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The Effect of Administration of Red Guava Juice (Psidium guajava) on The Hemoglobin Levels of Breast Cancer Patients Undergoing Chemotherapy

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ABSTRACT

Background: *Breast cancer patients undergoing chemotherapy may experience side effects such as anaemia due to the use of chemotherapy drugs. Anaemia in cancer patients can worsen clinical conditions and reduce quality of life. One non-pharmacological approach that may help increase haemoglobin levels is the consumption of red guava, which contains beneficial nutrients such as vitamin C, iron, and lycopene, which play a role in increasing haemoglobin levels.*

Research Methods: *This study is a quantitative study using a pre-experimental design with a one-group pretest-posttest design. The study involved 15 participants with breast cancer-related anaemia who were undergoing chemotherapy. The intervention consisted of 250 ml of red guava juice, made from 200 g of guava and 50 ml of water, taken in the morning for 7 days. Measurements were taken using a haemoglobinometer or blood chemistry analysis.*

Research Results: *The administration of red guava juice resulted in a significant change in the subjects' haemoglobin levels; the mean haemoglobin level before the intervention was 10.4 g/dL ± 1.12 and increased to 11.7 g/dL ± 1.34 (p = 0.001).*

Conclusion: *The administration of red guava juice (Psidium guajava) significantly increased haemoglobin levels in breast cancer patients undergoing chemotherapy.*

BACKGROUND

Breast cancer is a non-communicable disease, and the number of people affected and dying from this disease continues to rise each year. Data from the WHO's Global Cancer Observatory (GLOBOCAN) in 2018 showed a 20% increase in new cases and a 14% rise in deaths. In 2022, the WHO recorded approximately 2.3 million women diagnosed with breast cancer, with 670,000 deaths worldwide. In Indonesia, the 2018 Riskesdas reported that the highest prevalence among women was for breast cancer, at 42.1 per 100,000 population. Data from the West Nusa Tenggara Health Office in 2022 recorded 57 cases, whilst at the West Nusa Tenggara Provincial General Hospital in 2023 there were 930 patients undergoing chemotherapy, with 47 deaths.

Breast cancer is the uncontrolled growth of cells in the breast, usually in the form of a tumour. These tumours can grow and spread to surrounding tissue or to other parts of the body (Yosali et al., 2019). These cells divide continuously and develop abnormally. They continue to grow, spreading to surrounding tissues and travelling through connective tissue and the bloodstream, invading vital organs and the spinal cord (Rafli et al., 2021).

According to Alfiani et al. (2022), factors contributing to breast cancer in women include age, gender, ethnicity, radiation exposure, breast abnormalities, breast density, a history of cancer, the menstrual cycle, pregnancy, and breastfeeding. Women are 100 times more likely to develop breast cancer than men. Breast cancer can be spontaneous, familial, or hereditary. Women with a family history of breast cancer have a risk twice as high as those without a family history. Other diagnoses for lumps in the breast include fibroadenoma, breast cysts, intraductal papilloma, or fibrocystic changes (Setiawan, 2023).

One way of treating breast cancer is chemotherapy, which involves administering drugs that kill cancer cells. Chemotherapy uses specific drugs to kill tumour cells by disrupting their function and reproduction. The aim of chemotherapy is to cure, control, and alleviate the condition of cancer (Kolin et al., 2016). Chemotherapy is a treatment using drugs that kill tumour cells by disrupting their function and growth. According to the National Cancer Institute, the side effects of chemotherapy can include nausea, vomiting, diarrhoea, mouth sores, hair loss, increased susceptibility to infection, reduced blood cell counts, nerve damage, and muscle pain (Haryati & Sari, 2019). Red guava contains vitamin C, iron, amino acids, and lycopene. These substances play a role in the formation of haemoglobin and protect red blood cells from oxidative damage. Several studies have shown that consuming red guava juice can significantly increase haemoglobin levels in anaemic patients, including those undergoing chemotherapy. In addition to providing nutritious food, guava also strengthens the body's resistance to infection (Arief, 2018).

Based on this, this study was conducted to determine the effect of red guava juice administration on haemoglobin levels in breast cancer patients undergoing chemotherapy at the NTB Provincial General Hospital.

