

Correlation Between Body Mass Index and Breast Cancer Case in Dr. Soetomo General Academic Hospital

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Abstract

Data of World Health Organization (WHO) 2014 stated that breast cancer ranks first in terms of the highest number of cancer incidence in Indonesia and is one of the leading causes of cancer death. Factors commonly associated with increased rates of breast cancer in general include gender, genetics, age, medical history, family history, unhealthy lifestyles such as obesity and smoking. If modifiable risk factors are corrected, the situation can be improved. This study focuses on the relation between body mass index (BMI) and breast cancer case in Dr. Soetomo General Academic Hospital. The objective of this study is to determine the correlation between body mass index and breast cancer case in Dr. Soetomo General Academic Hospital. This study uses case control design with secondary data from medical records. The sampling was calculated using Open-Epi website. The research sample used was 118 subjects, consisting of 59 breast cancer patients and 59 of normal people. As a result, out of a total of 59 respondents with breast cancer, there were 4 people (6.8%) had underweight BMI, 18 people (30.5%) had normal weight BMI, 30 people (50.8%) had overweight BMI, and 7 people (11.9%) had obese BMI. Meanwhile in normal people respondents there were 1 person (1.7%) had underweight BMI, 33 people (55.9.5) had normal weight BMI, 19 people (32.2%) had overweight BMI, and 6 people (10.2%) had obese BMI. This research concluded that there was a correlation between body mass index (BMI) and breast cancer case in Dr. Soetomo General Academic Hospital.

Keywords: Body mass index (BMI); Breast cancer; Dr. Soetomo General Academic Hospital; Women; Age 40-60

1. Introduction

Cancer is one of the health problems with the highest mortality throughout the world, especially breast cancer [1]. According to World Health Organization (WHO), breast cancer ranks first in terms of the highest number of cancer incidence in Indonesia and is one of the first contributors to cancer deaths. By the end of 2020, there were 7.8 million living women diagnosed with breast cancer in the last 5 years, making it the most common cancer in the world. In Indonesia, it has also become the first contributor to cancer death and ranks first in the highest number of cancer incidence. Based on Globocan data in 2020, the number of new cases of breast cancer reached 68,858 cases (16.6%) of the total 396,914 new cases of cancer in Indonesia. While the number of deaths reached more than 22,000 cases [18].

Factors that are often associated with increased rates of breast cancer in general are gender, genetics, age, past medical history, family history, unhealthy lifestyles such as obesity and smoking. If modifiable risk factors are corrected, the situation may improve. High body weight (measured in terms of body mass index, BMI) has been recognized as an important risk factor for breast cancer among postmenopausal women in many previous epidemiological studies [12].

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Body mass index (BMI) is a person's weight in kilograms divided by the square of height in meters (kg/m²). WHO has classified BMI into several categories such as normal, underweight, overweight, and obese.

Several studies have been conducted on the correlation between BMI and the risk of breast cancer. A study conducted in Okinawa, Japan, showed that women who are overweight during the postmenopausal age have a higher risk of developing ER-positive breast cancer compared to women of normal weight [17]. Another study revealed that every 5 kg/m² increase in BMI was associated with a 2% increase in breast cancer risk in women [19]. This phenomenon is also found in Indonesia, revealed by Kusnul Chotimah in his research that 31.25% of breast cancer patients suffer from obesity [3].

With all the previous research, the author wants to study whether there is a similar incident in Dr. Soetomo General Academic Hospital. Therefore, in this study, the relationship between body mass index and the incidence of breast cancer was investigated with a case control study.

2. Material and methods

This research is an analytical type with case control design, using secondary data from medical records to collect the breast cancer patient's data. The population in this study consist of case population and control population. The case population is breast cancer patients who had been treated at the Center for Cancer Service Development Dr. Soetomo General Academic Hospital. The control population is normal people. The sample size was calculated using Open Epi website, required 118 sample consisting 59 case sample and 59 control sample. The inclusion criteria are female patient, age 40-60, patients who diagnosed breast cancer, and patients with complete medical record data. The research instrument used were medical record data of breast cancer patients at the Center for Cancer Service Development Dr. Soetomo General Academic Hospital and antropometri. The data obtained according to variable components including body mass index and breast cancer case. All data will be processed computerized then analyzed with Chi-Square test.

3. Results and discussion

Sampling for this study was carried out from 28 February 2023 to 12 May 2023 at the Center for Cancer Service Development Dr. Soetomo General Academic Hospital Surabaya. The case samples taken were breast cancer patients undergoing chemotherapy and the control samples were normal people who did not have breast cancer. The number of samples collected was 59 subjects as a case sample and 59 subjects as a control sample. The acquired data is secondary data. The data were then tabulated using Microsoft Excel and analyzed using Statistical Products and Services Solutions (SPSS) program.

