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The Correlation between the Level of Physical Activity and the Incidence of Breast Cancer in RSUD Dr. Soetomo Surabaya

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ABSTRACT

Breast cancer is one of the most common cancers worldwide. This study aims to investigate and analyze the relationship between the level of physical activity and the occurrence of breast cancer at Dr. Soetomo Hospital Surabaya. The research method employed in this study is correlation analysis. The sample population was obtained from the Cancer Service Development Center (PPLK) at Dr. Soetomo Hospital Surabaya. The results of this study indicate that the majority of the 53 research subjects suffering from breast cancer had low-intensity physical activity since childhood to adolescence, with 41.5% of the total subjects (22 patients). In contrast, only 24.5% (13 patients) and 34% (18 patients) had moderate and high-intensity physical activity, respectively. Statistical analysis using Microsoft Excel version 2019 and SPSS showed that the calculated Chi-square value was greater than the tabulated Chi-square value, thus rejecting the null hypothesis (H0). This indicates a significant relationship between the intensity of physical activity during childhood to adolescence and the occurrence of breast cancer in the research subjects. This study implicates the importance of awareness regarding the significance of physical activity in maintaining breast health, especially from a young age. The practical implication of this research is the necessity of a preventive approach to breast cancer involving the promotion of a healthy lifestyle and regular physical activity, particularly during childhood and adolescence.

Keywords: Physical Activity; Breast Cancer; GPAQ; RSUD Dr. Soetomo Surabaya.

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INTRODUCTION

Breast cancer is a malignant tumor that develops in breast tissue (Anggraini et al., 2018). This type of cancer is one of the most common cancers. In 2020, breast cancer ranked number one in the world as the type of cancer with the newest cases. More than two million people in the world had breast cancer that year (Huang et al., 2022).

Based on data from the Global Cancer Observatory (2020), breast cancer cases have a high prevalence in Indonesia (Ng et al., 2023). The incidence of new cases of breast cancer in Indonesia reached 68,858 cases, and the death rate was more than 22 thousand people in 2020 (Hamami et al., 2022). This makes breast cancer one of the first causes of death due to cancer in Indonesia.

Breast cancer can be prevented in several ways, including avoiding risk factors. Although the etiology of breast cancer is still not entirely known, several risk factors influence the development of breast cancer (Hutagalung & Utomo, 2017). According to researchers, breast cancer has several risk factors, including consumption of alcohol and cigarettes, BMI, and inappropriate amount of physical activity. Etc (Singh & Sharma, 2020).

Physical activity is any body movement that expends more energy than when resting (Lieberman, 2020). The physical activity that is often recommended is moderate to vigorous physical activity or MVPA (Lieberman, 2020). Physical activity is often referred to as one thing that affects body functions, such as strengthening muscles and bones and losing weight. Apart from that, regular physical activity also plays a role in reducing risk factors for various diseases, one of which is cancer (Adraskela et al., 2017).

The intensity of physical activity is divided into two: absolute and relative. Absolute physical activity is measured based on how complex the activity is. For example, in aerobic activity, the intensity of physical activity is measured based on the energy expended. The amount of energy expended during physical activity is usually classified in MET units or Metabolic Equivalent of Task. MET is the energy amount expended based on specific activities (Hills et al., 2014).

One MET is the energy expended while resting or sitting still, equivalent to calorie consumption of 1 kcal/kg/hour. Absolute intensity is divided into three categories: low, moderate, and high. Compared to sitting still (low intensity), the calories consumed at moderate intensity are four times more. Meanwhile, for high activities, it is eight times more. So, it can be concluded that physical activity is classified as moderate intensity if the energy expended is 4.0 MET and high intensity if the energy expended is 8.0 MET (WHO, 2020).

If absolute intensity measures are based on how hard the activity is performed, relative intensity measures are based on the subject. Relative intensity measures the cardiorespiratory fitness of subjects performing physical activity. For example, in aerobic activity, the intensity of physical activity is measured by measuring the percentage of maximum VO_2, VO_2 reserve, maximum H.R. (heart rate), or H.R. reserve. In addition, relative physical activity intensity can be measured by asking the subject how they feel when doing physical activity (such as using a 0-10 scale) (Henry & Moore, 2016).

