



INTERNATIONAL JOURNAL OF PHARMACY AND ANALYTICAL RESEARCH

ISSN:2320-2831

IJPAP | Vol.9 | Issue 2 | Apr - Jun - 2020

Journal Home page: www.ijpar.com

Research article

Open Access

Number of leukosits in patients of nasopharynx cancer after radiotherapy Retrospective Case Study: Nasofaring Cancer in Radiotherapy Installation of Sanglah Hospital

Burlian Mughnie¹, Retno Laksmi Faraningrum², Kadek Yuda Astina*¹

¹Department Imaging Radiology Technology, ATRO Bali, Indonesia

²Department Radiotherapy, Sanglah General Hospital Bali, Indonesia

*Corresponding Author: Burlian Mughnie

Email: yudaastina@atro-bali.ac.id

ABSTRACT

Radiotherapy is a way to cure or reduce pain in patients with tumors or cancer by using ionizing radiation. One type of cancer that is quite commonly experienced by cancer sufferers in Indonesia is nasopharyngeal cancer (NPC). This study aims to determine the effect of radiotherapy irradiation on human organs, especially in white blood cell types of leukocytes which are the most sensitive blood cells to radiation. This type of research uses quantitative research and uses retrospective data. Data collection in this study was carried out at Sanglah Hospital Radiotherapy Installation Denpasar. The population of this study were all nasopharyngeal cancer patients who underwent radiotherapy with the study sample including thirty nasopharyngeal cancer patients who underwent radiotherapy irradiation for the period 2018-2019. The study was conducted by recording the number of leukocytes from the results of the patient's complete blood laboratory. The data is then processed using SPSS, namely Pearson correlation test and linear regression test. The results of the study using the Pearson correlation test obtained a significant value of 0.002 (p -value < 0.05) then there is the effect of radiotherapy irradiation on the number of leukocytes in nasopharyngeal cancer patients. Linear Regression Test also shows the coefficient value of -0.371, the longer the radiation radiotherapy the number of leukocytes will decrease, while the value of 0.371 indicates that the correlation value is low which means the number of leukocytes in nasopharyngeal cancer patients decreases less sharply due to radiotherapy.

Keywords: Leukocytes, Nasopharyngeal Cancer, Radiation Radiotherapy

INTRODUCTION

Radiotherapy is a way to cure or alleviate pain in patients with a tumor or cancer using ionizing radiation. Cancer or malignant neoplasm is a disease characterized by cell cycle abnormalities

that cause the cell's ability to grow uncontrollably (cell division exceeds normal limits), attack the surrounding biological tissue, able to migrate to other body tissues through blood circulation (metastasis) (Waryono and Triyani, 2011) [13].

One type of cancer that is quite commonly experienced by cancer sufferers in Indonesia is nasopharyngeal cancer (NPC). Based on 2008 Globocan data, the incidence of NPC in Indonesia ranks fifth with a percentage of 4.9% after breast, lung, colorectal and stomach cancers. The KNF incident in Indonesia occurred 6.5 / 100,000 population (International Agency for Research on Cancer, 2010).

Prevalence and Estimation of the Number of Cancer Patients in Population of All Ages by Province in 2013. Bali Province according to doctor's diagnosis is 2.0% and estimated absolute number is 8,279 people. Based on data from Sanglah Hospital Denpasar (2014), in 2013 there were 71 KNF cases and 10 of them died and an increase in new cases in 2014 amounted to 1,976 cases and no one died. According to data in Sanglah Hospital Radiotherapy Installation (2016), the number of NPC patients in 2013 was 41 people (26.8%), in 2014 there were 43 people (25.7%), in 2015 there were 51 people (17.8%) and in 2016 increased by 53 (15.8%).