RESEARCH METHODS

This study is a quantitative study employing a single-group design with pre- and post-tests and a pre-experimental design. The study subjects comprised 15 patients suffering from anaemia due to breast cancer and currently undergoing chemotherapy. The intervention consisted of administering 250 ml of red guava juice—made from 200 grams of guava and 50 ml of water—in the morning for seven days. Measurements were taken using a haemoglobinometer or blood chemistry analyser. This study was conducted on breast cancer patients undergoing chemotherapy and outpatients at the West Nusa Tenggara Provincial General Hospital who were suffering from anaemia. The study was carried out from January to April 2025. The population in this study consisted of breast cancer patients undergoing chemotherapy at the West Nusa Tenggara Provincial General Hospital. The sample or research subjects were selected from patients undergoing chemotherapy who had low haemoglobin levels or via purposive sampling. To analyse the data, this study employed univariate and bivariate analysis.

RESULTS

Characteristics of the Study Subjects

This study was conducted on outpatients undergoing chemotherapy for breast cancer and residing in the Mataram City and West Lombok Regency areas. Of the total 15 subjects participating in the study, 8 resided in Mataram City, specifically in the Sandubaya and Cakranegara areas. Meanwhile, the other 7 were from West Lombok Regency, covering the areas of Labuapi, Kediri, and Gerung.

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Table 1. Distribution of Research Subject Characteristics

Category	n	%
Age		
<40	0	0
≥40	15	100
Total	15	100
Gender		
Female	15	100
Total	15	100
Genetic History		
Present	4	26.7
No	11	73.3
Total	15	100
History of Chemotherapy		
Regimens	11	73.3
Regimens	4	26.7
Total	15	100
Physical activity		
Light	2	13.3
Bedrest	13	86.7
Total	15	100
Nutritional status		
Normal	13	86.6
Overweight	1	6.7
Obesity 1	1	6.7
Total	15	100
Onset of cancer		
>1 year	0	0
<1 year	15	100
Total	15	100

Based on Table 1 above, it was found that 26.7% had a family history of the condition, whilst 73.3% did not. Physical activity during the treatment period showed that 13.3% were on bed rest and did not engage in physical activity, whilst 86.7% engaged in light physical activity. Based on nutritional status, the majority of subjects had a normal nutritional status (86.6%), whilst 6.7% fell into the categories of overweight and grade 1 obesity. In terms of treatment, the majority of subjects (73.3%) underwent two courses of chemotherapy, whilst 26.7% underwent three courses of chemotherapy. All subjects in this study had a cancer onset of more than one year, resulting in a subject participation rate of 100%.

Energy, Protein, Iron and Vitamin C Intake

Table 2. Results of the Test of Differences in Mean Intake of Energi, Protein, Iron and Vitamin C Before and During the Intervention

Intake	Mean ± SD	p
Energy (kcal)		
Before	995.8 ± 62.28	0.532[b]
During	1,069 ± 64.34	
Protein (g)		
Before	49.7 ± 3.12	0.513[b]
During	52.8 ± 3.64	
Iron (mg)		
Before	5.86 ± 0.88	0.001[a]
During	11.0 ± 0.97	
Vitamin C (mg)		
Before	43.1 ± 13.24	0.001[a]
During	204.6 ± 6.43	

Based on Table 3 above, it was found that prior to the intervention, the average energy intake was lower than during the intervention, increasing by 73.2 kcal. However, the results of the Wilcoxon test indicated that this difference was not significant (p = 0.532). Meanwhile, protein intake before the intervention was also lower than during the intervention, increasing by 3.1 grams. The results of the Wilcoxon test showed that this difference was not significant (p = 0.513). For iron, the average intake was lower before the intervention than during the intervention, increasing by 5.14 mg. The results of the Wilcoxon test showed that this difference was significant (p = 0.001). The same was true for vitamin C intake, which increased by 161.5 mg after the intervention. The results of the Wilcoxon test showed that this difference was significant (p = 0.001).

Table 3. Results of the Test for Differences in Mean Percentages of Energy, Protein, Iron, and Vitamin C Intake Before and During the Intervention

Intake	Mean ± SD	p
% Energy		
Before	67.13 ± 4.76	0.513[b]
During	71.66 ± 4.15	
% Protein		
Before	67.4 ± 4.94	0.496[b]
During	70.9 ± 5.12	
% Iron		
Before	24.2 ± 3.36	0.001[a]
During	43.8 ± 3.77	
% Vitamin C		
Before	57.4 ± 17.64	0.001[a]
During	273 ± 8.57	

Note: Wilcoxon test[a] and paired t-test[b]

Looking at Table 4, we see that the average percentage of energy consumed before the intervention was lower than during the intervention, which increased by 4.53%. However, when we examined this using the Wilcoxon test, the difference was not large enough to be considered significant (p = 0.513). The same applies to protein intake—before the intervention, the average intake was lower, but it increased by 3.5%. Once again, the Wilcoxon test showed no significant difference (p = 0.496). For micronutrients such as iron, the average intake before the intervention was lower than afterwards, and increased by 19.6%.