In previous research, breast cancer was often associated with the intensity of physical activity as a risk factor. According to researchers, physically inactive people have a higher risk of cancer (Friedenreich et al., 2021) (Ligibel et al., 2019). However, according to researchers, a history of physical activity is not related to the incidence of breast cancer (Boeke et al., 2014). Therefore, the relationship between breast cancer and physical activity requires further research. According to WHO (2020), physical activity is all movements that require energy and are carried out using skeletal muscles (Ramsey et al., 2021). WHO (2021) recommends that adults do a minimum of 150 minutes of moderate-intensity physical activity, 75 minutes of vigorous-intensity, or 600 MET (Metabolic Equivalent of Task) minutes/per week (Wickramarachchi et al., 2021).

Based on the background above, the objective of this study is to determine and analyze the relationship between the level of physical activity and the incidence of breast cancer at Dr. Soetomo Hospital Surabaya. The benefits of this research are to provide a better understanding of the role of physical activity in preventing breast cancer, to provide a basis for the development of effective preventive interventions, and to increase awareness of the importance of a healthy lifestyle and physical activity in maintaining breast health.

METHOD

This type of research is a correlation analysis study. The research was conducted using a survey method by asking respondents the questions in the questionnaire. The sample population was obtained from the Pusat Pengembangan Layanan Kanker (PPLK) RSUD Dr. Soetomo Surabaya. This research uses a case-control design. The inclusion criteria used in this study were female patients aged 40 – 60 years. The independent variable in this study is the patient's physical activity level, while the dependent variable is the incidence of breast cancer. This research uses the GPAQ or Global Physical Activity

Questionnaire published by WHO. GPAQ measures physical activity levels based on MET (Metabolic Equivalent of Task). This questionnaire has moderate validity if tested on samples aged less than or equal to 60 years. A more careful and detailed interpretation is needed if tested on people over 60. GPAQ has been translated into Indonesian by the author, and the validity value of this questionnaire is 0.64. Meanwhile, the reliability value is 0.625, meaning this questionnaire is valid and reliable. Researchers will convert the questionnaire results into MET units using the MET calculation formula in the GPAQ guidebook in data processing.

RESULTS AND DISCUSSION

The following data on the distribution of physical activity intensity from childhood to adolescence (8 - 18 years) in breast cancer patients aged 40-60 years and control sample (non-cancer patients) taken from June to August are as follows:

Table 1 Data Distribution

	Breast Cancer Patient	Healthy Woman (Non-Breast Cancer)	Total
Low	22	11	33
Moderate	13	13	26
High	18	29	47
Total	53	53	106

The expected value from the data in Table 2 is shown in table 2 below.

Table 2 shows the expected value.

	Breast Cancer Patient	Healthy Woman (Non-Breast Cancer)	Total
Low	16,5	16,5	33
Moderate	13	13	26
High	23,5	23,5	47
Total	53	53	106

The results of the Chi-square calculation in this study are shown in Table 3 below.

Table 3 Chi-square Calculation Results

Probability	0,0441321
x^2	6,2411348
Chi-square table	5,9914645

The x^2 value was more significant than the Chi-square table value, so the H0 value was rejected. Rejected H0 is interpreted that there is a correlation between the intensity of physical activity at 8 – 18 years old and the incidence of breast cancer.

The following is a multivariate calculation using SPSS 26.

Table 4 Multivariate P-value Calculation Results

		B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for Exp(B) Lower	Upper
Step 2[a]	Low Intensity			7.456	2	0.024			
	Moderate Intensity	-1.593	0.586	7.381	1	0.007	0.203	0.064	0.642
	High Intensity	-0.367	0.569	0.415	1	0.520	0.693	0.227	2.116

Table 4 shows that the P-value value is 0.007. This value is smaller than 0.05, which means there is a significant influence between the level of physical activity and the incidence of breast cancer in RSUD Dr. Soetomo Surabaya.