Nasopharyngeal cancer is a malignancy originating from the nasopharyngeal area. One treatment for nasopharyngeal cancer is radiotherapy. Radiation of nasopharyngeal cancer radiotherapy causes changes in blood cell production. Radiation dose throughout the body around 0.5 Gy can cause a decrease in the process of formation of blood cells so that the number of blood cells will decrease. This decrease in the number of blood cells will have a very serious impact if left untreated because blood has an important role on the functions of the human body such as immunity, oxygenation, hemostasis, and other roles (Pearce, 2010). Blood cells include leukocytes, erythrocytes and platelets. Leukocytes function in the immune body's system, erythrocytes function to circulate juice throughout the body and tissue oxygenation, while platelets play a role in the blood clotting system. Radiosensitivity of various types of blood cells varies. The most resistant cells are erythrocyte cells and the most sensitive are leukocyte cells (Scanlon, 2012) [9].

During the authors made observations at Sanglah Hospital Radiotherapy, patients with nasopharyngeal cancer radiation experienced several changes such as changes in body weight, skin color and changes in blood cells in the body. Changes in blood cells are known from the

laboratory results of each patient. The patient underwent a complete blood laboratory test after performing 5 times of radiation where each time the patient received a dose of 2 Gy per day. The purpose of this study was to determine whether there was an effect of radiotherapy irradiation on the number of leukocytes in nasopharyngeal cancer patients in Sanglah Hospital Radiotherapy Installation and to determine the effect of radiotherapy irradiation on the number of leukocytes in nasopharyngeal cancer patients in Sanglah Hospital Radiotherapy Installation.

This study aims to determine whether there is a radiotherapy irradiation effect on the number of leukocytes in nasopharyngeal cancer patients in Sanglah Hospital Radiotherapy Installation and to determine the effect of radiotherapy irradiation on the number of leukocytes in nasopharyngeal cancer patients in Sanglah Hospital Radiotherapy Installation.

METHODS

Type of research is quantitative research using retrospective data. The author records the number of leukocytes from the results of laboratory tests of complete blood contained in the medical records of nasopharyngeal cancer patients at Radiotherapy Hospital Sanglah in January 2020.

The population in this study were all nasopharyngeal cancer patients who had received radiation therapy in 2018-2019 at the Radiotherapy Installation Sanglah Hospital Denpasar. Samples in this study were 30 nasopharyngeal cancer patients who weighed 45-65 kg and had received radiation therapy at the Radiotherapy Installation of Sanglah Hospital Denpasar.

The research procedure was carried out by collecting data in the form of medical records of nasopharyngeal cancer patients. Selection of data on nasopharyngeal cancer patients with the same dose and within a specific weight range of 45-65 kg. Recording of blood WBC results of nasopharyngeal cancer patients before irradiation and after undergo radiotherapy irradiation. Data after 1 (one) week, up to 5 (five) weeks after radiotherapy irradiation. Data processing of leukocyte count (WBC) results in nasopharyngeal cancer patients uses SPSS version 23 calculation using Pearson correlation test and linear regression test.

RESULTS

This study was conducted at the Radiotherapy Installation of Sanglah Hospital Denpasar in January 2020 using retrospective data from thirty nasopharyngeal cancer patients who had undergone radiation for five weeks. Retrospective data collection is done by looking at the number of leukocytes in the medical records of patients who have completed radiation exposure. Leukocytes or white blood cells are part of the immune system (immunity), the main function of leukocytes is to provide protection for the body against germs that cause infection or disease or infection, tumor cells or other foreign substances that are dangerous normal leukocyte counts 4.1 - 11.0 (10³/ μ L). Measuring the number of leukocytes taken before irradiation and after 1 week to 5 weeks irradiation of radiotherapy. In general, irradiation is carried out for five days a week while two days a week is not irradiated to provide an opportunity for healthy

cells to regenerate on the fifth day after irradiation radiotherapy patients are required to conduct a complete blood laboratory examination. The sample in this study was data from 30 nasopharyngeal cancer patients who had undergone irradiation by looking at the patient's medical records. The study sample consisted of 7 female patients and 23 male patients. All patients radiation get a dose of 70 Gy in 35 times the radiation. The patient's body weight was recorded in the medical records of nasopharyngeal cancer patients at Sanglah Hospital Radiotherapy Installation. The body weight that the author uses in this study is body weight with a range of 45kg - 65kg. Data obtained from medical records of nasopharyngeal cancer patients on the results of complete blood laboratory in the form of the number of leukocytes. The data is processed to determine the effect of radiotherapy irradiation on the number of leukocytes before and after 1 week to 5 weeks is shown in Table 1.

