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The Relationship Between Body Mass Index with Breast Cancer Incidence in Dr. M Djamil General Hospital Padang

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ABSTRACT

Introduction: Breast cancer is a type of cancer that most commonly found in women. There are several risk factors for breast cancer where the primary cause has not been established. Few studies have investigated the association between body mass index (BMI) and breast cancer but still uncertain. The aim of this study is to know the correlation between BMI and breast cancer in Dr. M. Djamil General Hospital Padang.
Methods: This research was conducted in September 2015 until March 2016 with the case-control study design of 100 breast cancer cases and 100 age matched cancer-free controls. Samples taken from the cases of the medical records of Surgical Oncology of Dr. M. Djamil General Hospital Padang. Pearson Chi Square test was used to assess the relationship between the variables.
Result: The result showed 44% of cases and 49% of controls within BMI≥25, 39% of cases and 29% of controls within BMI 18.5 to 22.9, and the rest was in the BMI range of 23 to 24.9. From the Chi Square test, resulted as p = 0.304 for BMI to the cases and control groups.
Conclusion: There was no significant correlation between body mass index with the incidence of breast cancer in the studied population. It needed to do further research on other factors that may be related.

Keywords: body mass index, breast cancer, risk factor

INTRODUCTION

Breast cancer is the leading cause of cancer-related deaths among women in developing countries. It ranks second in global cancer incidence, with an estimated 1.67 million new cases (25% of all cancers) in 2012, slightly more common in developing countries than in developed ones. In the United States, there were 232,340 new invasive breast cancer cases and 39,620 related deaths.[1]

In Indonesia, breast cancer had the second-highest prevalence after cervical cancer in 2013, with rates of 0.8‰ for cervical cancer and 0.5‰ for breast cancer. In West Sumatra, the prevalence of breast cancer among women was 0.9‰—higher than the national average—placing it third among 33 provinces after Yogyakarta and East Kalimantan.[2]

The exact cause of breast cancer remains unclear. However, research shows several risk factors associated with increased risk, which are categorized into modifiable and non-modifiable factors. Age, early menarche, late menopause, and genetic

factors are non-modifiable. Obesity, physical activity, hormone replacement therapy, alcohol use, lactation, oral contraceptives, and diet are considered modifiable risk factors.[3]

Obesity may increase the risk of breast cancer because fat tissue synthesizes estrogen, which stimulates breast tissue proliferation. High estrogen concentrations may stimulate breast cancer cells. Several studies indicate that obesity raises breast cancer risk in postmenopausal women.[4,5] However, a 2012 study by Anderson in the U.S. also found a link between obesity and breast cancer in premenopausal women.[6]

According to Indonesia's 2013 Basic Health Research (Riskesdas), the obesity rate (BMI >25) among women over 18 years was 14.8% in 2007 and rose significantly to 32.9% by 2013. In West Sumatra, the adult female obesity rate (>15 years) in 2007 was 21.2%.[7]

A 2011 study by Faiz on stage 1 and 2 breast cancer patients at Haji Adam Malik Hospital, Medan, found that 25 out of 31 patients (80.6%) were classified as class I obese (BMI 25–29.9 kg/m²), 3 patients (9.7%) as class II obese (BMI >30), 2 (6.5%) overweight (BMI 23–24.9), and only 1 within the normal range. This indicates a high distribution of breast cancer cases among obese individuals.[8]

A 2006 study by Azamris also found that overweight individuals (BMI ≥23) had 2.29 times greater risk of developing breast cancer compared to those with normal BMI at Dr. M. Djamil General Hospital, Padang.[9]

MATERIALS & METHODS

This study was an observational analytic study using a case-control design, conducted in the Surgical Oncology Department at Dr. M. Djamil General Hospital, Padang, from September 2015 to March 2016. The study population included all inpatient and outpatient breast cancer patients at Dr. M. Djamil General Hospital.

Case samples consisted of female patients recorded in the medical records of the Surgical Oncology Department who had Body Mass Index (BMI) data and were diagnosed with breast cancer. Control samples were patients' family members or companions who visited the outpatient clinic and were randomly selected using an age-matching technique with the case group.

Controls who suffered from diabetes, cancer, or cardiovascular disease were excluded from the study. The sample size was calculated based on the appropriate formula, resulting in 100 individuals for each group (cases and controls), with a total of 200 samples.

The data were analyzed using computer software. Data analysis included univariate and bivariate analyses.

STATISTICAL ANALYSIS

The results of the study were computerized using the *Statistical Package for the Social Science* (SPSS) application with the chi-Square test, whose significance value is 5%. Interpretation is based on the theory that the hypothesis is rejected if the probability is > 0.05, while if the probability is < 0.05, then the hypothesis is accepted.

RESULT

The study was conducted at Dr. M. Djamil General Hospital, Padang, from February 15 to March 2, 2016. A total of 200 samples met the inclusion and exclusion criteria, consisting of 100 cases and 100 controls. The patient characteristics are described as follows:

Table 1. Frequency distribution based on patient characteristics

	Case	Control
	n (%)	n (%)
Age Distribution		
<30	2	8
30-39	8	5
40-49	39	40
50-59	41	39

≥60	10	8
Average age	49,1	49
DS	8,8	9,6
Occupation		
Civil servants	47	47
Private employees	4	10
Entrepreneurs	1	10
Farmers/fishermans	2	2
Housewives/unemployed	46	31
Educational Background		
Elementary school	3	4
Junior high school	2	4
Senio high school	12	30
Diploma/bachelor	16	56
Magister	4	6
Unknown	23	0
Menopausal Status		
Premenopause	52	60
Postmenopause	48	40

The highest number of breast cancer cases occurred in the 50–59 year age group (41 patients). The number of cases increased with age up to 59, then decreased in the over-60 group. Patient ages ranged from 28 to 79 years. The age distribution was homogeneous between case and control groups.

