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Comparison of Quality of Life in Breast Cancer Patients with Ovarian Insufficiency After Anthracycline and Taxane-Based Chemotherapy at Dr. Soetomo General Hospital, Surabaya

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ABSTRACT

Background: A comparison of anthracycline- and taxane-based chemotherapy in relation to the incidence of ovarian insufficiency and its impact on patients' quality of life in women at Dr. Soetomo General Hospital, Surabaya. Objective: To assess the difference in quality of life among breast cancer patients with ovarian insufficiency who received anthracycline- and taxane-based chemotherapy. Methods: This retrospective cohort study was conducted involving breast cancer patients with ovarian insufficiency who received chemotherapy at Dr. Soetomo General Hospital. Data were collected using validated questionnaires. Statistical analysis using the Mann-Whitney U test to determine the effect of anthracycline and taxane-based chemotherapy on patients' quality of life. Results: It can be determined that there is a relationship between the type of chemotherapy for breast cancer patients and differences in quality of life. This is consistent with the study's P-value of < 0.05, which means it is statistically significant. In terms of mean differences, it was found that there is a lower QOL value in the taxane group; however, this is still heavily influenced by other variables that may not have been assessed in this study. Conclusion: Breast cancer patients with ovarian insufficiency who underwent anthracycline-based chemotherapy experienced significantly worse quality of life compared to those treated with taxane-based chemotherapy ($p = 0.025$).

KEYWORDS: Breast Cancer, Quality of Life, Ovarian Insufficiency, Taxane Chemotherapy, Anthracycline Chemotherapy.

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INTRODUCTION

Breast cancer is a type of cancer that occurs when abnormal cells in the breast grow uncontrollably. It is the most common cancer among women worldwide [1], although men can also develop breast cancer [2]. Various treatment modalities for breast cancer have been developed, including chemotherapy. One of the side effects of chemotherapy is ovarian insufficiency [3].

Post-chemotherapy ovarian insufficiency can cause symptoms such as hot flashes, sleep disturbances, decreased libido, and mood changes. This condition can significantly affect a patient's quality of life [3].

Anthracycline chemotherapy, such as doxorubicin and epirubicin, has been associated with a higher risk of ovarian insufficiency compared to taxanes, such as paclitaxel and docetaxel. Studies have shown that exposure to anthracyclines during chemotherapy can cause direct damage to ovarian follicles, which can disrupt ovarian function and lead to ovarian failure. On the other hand, taxanes tend to have a lower risk of ovarian dysfunction. Taxanes work in a different way to inhibit cancer cell division, and while they still have the potential to cause damage to the ovaries, the risk is generally lower than with anthracyclines [4].

Given these differences in ovarian toxicity and their potential impact on patients' well-being, it is important to comprehend how each chemotherapy regimen affects overall quality of life. This paper aimed to assess the difference in quality of life among breast cancer patients with ovarian insufficiency who received anthracycline- and taxane-based chemotherapy.

RESEARCH METHOD

The study design is an analytical observational study with a retrospective cohort approach, comparing the quality of life in breast cancer patients with ovarian insufficiency who received anthracycline-based versus taxane-based chemotherapy at Dr. Soetomo General Hospital. Data was collected from the medical records of Dr. Soetomo General Hospital in Surabaya.

Inclusion criteria included:
Postmenopausal breast cancer patients (aged 40-50 years) undergoing their first course of anthracycline or taxane chemotherapy at Dr. Soetomo General Hospital.
The patient or family agreed to participate in the study.

Exclusion criteria included:
Patients who had previously received hormonal therapy or chemotherapy.
Patients who had undergone a hysterectomy or a bilateral salpingo-oophorectomy.
Patients who received a combination of both types of chemotherapy or received fewer than 6 cycles of chemotherapy.
Patients with a history of blood clotting disorders, immune factors, or hormonal disorders.

Incomplete medical records.
Patients who met the inclusion criteria were assessed using the MENQOL (Menopause-Specific Quality of Life Questionnaire). Data analysis was then performed using the Mann-Whitney U test in SPSS v23 for Windows.

RESULTS

During the study period, a total of 40 research subjects were obtained, with 20 of them receiving anthracycline chemotherapy and 20 patients receiving taxane chemotherapy.

Table 1: Sample Study Characteristics

Variables		Mean ± standar deviation or n (%)
Age		41,63 ± 4,63
Type of Chemotherapy	Anthracycline	20 (50,0%)
	Taxane	20 (50,0%)
Quality of Life		33,83 ± 9,91

There was a significant difference between the anthracycline and taxane groups in the variables of fatigue, difficulty sleeping, and anxiety, with a P-value < 0.05. The average MENQOL score was higher for the anthracycline group.

Table 2: Mann-Whitney U test for physical and emotional function

Physical and Emotional Function	Mean ± deviation		p
	Taxane	Anthracycline	
Fatigue	2,45 ± 0,89	3,45 ± 0,61	0,010*
Insomnia	2,2 ± 0,89	3,2 ± 0,69	0,001*
Anxiety or tension	2,05 ± 0,95	2,75 ± 1,07	0,039*
Feeling sad or depressed	1,85 ± 0,81	2 ± 0,73	0,437
Mood swings	2 ± 0,73	1,85 ± 0,75	0,558
Body dissatisfaction	2,35 ± 0,49	2,35 ± 0,75	0,988

There was a significant difference between the anthracycline and taxane groups in the variables of hot flashes, night sweats, and decreased sexual desire, with a P-value < 0.05. The average MENQOL score for these symptoms was higher in the anthracycline group.