Table 1 Recapitulation of Leukocyte Counts

	Leukocyte count (10 ³ / μ L)					
	before	After 1 Week	After 2 Weeks	After 3 Weeks	After 4 Weeks	After 5 Weeks
Maximum	13.65	20.77	22.82	11.58	12.63	10.65
Minimum	2.21	3.95	3.10	3.73	3.90	3.54
Mean	7.909	8.287	8.274	7.493	6.703	6.416

The above table shows the number of leukocytes before and after radiotherapy irradiation for five weeks. The table shows the value - average number of leukocytes before irradiation 7.909 10³/ mL and the first week 8.287 10³/ mL, the second week 8.274 10³/ mL while the third week 7.493 10³/ mL and the fourth week 6.703 10³/ μ L. The average value after undergoing radiotherapy for five weeks was 6.416 10³/ μ L. Data on the number of leukocytes obtained from medical records of nasopharyngeal cancer patients, then analyzed with the normality test to determine whether the data is

normal or not. Then proceed with the Pearson Correlation test and Linear Regression to determine the presence or absence of the effect of irradiation on nasopharyngeal cancer patients. From the data in table 1 then inputted to the SPSS version 23 program and performed Pearson Correlation test aims to determine whether there is an effect of radiotherapy irradiation on the number of leukocytes in nasopharyngeal cancer patients after radiotherapy irradiation for five weeks. Pearson correlation test results are shown in Table 2.

Table 2 Pearson Correlation Test Results

p value	R	Meaning
0,002	-0,371	There is a significant effect of radiotherapy irradiation on the number of leukocytes in nasopharyngeal cancer patients after radiotherapy irradiation for five weeks.

P value showed the result of 0.002 (p <0.05) and the R value ranged from 0.200 to 0.399 meaning that the effect of radiotherapy irradiation

on the number of leukocytes in nasopharyngeal cancer patients after radiotherapy irradiation for five weeks was significant and low. Negative signs

indicate the opposite direction, meaning that the longer the radiotherapy irradiation the number of leukocytes will decrease. Based on the correlation test obtained a very strong relationship so that it can be continued with a regression test to prove the

effect of radiotherapy irradiation on the number of leukocytes in nasopharyngeal cancer patients after radiotherapy irradiation for five weeks. From the statistical regression tests obtained R square values in table 3.

Table 3: Linear Regression Test Results

p value	R Square	Meaning
0,002	0,465	46.5% of the number of leukocytes in nasopharyngeal cancer patients after radiotherapy irradiation for five weeks is influenced by radiotherapy irradiation while the rest is influenced by other factors (53.5%)

DISCUSSION

Descriptive analysis showed the number of leukocytes in nasopharyngeal cancer patients decreased after at the 3rd week of irradiation. The average number of leukocytes before undergoing irradiation of 7,909 103 / μL , after 1 week of irradiation increased by 8,287 103 / μL , in the second week of irradiation the number of leukocytes in patients decreased by 8,274 103 / μL , then 3 weeks of irradiation to 7,493 103 / μL and in the second week of irradiation the number of leukocytes patients decreased by 8,274 103 / μL , then 3 weeks of irradiation to 7,493 103 / μL and 4 weeks irradiation decreased the number of leukocytes to 6,703 103 / μL until undergoing 5 weeks of irradiation the number of leukocytes in nasopharyngeal cancer patients decreased by 6,416 103 / μL .

These results were also supported by the results of statistical tests from the Pearson Correlation test. It can be concluded that there is an effect of radiotherapy irradiation on the number of leukocytes in nasopharyngeal cancer patients for five weeks, with a significant value of 0.002 (p-value <0.05) so that H_a is accepted which means there is an effect of radiotherapy irradiation on the number of leukocytes after receiving irradiation for five weeks.