Most participants were civil servants (47%) in both groups, followed by housewives/unemployed, and then private employees, entrepreneurs, and farmers/fishermen.

The most common education level was diploma/bachelor's degree: 16% in the case group and 56% in the control group. In the case group, 23% had unknown education levels.

Among the case group, 52% were premenopausal; in the control group, this was 60%.

Table 2. Frequency distribution based on body mass index

	Case	**Control**	**Total**
	n (%)	**n (%)**	
Body Mass Index			
Normal	39	29	68
Overweight	17	22	39
Obesity	44	49	93

Table 2 shows that most individuals in both groups had BMI ≥25: 44% in the case group and 49% in the control group. The BMI variation between the groups was relatively similar.

Table 3. BMI by Breast Cancer Subtype

	Luminal A	**Luminal B**	**HER2+**	***TNBC***	**Total**
	n (%)	**n (%)**	**n (%)**	**n (%)**	
BMI					
Normal	8(53,3)	13(52)	6(40)	1(14)	28
Overweight	1(6,7)	2(8)	2(13,3)	3(43)	8
Obesity	6(40)	10(40)	7(46,7)	3(43)	26
Total	15	25	15	7	62

Table 3 shows that the most common breast cancer subtype was Luminal B. Luminal A and HER2+ each accounted for 15 cases. A total of 37 cases could not be classified by subtype.

Table 4. Statistical Analysis of BMI and Breast Cancer

	Case	Control	Total	*p value*
	n (%)	n (%)		
BMI				0.304
Normal	39	29	68	
Overweight	17	22	39	
Obesitas	44	49	93	

Table 4 presents the chi-square test results with a p-value of 0.304 (p>0.05), indicating no statistically significant association between BMI and breast cancer incidence in this population.

DISCUSSION

In this study, the age group with the highest number of breast cancer cases was 50–59 years (41%), with an average patient age of 49.1 years. A similar study by Norsa'adah et al. (2005) involving 147 breast cancer patients in Kelantan, Malaysia, found the highest proportion in the 41–55 year group (59.9%) with a mean age of 46.3 years.[10] A study by Li et al. (2014) in China involving 4,211 breast cancer cases showed a mean age of 48.7 years, predominantly in the 40–69 year age group.[11] Azamris (2006) also reported a similar pattern, with most patients in the 40–50 year group (34.3%).[9]

The dominant education level was diploma/bachelor's degree (16% in cases, 56% in controls), typically associated with higher socioeconomic status. Moorman et al. found that 81.9% of 791 subjects had a high school education or higher.[12] This does not imply that those with higher education levels are more at risk, but rather reflects the profile of patients seeking treatment at Dr. M. Djamil Hospital. Occupational data showed that most participants in both groups were civil servants or housewives/unemployed. These results align with Situmorang's (2012) study in RSU Dr. Pirngadi Medan, which found that 55.56% of breast cancer patients were housewives.[13]

The frequency of premenopausal status was similar between groups: 52% in cases and 60% in controls. Norsa'adah et al. (2005) found that 72.8% of breast cancer patients were premenopausal. Most case group participants had a BMI ≥25 (44%), which aligns with Norsa'adah's (2005) finding of 49.7% in the same category. The BMI distribution in both groups was nearly identical: 70.7% in cases and 73.2% in controls.[10]

The most common subtype of breast cancer in this study was Luminal B, unlike the findings of Sueta et al. (2012) and Yang et al. (2007), who reported Luminal A as the most frequent subtype (around 70%).[14,15] This discrepancy may be due to differences in classification—this study only used ER, PR, and HER2 status and did not assess Ki-67 levels. Including Ki-67 could reclassify Luminal A cases as Luminal B when Ki-67 is positive.

This study found that overweight and obese individuals were more associated with the triple-negative and HER2+ subtypes compared to normal weight individuals, who were more associated with Luminal A. In postmenopausal women, obesity is generally linked to higher plasma estrogen due to fat tissue and an increased risk of ER+ breast cancer.[16] The mechanism is still unclear, but hypotheses suggest that obesity may influence breast cancer through inflammation, insulin, IGF, and adipokine pathways, contributing to triple-negative subtype development.[17]

This study found no significant association between BMI and breast cancer (p > 0.05), consistent with findings by Indrati et al. (2015), who also found no such relationship.[18] However, this contrasts with other studies that did find significant associations.[9,10]

The increased risk of breast cancer with higher BMI in postmenopausal women may be due to increased estrogen synthesis via aromatase enzymes in fat tissue.[19,20] Some U.S. studies suggest a protective effect of obesity in premenopausal women due to

frequent anovulation and lower estradiol and progesterone levels. However, this association remains uncertain.[21] Anderson's (2012) study found that even premenopausal obese women are at risk, likely due to differences in study design and population risk factor exposure.[6]

Geographic differences may explain inconsistent results. Obesity may be associated with breast cancer in Western countries, where obesity rates are higher than in Indonesia. Furthermore, BMI only estimates fat percentage and does not reflect fat distribution accurately, especially in muscular individuals like athletes. Other unmeasured factors, such as genetics, hormones, and lifestyle, may also influence breast cancer risk.

CONCLUSION

Statistical analysis showed no significant association between body mass index and the incidence of breast cancer among patients at Dr. M. Djamil General Hospital Padang.

Declaration by Authors

Ethical Approval: Approved

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