Characteristics of Samples

All patients involved as subjects of this research were female breast cancer patients. Patients who are included in the inclusion criteria are aged 40 to 60 years; this aims to avoid other risk factors for breast cancer, namely BRCA gene mutations (Arpino et al., 2016). This study also only included breast

cancer patients who were fully aware so they could answer the questionnaire questions optimally. Apart from that, for the comparison variable, the authors also distributed questionnaires to healthy women (not currently suffering from or ever who have breast cancer) aged 40 to 60 years.

The Effect of Physical Activity on Breast Cancer Incidence

This research uses the Global Physical Activity Questionnaire (GPAQ) questionnaire instrument published by WHO. This questionnaire has been translated into Indonesian and is declared valid. This questionnaire assesses several types of physical activity: physical activity during work, transportation, sports or recreation, and sedentary behavior. Apart from that, there are also three types of physical activity classification, namely low, moderate, and heavy, based on the total MET (Metabolic Equivalent of Task) calculation. Research subjects were interviewed regarding the physical activity they did at the age of 8 to 18, namely during the thelarche or breast development period (Cugno & Azzi, 2022).

In data processing, it was found that of the 53 breast cancer patients who were research subjects, 41.5% or 22 patients had low-intensity physical activity from childhood to adolescence. Meanwhile, 13 (24.5%) and 18 (34%) patients were for moderate and high intensity, respectively. This shows that most of the breast cancer patients who were the subjects of this study had low physical activity when they were children and teenagers. After obtaining the data, data analysis was carried out using Microsoft Excel version 2019 and SPSS. Data analysis found that the calculated Chi-square value was more significant than the table Chi-square value, so the H_0 value was rejected. H_0, which was rejected, interpreted that there was a relationship between the intensity of physical activity from childhood to adolescence and the incidence of breast cancer.

The results of this study are research by researchers, which state that increasing physical activity is a supporting factor in lowering the risk of breast cancer (Consortium, 2022). The results of this study are also similar to the results of several previous studies, which stated that the level of physical activity is related to the incidence of breast cancer (Ligibel et al., 2019). This is also supported by a previously existing theory, which states that low levels of physical activity can be a risk factor for various diseases, one of which is breast cancer (Lontoh et al., 2020).

Physical activity and obesity are two interrelated things. By doing the appropriate amount of physical activity, obesity can be prevented and can reduce the risk of various diseases, including breast cancer (Ligibel et al., 2019). Obesity can increase breast cancer risk factors in women before and after menopause. A diet can be categorized as bad if the food consumed is high in starch, sugar, saturated, and trans-saturated fats but low in fiber, omega-3 fatty acids, and natural antioxidants (Seiler et al., 2018). Besides poor diet, daily sedentary behavior (such as sitting or lying) can also increase the risk of cancer and other non-communicable diseases (Syamsudin et al., 2021).

According to researchers, physical activity also has a positive relationship with sex hormones, namely SHBG (sex hormone-binding-globulin) (Friedenreich et al., 2021). Ideal physical activity can increase SHBG so that the risk of breast cancer decreases. Vice versa, a decrease in SHBG can increase the risk of breast cancer (Hawkins et al., 2019).

CONCLUSION

The level of physical activity is closely related to the occurrence of breast cancer. In the group of breast cancer patients, more individuals reported engaging in low-intensity physical activity since childhood to adolescence. Conversely, in the non-breast cancer group, more individuals were reported to engage in high-intensity physical activity between the ages of 8-18 years. Therefore, the higher the intensity of physical activity during childhood to adolescence, the lower the incidence of breast cancer. The implication of this research underscores the importance of paying attention to and promoting sufficient physical activity from an early age as part of breast cancer prevention strategies. This

reaffirms that patterns of physical activity during development can affect the risk of breast cancer later in life, and supports the adoption of an active lifestyle as a proactive step in maintaining breast health.

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