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Comparison of Hemoglobin Levels of Nasopharyngeal Cancer Patients before and After Radiation in Radiotherapy Installations RSUD Prof. Dr. Margono Soekardjo

Ermi Susi Yanti¹, Tantri Analisawati Sudarsono², Arif Mulyanto³, Linda Wijayanti⁴^{1,2,3} Universitas Muhammadiyah Purwokerto, Indonesia⁴RSUD Banyumas, Indonesia

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ABSTRACT

Hemoglobin levels can be used as an indicator of a decrease in a person's nutritional status. Radiotherapy can result in a decrease in nutritional status in nasopharyngeal cancer patients. This study aims to prove the existence of differences in hemoglobin levels in nasopharyngeal cancer patients before and after radiotherapy. This study used a retrospective design, based on medical record data of nasopharyngeal cancer patients who were treated at rsud Prof. Dr. Margono Soekardjo January – May 2022 Data analysis in this study includes descriptive analysis and hypothesis testing. Test the hypothesis using the T Dependent test with normal distributed data. The degree of meaningfulness is $p \leq 0.05$. The research data is normally distributed so that the T Dependent test is used. A meaningful comparison of hemoglobin levels was obtained in patients with nasopharyngeal cancer before and after radiation with $p 0.003$ So it can be concluded that there is a significant comparison with hemoglobin levels in nasopharyngeal cancer patients before and after radiation at rsud Prof. Dr. Margono Soekardjo.

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Corresponding Author:

Tantri Analisawati Sudarsono

Universitas Muhammadiyah Purwokerto

Jl. KH. Ahmad Dahlan, Dusun III, Dukuhwaluh, Kec. Kembaran, Kabupaten Banyumas, Jawa Tengah

53182, Indonesia

Email: tan3analisa89@gmail.com

INTRODUCTION

Nasopharyngeal carcinoma (NPC) is one of the most common malignancies of the head and neck region in the world. Nasopharyngeal cancer has a fairly distinctive geographical distribution, namely in the continents of Asia and Africa. About 81% of all new cases of NPC occur in Asia, especially Southeast Asia which accounts for about 67% of the total burden of NPC in the world. Nasopharyngeal cancer is a rare malignancy with an incidence of less than one per 100,000 population each year (Salehiniya, Mohammadian, Mohammadian-Hafshejani & MahdaviFar, 2018).

Indonesia is the country with the second highest NPC cases in the world after China with a total of 13,084 cases, followed by Vietnam, India, and Malaysia. In Indonesia, NPC is the fourth most common malignancy after breast cancer, cervical cancer, and lung cancer. It is estimated that the incidence of NPC in Indonesia is higher when compared to global data, which is around 5.7 per

100,000 population for men and 1.9 per 100,000 population for women. Valean, S., Acalovschi, Diculescu, Manuc, Goldis, Sfarti & Trifan, 2015).

Nasopharyngeal carcinoma is a malignant tumor originating from epithelial cells in the nasopharynx which is located behind the nasal cavity, above the soft palate and pharyngeal tonsils on the posterior wall. Radiotherapy is still the main choice of therapy for patients with NPC, especially the type of loco-regional NPC that has not yet distant metastases. The aim of radiotherapy is to eradicate tumors in vivo by delivering the required dose of radiation precisely to the radiation target area without damaging the surrounding healthy tissue, with the hope of improving the quality of life and prolonging the patient's survival rate (Santoso, Surarso, Kentjono & Head, 2009).

Radiotherapy given to NPC patients can side effects on the hematopoietic system. Radiation that hits the bone marrow will cause a depression in the number of blood cells due to the destruction of hematopoietic stem cells and progenitor cells that are very sensitive to radiation (Setyawan & Djakaria, 2014). Sensitivity to radiotherapy in each hematopoietic cell is different. Leukocytes are the most radiosensitive blood cells, followed by platelets and erythrocytes. Depression in leukocytes can increase the risk of infection after cancer treatment, while a decrease in the number of erythrocytes judged by hemoglobin levels can reduce the patient's oxygenation ability, while a decrease in the number of platelets can trigger bleeding (Kasper et al., 2015). From previous studies that specifically evaluated changes in the number of platelets, leukocytes and hemoglobin after radiotherapy in cancer patients, generally found no significant results (Kadiyala & Brundha, 2018), while for the examination of hemoglobin levels from different studies found a significant decrease in hemoglobin levels. in patients with nasopharyngeal carcinoma before and after radiotherapy (Wicaksono, 2006).

Research related to nasopharyngeal carcinoma in Indonesia is still limited, in particular a review of the effects of radiotherapy on hematological cell components. Therefore, in this study, we will discuss the effect of radiotherapy on the hematopoietic system in NPC patients by looking at hemoglobin levels before and after radiotherapy.

RESEARCH METHOD

This type of research is an analytic observational study where each research subject is observed twice and measurements are made on the independent variable and the dependent variable at the same time during the examination. The location of the sample examination was carried out at the Radiotherapy Installation at Prof. Hospital. Dr. Margono Soekardjo in June 2022. The sampling technique used in this study was conditional sampling in the study of 68 samples which were divided into 2 categories, namely cancer patients before and after radiation. By collecting secondary data at the Radiotherapy Installation at Prof. Hospital. Dr. Margono Soekardjo.