Table 1 Description of Research Data Result

BMI Category	Breast cancer		Non-Breast cancer	
	Frequency	Percentage	Frequency	Percentage
Underweight	4	6.8%	1	1.7%
Normal weight	18	30.5%	33	55.9%
Overweight	30	50.8%	19	32.2%
Obese	7	11.9%	6	10.2%
Total	59	100.0%	59	100.0%

Based on these results, it can be concluded that breast cancer patients occupy the BMI category which is not ideal more than normal people. People with breast cancer in underweight, overweight, and obese category have larger percentage than normal people.

Table 2 Analysis of Research Data

Variable	Fisher-Freeman-Halton Exact Test
Breast cancer case	0.029
Body Mass Index	

The result was analysed using Chi-Square test. However, there were 2 tables that have an expected count of less than 5 (> 20%) so it doesn't meet the Chi-Square test requirements. Therefore, the Fisher Exact Test was used. From the test result, the obtained p-value or sig. is 0.029, using an alpha 0.05, meaning the p-value < 0.05. Thus, H₀ is rejected and H₁ is accepted, which means there is a significant relationship between BMI and breast cancer case.

3.1. Obese and Overweight Category

Based on table 1, it is known that in breast cancer patients there were 4 people (6.8%) with underweight BMI, 18 people (30.5%) with normal weight BMI, 30 people (50.8%) with overweight BMI, and 7 people (11.9%) with obese BMI. Meanwhile, in normal people, there were 1 person (1.7%) with underweight BMI, 33 people (55.9%) with normal weight BMI, 19 people (32.2%) with overweight BMI, and 6 people (10.2%) with obese BMI. Based on this description it can be concluded that the largest percentage of breast cancer patients is overweight. Meanwhile, in normal people, the largest percentage is normal weight. This proves that groups of people in the overweight or even obese category are more susceptible to breast cancer.

It was also mentioned in the research conducted by Ria Irena on the Relationship between Obesity and Breast Cancer Incidence at Bangkinang Hospital, where the relationship between obesity and breast cancer obtained a p value of 0.024 (p < 0.05) thus proving that mothers who are obese are 2.199 times more at risk of developing breast cancer than mothers who are not obese [5].

The results of this study are in line with Mohanty and Mohanty [10] which states that postmenopausal obesity amplifies the risk of breast cancer, because adipose tissue acts as the major reservoir for estrogen biosynthesis after menopause. High estrogen levels in serum along with enhanced peripheral site production of estrogen have been viewed as major reasons of developing breast cancer in overweight postmenopausal women. Some breast cancers are estrogen receptor positive (ER+), meaning that estrogen stimulates the growth of breast cancer cells. So, the more adipose tissue, the more estrogen binds to ER+ cancer cells.

Fat tissue is the main site for endogenous estrogen production. Therefore, women who weigh more than a high Body Mass Index (BMI) have high estrogen levels. Obesity is also associated with low levels of Sex Hormone Binding Globulin (SHBG), which plays a role in increasing the amount of estradiol. Maintain a Body Mass Index (BMI) of around 20-25 kg/m will reduce the risk of breast cancer. Meanwhile, in the World Cancer Research Found in 2007 recommended maintaining BMI in the range of 21-33 kg/m so that it can reduce the risk of developing breast cancer.

3.2. Underweight

In underweight category, it can be seen that the percentage of breast cancer people is larger than normal people. This means that people with underweight BMI still can be at risk in developing breast cancer, even though the number is not as high as the overweight category. Even so, it's still needs to take notice because low BMI in breast cancer patients tend to has adverse prognosis. There are several factors that can cause this. First, underweight patients have decreased physiological reserve which may make them more vulnerable to adverse events. Second, underweight patients were less tolerant of cancer therapies and at higher risk of procedure-related complications. Finally, the low BMI usually finds in younger age group like 18 to 40 years old. This makes the number of underweight patients was relatively small, although the sample size was large [2].

3.3. Normal Weight

However, based on table 1, it can be seen that the incidence of breast cancer does not only occur due to a history of obesity and underweight, in fact as many as 18 respondents (30.5%) who do not have history of obesity or underweight can also suffer from breast cancer. This can happen because of the risk factors that can lead to breast cancer and were not controlled in the study, such as family history, age at menarche, age at first giving birth, history of breastfeeding, and use of hormonal contraception. So, it is possible for respondents who don't have a history of obesity or underweight to suffer breast cancer.

4. Conclusion

Based on the result of this research that has been done, it can be concluded that there is a relation between Body Mass Index and breast cancer case in Dr. Soetomo General Academic Hospital. People with overweight BMI are the most likely to have breast cancer. Following by normal weight, obese, and underweight.

Compliance with ethical standards

Disclosure of conflict of interest

The authors report no conflicts of interest.

Statement of ethical approval

The study was approved by the health research ethics committee (No. 1218/LOE/301.4.2/II/2023) on 5 February 2023.

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