The Wilcoxon test showed this difference to be significant (p = 0.001). Vitamin C intake also increased significantly—by 215.6% following the intervention. The Wilcoxon test confirmed that this change was significant (p = 0.001).

Haemoglobin Levels Before and After the Intervention

Table 4. Mean Haemoglobin Levels

Haemoglobin results	Min	Max	Mean ±SD
Before	7.9	11.6	10.4 ±1.12
After	8.3	13.4	11.7 ±1.34

Based on Table 4 above, it was found that the mean haemoglobin level prior to the intervention was 10.4 g/dL, which falls within the anaemia category, with the lowest haemoglobin level at 7.9 g/dL and the highest at 11.6 g/dL. Meanwhile, the mean haemoglobin level in the post-test after the intervention was 11.7 g/dL, which falls within the normal category, with the lowest haemoglobin level at 8.3 g/dL and the highest at 13.4 g/dL.

The Effect of Red Guava Juice Administration on the Haemoglobin Levels of Breast Cancer Patients Undergoing Chemotherapy Before and After the Intervention

Table 5. Results of the Mean Haemoglobin Level Test

Hemoglobin level results	Min	Max	Mean ± SD	p
Before	7.9	11.6	10.4 ±1.12	0.001
After	8.3	13.4	11.7 ±1.34	

Note: Wilcoxon test

Based on Table 5, the mean haemoglobin level prior to the intervention was 10.4 g/dL, classified as anaemia, with a minimum level of 7.9 g/dL and a maximum of 11.6 g/dL. After the intervention, the mean haemoglobin level increased to 11.7 g/dL, falling within the normal range, with a minimum of 8.3 g/dL and a maximum of 13.4 g/dL. The mean haemoglobin levels before and after the intervention showed a p-value < 0.05, indicating a statistically significant difference.

DISCUSSION

Subject Characteristics by Age

As shown in Table 1, subject characteristics by age indicate that all participants in this study were aged 40 years or older, with an age range of 40 to 52 years. These findings are consistent with the results of Faida's 2016 study on how age, marital status, and family history influence breast cancer patients at Surabaya Oncology Hospital. In that study, the majority of patients were over 50 years old (54.38%), followed by those aged between 31 and 50 years (45%), with only a few being younger.

Characteristics by Gender

The characteristics of the subjects by gender in Table 1 show that all participants were women. This is consistent with the findings of Mega et al. (2024), who investigated the relationship between gender, age, and molecular subtypes of invasive ductal carcinoma (IDC) at Dr. H. Abdul Moeloek Provincial Hospital, Lampung. Their study found that all breast cancer patients were women, who formed the majority of the patient group. Breast cancer is more common in women than in men, with men accounting for only around 1% of all cases. This is due to hormones such as progesterone and oestrogen, which stimulate the growth of breast cells, leading to greater changes and development in women's breast cells.

Subject Characteristics Based on Nutritional Status

Looking at Table 1, the characteristics of individuals based on their nutritional status show that those most affected by breast cancer are those with normal nutrition, accounting for 86.6% of cases. This finding is inconsistent with the study conducted by Purwanti et al. in 2021, which found a strong association between obesity and breast cancer in women. In their study, obese women had an 11.7-fold higher risk of developing breast cancer compared to non-obese women.

Subject Characteristics Based on Cancer Onset

Referring to Table 1, the characteristics of cancer onset in this study show that all subjects in both groups had been diagnosed with cancer for one year or more. Treatment lasting over one year affects overall functional status and quality of life. This is consistent with a study stating that the average quality of life score for breast cancer patients was higher among those diagnosed for more than one year compared to those undergoing treatment for one year or less. This is because, at the time of initial diagnosis, patients tend to experience anxiety and concern regarding the spread of the cancer, which may lead to death.

Subject Characteristics Based on Genetic History

In Table 1, the genetic history indicates that the majority of people (73%) have no history of breast cancer. These findings differ from those of a study conducted by Yulianti et al. in 2016, which found that people with a family history of breast cancer had a 2.778-fold higher risk of developing breast cancer. This result is statistically significant, with a confidence interval of 1.123 to 6.868 and a p-value of 0.025, meeting the standard for a strong causal relationship. Women with a family history of breast cancer are at greater risk of developing breast cancer than those without such a history.

Subject Characteristics Based on Chemotherapy History

Table 1 shows that the most commonly used treatment is a combination of doxorubicin and cyclophosphamide. Doxorubicin is part of the anthracycline group, which is the main type of chemotherapy currently used to treat breast cancer. Anthracyclines work by stopping cell division. They do this by preventing the breakdown of microtubules, structures necessary for cell division. This process can also reduce the number of blood cells in the body (Nabilah et al., 2024).

