese. This condition is believed to play a role in increasing the risk of breast cancer, especially in postmenopausal women. Excess fat tissue produces high levels of the hormone estrogen, which is known to stimulate the growth of breast epithelial cells. If this hormone production continues at high levels, it increases the likelihood of uncontrolled cell division, which can ultimately trigger cellular changes that lead to cancer.

Furthermore, obesity also causes various other metabolic changes such as insulin resistance, increased levels of insulin-like growth factor (IGF-1), and chronic low-grade inflammation. All of these factors can create a biological environment that supports the initiation, promotion, and progression of cancer cells. Therefore, this study assumes that a high Body Mass Index is not only an indicator of excess weight but also acts as a significant risk factor for breast cancer. Researchers believe there is a significant association between high-risk BMI and increased breast cancer incidence, as supported by previous studies from various countries.

The researchers assume that hormonal contraceptive use can influence breast cancer risk due to long-term exposure to synthetic hormones, such as estrogen and progestin. These hormones are known to stimulate breast cell proliferation, which over time can increase the likelihood of cell mutation and cancer development. Furthermore, the researchers also

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assume that the duration of use, the type of hormonal contraceptive used, and the age at first use are also risk factors that potentially increase the chance of breast cancer. Therefore, it is important to conduct individual considerations and regular monitoring of hormonal contraceptive users, especially those with a family history of breast cancer or other risk factors.

Conclusion

The study conducted at Dr. (H.C.) Ir. Soekarno Regional General Hospital revealed that there was no significant relationship between age and the incidence of breast cancer. However, a significant relationship was found between body mass index (BMI) and the use of hormonal contraception with the incidence of breast cancer. These findings highlight that lifestyle factors and the use of hormonal contraception play an important role in increasing the risk of breast cancer, while age was not directly associated in this study population.

Conflict of Interest

No declare.

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