Table 3: Mann-Whitney U test for Menopause Sign

Menopause Sign	Mean ± deviation		p
	Taxane	Anthracycline	
Hot flashes	2,5 ± 0,61	3,6 ± 0,59	0,021*
Night sweats	1,85 ± 0,99	2,3 ± 0,66	0,038*
Vaginal dryness	2,15 ± 0,88	2,15 ± 0,93	0,988
Reduced libido	1,95 ± 0,51	2,65 ± 0,75	0,002*
Dyspareunia	1,8 ± 0,69	1,7 ± 0,47	0,817

There was a significant difference between the anthracycline and taxane groups in the variable of family and friend support, with a P-value < 0.05. The average MENQOL score was higher in the anthracycline group.

Table 4: Mann-Whitney U test for Social and Relationship Domain

Social and Relationship Domain	Mean ± deviation		p
	Taxane	Anthracycline	
Family and Friend Support	1,1 ± 0,72	1,75 ± 0,44	0,033
Self Confident	1,85 ± 0,59	1,9 ± 0,79	0,988
Comfortable talking about the condition	1,55 ± 0,37	1,65 ± 0,75	0,048

There was a significant difference between the anthracycline and taxane groups in the variable of optimism about the future, with a P-value < 0.05. The average MENQOL score was higher in the anthracycline group.

Table 5: Mann-Whitney U test for Health and Future Outlook

Health and Future Outlook	Mean ± deviation		p
	Taxane	Anthracycline	
Feeling healthy	2 ± 0,79	1,9 ± 0,45	0,819
Optimistic about the future	2,1 ± 0,79	2,55 ± 0,89	0,015
Feeling that my life is still meaningful	2,25 ± 0,44	2,25 ± 1,02	0,524

DISCUSSION

In the group that received anthracycline compared to taxane, there was a significant difference in the variables of hot flashes, night sweats, and decreased sexual desire, with a P-value < 0.05. The average MENQOL score was higher for the anthracycline group.

[5] reported on menopausal symptoms after chemotherapy. A prospective study of 124 young women post-chemotherapy reported that patients experienced a significant increase in vasomotor symptoms (hot flashes, night sweats) compared to before treatment ($p<0.01$). Patients with an Anti-Mullerian Hormone (AMH) level of < 0.10 ng/mL (a sign of very low ovarian reserve) had a higher risk for hot flashes (OR = 2.2, $p=0.04$) compared to those with higher AMH.

The symptoms of hot flashes in breast cancer patients undergoing chemotherapy with anthracyclines and taxanes are closely related to a disruption of the body's hormonal and thermoregulatory systems. Ovarian Damage from Chemotherapy Chemotherapy drugs like doxorubicin (an anthracycline) and paclitaxel (a taxane) are gonadotoxic. They damage ovarian follicles, causing a drastic decrease in estrogen production. This leads to premature menopause, especially in premenopausal women. Disruption of the Thermoregulatory Center in the Hypothalamus Estrogen plays a crucial role in maintaining the stability of the thermoregulatory center in the hypothalamus. The drop in estrogen causes hypersensitivity to changes in internal body temperature. The hypothalamus misinterprets the body's temperature as being too hot, triggering peripheral vasodilation and excessive sweating to "cool down" the body, which leads to the sensation of hot flashes. The Role of Neurotransmitters The decrease in estrogen also affects the levels of neurotransmitters like norepinephrine and serotonin. This imbalance worsens thermoregulatory disturbances and intensifies vasomotor symptoms like hot flashes, causing patients to sweat easily due to the compromised thermoregulation. Estrogen is vital for maintaining the health of the vaginal mucosa, including its moisture, elasticity, and epithelial thickness. Vaginal Mucosal Atrophy The decrease in estrogen causes atrophy of the vaginal epithelium: the mucosal lining becomes thinner, drier, and more fragile. Vaginal secretion production decreases, reducing natural lubrication. As a result, patients experience vaginal dryness, itching, pain during sexual intercourse (dyspareunia), and sometimes a burning sensation. Changes in Microbiota and pH Estrogen also helps maintain an acidic vaginal pH and supports the growth of lactobacillus. A decrease in estrogen causes the pH to rise, leading to changes in the normal flora and increasing the risk of infection and irritation. This also affects sexual desire. Some chemotherapy agents can affect the function of the central nervous and endocrine systems, worsening a decrease in libido. Side effects such as nausea, pain, and fatigue also reduce energy and interest in sexual activity [6].

The impact on emotional function is also a finding consistent with the literature. Breast cancer patients undergoing chemotherapy often experience increased levels of anxiety, depression, and psychological distress due to treatment side effects, changes in body image, and prognostic uncertainty [7]. The emotional difference between the two groups may reflect a greater intensity or type of side effect that triggers a negative emotional response in one regimen, or there may be other psychological factors that interact with the type of chemotherapy administered. For example, more severe fatigue or chronic pain caused by one regimen may be directly correlated with increased emotional distress [8].

Conversely, the absence of a significant difference in menopausal symptoms, social and relationship aspects, and general health and future outlook indicates that, despite differences in physical and emotional function, both chemotherapy regimens have a similar impact on these aspects of quality of life. Menopausal symptoms, such as hot flashes, night sweats, or vaginal dryness, are often induced by chemotherapy due to ovarian suppression. This finding may suggest that both anthracyclines and taxanes have similar effects in inducing or worsening menopausal symptoms [9]. Likewise, social and relationship aspects, as well as perceptions of general health and future outlook, may be more influenced by the cancer diagnosis itself, the social support received, or the individual characteristics of the patient rather than the specific differences between the chemotherapy regimens used [10]. This suggests that interventions to improve social support and promote a positive outlook need to be provided to all breast cancer patients equally, regardless of the specific chemotherapy regimen.

CONCLUSION

The group of breast cancer patients with ovarian insufficiency who received anthracycline-based chemotherapy experienced a more severe impairment of quality of life compared to those who received taxane-based chemotherapy.

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