Subject Characteristics Based on Physical Activity

The majority of participants in this study (86.6%) were not very physically active. A lack of physical activity is associated with a higher risk of breast cancer compared to those who are more active or exercise regularly. Engaging in sufficient physical activity helps maintain a balance between calories consumed and calories burned. However, although physical activity can reduce the risk of breast cancer, there is no clear biological reason why this occurs, so it does not fully meet the criteria for a strong cause-and-effect relationship (Yulianti et al., 2016).

Energy, Protein, Iron, and Vitamin C Intake

Energy Intake

Referring to Table 2, the average energy intake before the intervention was lower than during the intervention, with an increase of 73.2 kcal. The results of the Wilcoxon test showed that there was no significant difference between before and after the intervention ($p = 0.532$). Based on data obtained from the study subjects, it was found that some breast cancer patients had energy intakes that did not meet their requirements. This is consistent with the literature by Hidayat et al. (2020), which states that cancer patients experiencing an energy deficit tend to have a higher risk of malnutrition, muscle mass loss, and immune dysfunction.

Protein Intake

Referring to Table 2, the average protein intake prior to the intervention was lower than during the intervention, with an increase of 3.1 g. The results of the Wilcoxon test showed that this difference was not significant ($p = 0.513$). Inadequate protein intake can inhibit globin chain synthesis, which leads to a reduction in haemoglobin production; haemoglobin consists of globin and heme, with four polypeptide chains comprising two alpha globin chains and two beta globin chains.

Iron Intake

Referring to Table 2, prior to the intervention, participants consumed less iron than during the intervention. They consumed more iron—specifically 5.2 mg more—from consuming red guava and animal protein. The Wilcoxon test revealed a significant difference in iron levels before and after the intervention ($p = 0.001$; $\alpha = 0.05$). Iron is essential for the body as it helps transport oxygen from the lungs to body tissues, transfers electrons within cells, and is a component of many enzymatic reactions in the body.

Vitamin C Intake

Referring to Table 2, the average Vitamin C level before the intervention was lower than during the intervention, with an increase of 200.3 mg resulting from the administration of red guava and dietary intake of fruit. The results of the Wilcoxon test showed a significant difference between before and after the intervention ($p=0.001$; $\alpha=0.05$). Vitamin C is one of the specific vitamins that helps strengthen the immune system. When the body receives sufficient vitamins and minerals, it can avoid various types of illness. Consuming vitamin C, which also functions as an antioxidant, has been shown to help combat viruses (Zahara et al., 2022).

Hemoglobin Levels Before and After the Intervention

According to Table 4, the mean haemoglobin levels before and after the intervention had a p-value of less than 0.05, indicating a significant difference between the measurements. The mean levels before and during the intervention were low, at 10.4 g/dL and 11.7 g/dL respectively, showing an increase of 1.3 g/dL. Vitamin C helps the body absorb iron more effectively, and this vitamin is found in guava juice. This is because vitamin C converts ferric ions into ferrous ions, which are more easily absorbed by the body. Consuming red guava juice can help increase haemoglobin levels. Vitamin C is an essential nutrient that supports iron absorption (Fitri Aprinti and Lara Andriani, 2019).

The Effect of Red Guava Juice Administration on Haemoglobin Levels in Breast Cancer Patients Before and After Intervention

Based on Table 5, before and after administration, haemoglobin levels underwent a statistically significant change, as indicated by a p-value of less than 0.05. Red guavas are rich in vitamin C, and this vitamin has been shown to help the body absorb iron more effectively. In addition to increasing haemoglobin levels, red guava juice may also help increase ferritin levels in anaemic patients, according to a study by Rusdi et al. in 2018. Vitamin C also makes the stomach more alkaline, which helps the body absorb iron more effectively—up to 30% better. This vitamin helps transport iron from transferrin in the blood to ferritin in the liver. Most of the transferrin in the blood carries iron to the bone marrow to be stored as iron reserves and to other parts of the body (Sianturi, 2021).

CONCLUSIONS

The majority of subjects were aged over 40 years and all were female. The subjects' nutritional status was predominantly normal, with cancer onset one year or more prior. The majority of subjects had no family history of cancer, and chemotherapy was the most common type of treatment undergone by the subjects. Most subjects received two drug regimens, and the majority had a low level of physical activity.

The mean energy intake before the intervention was 995.8 kcal and increased to 1,069 kcal ($p = 0.532$), whilst the mean protein intake before the intervention was 49.7 g and increased to 52.8 g ($p = 0.513$. The mean iron intake before the intervention was 5.86 and increased to 11.0 with a p-value of 0.001. The mean vitamin C intake before the intervention was 43.1 and increased to 204.6 with a p-value of 0.001.