The effect of irradiation can also be seen in the Linear Regression test showing an R square value of 46.5% of the number of leukocytes in nasopharyngeal cancer patients after radiotherapy irradiation for five weeks is influenced by radiotherapy irradiation the rest is influenced by other factors (53.5%). Coefficients value of Linear

Regression test is -0.371, negative sign shows a correlation of inversely correlated, that is the longer radiotherapy of leukocyte number will decrease. Coefficient value of 0.371 according to Sugiyono (2007) shows that the correlation is low. Thus the number of leukocytes in nasopharyngeal cancer patients decreases not so sharply. This is because the condition of patients undergoing radiation is always controlled by examining the condition General of the patient and checking the complete blood laboratory every 5 times irradiating, as well as educating nutrition intake, even administration of drugs or transfusion if needed. During the 2 days a week is not irradiated, it is because it provides an opportunity for healthy cells to regenerate..

CONCLUSION

The results of Pearson correlation test obtained significant value of 0.002 (p-value <0.05) then there is a radiation effect of radiotherapy on the number of leukocytes in patients with nasopharyngeal cancer. Linear Regression Test shows the R square value of 46.5% of the number of leukocytes in nasopharyngeal cancer patients after radiotherapy irradiation for five weeks is influenced by radiotherapy irradiation while the rest is influenced by other factors (53.5%). The coefficient value is -0.371, the longer radiotherapy of the number of leukocytes will decrease, while the value of 0.371 indicates that the correlation is low, which means the number of leukocytes in nasopharyngeal cancer patients decreases less sharply due to radiotherapy.

REFERENCES

- [1]. Cao. Anatomy of the Nasopharynx, FK USU, Medan 2011.
- [2]. Dahlan, MS. Statistics for Medicine and Health, Salemba Medika, Jakarta 2008.
- [3]. Kreshnamurti. Radiotherapy in Nasopharyngeal Cancer, Department of Obstetrics and Gynecology, Faculty of Medicine, Sriwijaya University, RS. Mohammad Hoesin Palembang 2012.
- [4]. Malikha.NZ. Side Effects of Radiotherapy in the Treatment of Nasopharyngeal Carcinoma. UGM FK. Yogyakarta 2008.
- [5]. Pearce, EC. Anatomy and Physiology for Paramedics, PT Gramedia Pustaka Utama, Jakarta 2010.
- [6]. Rahmad, R, Effects of Radiotherapy on Leukocyte Amounts in Patients with Nasopharyngeal Carcinoma, FK UNDIP, Semarang 2007.
- [7]. Rasyid A. Nasopharyngeal Carcinoma: Management of Radiotherapy. Nusantara Medical Magazine. XXXIII(1), 2008, FK USU, Medan.
- [8]. Roezin. Anatomy of the Nasopharynx, FK UNUD, Bali 2007.
- [9]. Scanlon. Anatomy and Physiology. 3rd Edition EGC, Jakarta 2012.
- [10]. Sugiyono. Administrative Research Methods "Correlation Coefficient Interpretation Value". Alfabeta, Bandung 2007.
- [11]. Susworo R. Radiotherapy Basics of Radiotherapy and Procedures for Cancer Radiotherapy, University of Indonesia, Jakarta 2007.
- [12]. Syahrur. MH. Effect of Radiation on Cellular Defense Systems in Nasopharynx Cancer Patients. Indonesian Medical Magazine, Jakarta.
- [13]. Syarifatul., U. Dosimetry Radiotherapy, FMIPA, University of Indonesia, Depok. Warjono, Triyani.E, 2011. Aircraft Radiotherapy at Hospitals in Indonesia Orbith: 7(2), 2011, 186-193, FMIPA UNHAS, Makassar Warjono, Triyani.E, 2011. Pesawat Radioterapi Pada Rumah Sakit di Indonesia Orbith: 7(2), 2011, 186 –193, FMIPA UNHAS, Makassar.