RESULTS AND DISCUSSIONS

Table 1. Frequency of Hemoglobin Levels Before and After

Kadar Hb	Frekuensi	Persentase (%)
Hb Before	68	100
Hb After	68	100

Source: Secondary Data June 2022

Table 2. Normality Test Result

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
HB1	.099	34	.200*	.985	34	.917
HB2	.115	34	.200*	.983	34	.860

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The test results in Table 2 show that the variables HB 1 before radiation and HB2 after radiation have a P value > 0.05 which means that the distribution of hemoglobin level data before and after is normally distributed.

Then the test was continued using the T dependent test to determine whether there was a comparison of hemoglobin levels before and after radiation.

Table 3. Frekuensi Kadar Hemoglobin Sebelum dan Sesudah

		Paired Samples Test					t	Df	Sig. (2-tailed)
		Paired Differences			95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	HB1 - HB2	.53235	.95083	.16307	.20059	.86411	3.265	33	.003

Based on Table 3, it is known that the average hemoglobin level before radiation was 12.2294 ± 1.31484 mg/dL, and the average hemoglobin level after the first 10 radiations was 11.6971 ± 1.45903 mg/dL. Dependent T test results to determine the comparison of hemoglobin levels of nasopharyngeal cancer patients before and after radiation resulted in a p value of 0.003 ($p < 0.05$), which means that there is an effect of radiation on hemoglobin levels before and after the first 10 x radiation of nasopharyngeal cancer patients.

Based on the dependent test, it was obtained that the sig value was 0.003 ($p < 0.05$) which showed a significant comparison and relationship between hemoglobin levels before and after radiation at the Radiotherapy Installation of Prof. Hospital. Dr. Margono Soekardjo.

These results are in line with research conducted by Dharmawan at Sanglah Hospital Bali, that there is an effect of radiation on hemoglobin levels.

This study aims to analyze the differences in hemoglobin levels in patients with nasopharyngeal cancer before and after radiation at the Radiotherapy Installation at Prof. Hospital. Dr. Margono Soekardjo.

This study is a retrospective observational study with a total of 68 samples obtained from medical records of nasopharyngeal patients who received radiation between January-May 2022 at Prof. Hospital. Dr. Margono Soekardjo.

Hemoglobin levels in nasopharyngeal carcinoma patients before and after receiving radiotherapy have never been studied, so the observation of hemoglobin levels in nasopharyngeal carcinoma patients at the Radiotherapy Installation of RSUD Prof. Dr. Margono Soekardjo is very important, because it will have an impact on food intake and nutritional status of patients receiving radiotherapy. Research on hemoglobin levels of patients with nasopharyngeal carcinoma can determine the extent to which radiotherapy has an effect on patients' hemoglobin levels. Further research will lead to hemoglobin levels in nasopharyngeal carcinoma patients before and after radiotherapy.

The average hemoglobin level of patients in this study, before radiation was 12.2294 ± 1.31484 mg/dL, still within normal limits based on WHO sources which stated that normal hemoglobin levels were 12-13 mg/dL.

The average hemoglobin level of nasopharyngeal cancer patients after radiation in this study was 11.6971 ± 1.45903 mg/dL, a decrease in comparison with previous research by Dharmawan 2018 which stated that the results were decreased for Hb levels after radiation.

Based on the data above in this study, it can be concluded that the hemoglobin levels of nasopharyngeal cancer patients before and after radiation at the Radiotherapy Installation of Prof. Hospital. Dr. Margono Soekardjo experienced a significant decrease or there was a significant comparison, this is comparable to previous research (Dharmawan & Doodoh, 2018).

Radiotherapy given can affect the hemopoetic system. So that there is a disturbance in the components that compose it, namely hemopoetic organs such as bone marrow, spleen and thymus. With a dose of 20 Gy, there will be a reduction in the number of stem cells, both erythroblasts, myelocytes and megakaryocytes, and will experience improvement in a few weeks. Improvement will occur in about 1 week for erythrocytes while for others in 2-6 weeks after radiation. In addition, radiation can also affect directly the blood cells circulating in the blood vessels (Siregar, 2016).

CONCLUSION

The average hemoglobin level of patients with nasopharyngeal carcinoma before radiation at the Radiotherapy Installation at Prof. Hospital. Dr. Margono Soekardjo more by 12.2294 ± 1.31484 mg/dL. The average hemoglobin level of nasopharyngeal carcinoma patients after the first 10 x radiation at the Radiotherapy Installation of Prof. Hospital. Dr. Margono Soekardjo of 11.6971 ± 1.45903 mg/dL. There is a comparison of hemoglobin levels of patients with nasopharyngeal carcinoma before and after radiation at the radiotherapy installation of Prof. Hospital. Dr. Margono Soekardjo. Based on the data above in this study, it can be concluded that the hemoglobin levels of nasopharyngeal cancer patients before and after radiation at the Radiotherapy Installation of Prof. Hospital. Dr. Margono Soekardjo has decreased so that Ha is accepted, which means that there is an effect of radiotherapy radiation in nasopharyngeal cancer patients on hemoglobin levels after receiving radiation.

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