The mean haemoglobin level of the subjects before the intervention was 10.4 g/dL and increased to 11.7 g/dL with a p-value of 0.001.

There was an effect of red guava juice (Psidium guajava) administration on haemoglobin levels in breast cancer patients undergoing chemotherapy at the NTB Provincial General Hospital.

RECOMMENDATIONS

In this study, the intervention lasted seven days, with a 24-hour food recall conducted on the day before the intervention and for two days during the intervention. For future researchers, it is recommended to conduct a 7-day food recall during the intervention to control the subjects' dietary intake and avoid bias.

In this study, no stratification of chemotherapy cycles was performed; therefore, future researchers are advised to consider the chemotherapy cycles undergone by the study subjects.

REFERENCES

Alfiani D, Putri MP, Widayanti W. Literature Review: Obesity as a Risk Factor for Triple-Negative Breast Cancer. Bandung Conference Series in Medical Sciences. Jan. 2022; 2(1):326–9.

Arief DZ. Characteristics of Red Guava (Psidium Guajava L) Fruit Leather with Different Types of Filling. Pas Food Technol J. Mar. 2018; 5(1):76.

Faida EW. Analysis of the influence of age, marital status and family history on breast cancer patients at Surabaya Oncology Hospital. J Health Manag Dr Soetomo Hospital Foundation. 2016;2(1):1–7.

Haryati F, Sari DNA. The relationship between body image and quality of life in breast cancer patients undergoing chemotherapy. Heal Sci Pharm J. Aug. 2019; 3(2):54.

I Made Agus Setiawan. The Role of Immunohistochemical Examination in the Diagnosis and Prognosis of Breast Cancer. Cermin Dunia Kedokteran. Aug. 2023; 50(8):443–6.

Kolin MYK, Warjiman W, Mahdalena M. Quality of Life in Cancer Patients Undergoing Chemotherapy. J Keperawatan Suaka Insa. 2016;1(1):1–12.

Mega M, Siswandi A, Ladyani F, Arania R. The Relationship Between Gender and Age with Breast Cancer of the Histopathological Molecular Subtype Invasive Ductal Carcinoma (IDC) at Dr H Abdul Moeloek General Hospital, Lampung Province. Journal of Medical and Health Sciences. Jan. 2025; 11(12):2246–51.

Nabilah A, Prabowo WC, Kuncoro H. The Effect of Chemotherapy on Haematological Parameters in Breast Cancer Patients at Dr. Kanujoso Djatiwibowo General Hospital, Balikpapan. J Mandala Pharmacon Indones. Aug. 2024;10(1):54–60.

Purwanti S, Syukur NA, Haloho CB. Risk Factors Associated with the Incidence of Breast Cancer in Women. J Bidan Cerdas. Dec. 2021; 3(4):168–75.

Rafli R, Abdullah D, Sinulingga BY. A Profile of Side Effects and Supportive Therapy in Breast Cancer Patients Following CAF Chemotherapy at M. Djamil General Hospital, Padang. Baiturrahmah Med J. 2021;1(1):8–13.

Sianturi, M.S. A Study of Adherence to Iron Supplementation Among Pregnant Women in the Service Area of the Way Kandis Inpatient Community Health Centre, Bandar Lampung, in 2021. Tanjungkarang Polytechnic of Health Sciences; 2021.

Sianturi MS, Zahara R, Jalaluddin J, Kurniawan E, Muhammad M, Masrullita M, et al. The Relationship Between Chemotherapy and Energy Intake with the Nutritional Status of Stage II and III Breast Cancer Patients at Fatmawati General Hospital, Jakarta, in 2018–2019. J Keperawatan Suaka Insa. 2016;2(1):76–83.

Yosali MA, Bintari N. The Relationship of Menarche Age with Breast Cancer Incidence in Women Aged 25–50 Years at the Short-Stay Centre of the Indonesian Breast Cancer Foundation (YKPI) in Jakarta. J Ilm Wijaya. 2019;11(2):155–65.

Yulianti I, Santoso HS, Sutinigsih D. Risk factors for breast cancer (a case study at Ken Saras Hospital, Semarang). J Kesehat Masy. 2016;4(4):401–9.

Zahara R, Jalaluddin J, Kurniawan E, Muhammad M, Masrullita M. Extraction of the antioxidant lycopene from guava fruit using a mixed solvent of ethanol and n-hexane. Chem Eng J Storage. Aug. 2022; 2(3):49–60.