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The Profile of Lymphocyte, Monocyte and Lymphocyte-monocyte Ratio in Colorectal Cancer Patients at Moewardi Hospital the Period from March to April 2019 (Retrospective Research)

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Authors' contributions

This work was carried out in collaboration between both authors. Author MRW designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author IBBSA managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Based on Globocan data (2012), the incidence of colorectal cancer in Indonesia is 12.8 per 100,000 adult population, with mortality of 9.5% of all cancer case. The ratio of neutrophil to lymphocytes, ratio of platelets to lymphocyte, C-reactive protein, and albumin are predictors in analyzing the changes that occur before and after treatment (chemotherapy and/or surgery) in patients with carcinoma.
Methods: This was a retrospective study, conducted Moewardi Hospital Surakarta during the period of March - April 2019. In that period there were 226 colorectal cancer patients admitted to the inpatient ward of the Moewardi Hospital. With the Slovin formula, we analyzed data from 70 patients as samples. The normal rate of Lymphocyte are 2% -40%, Monocyte are 2%-8%, and the normal rate of Lymphocyte to Monocyte Ratio are 2,1% – 3,8%.

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Results: From the 70 patients analyzed, consisting of 40 male patients (57,1%) and 30 women (42,9%). Based on age distribution, 9% were 31-40 years old, 10% were 41-50 years old, 37% were 51-60 years old, 13% were 61-70 years old, and 4% were over 70 years old. 52.8% of patients showed a decrease in monocyte count, while the remaining 47.2% were normal. 21.4% of patiens increased lymphocyte count, 15.7% of patients decreased lymphocyte count, while 48.6% were normal. From the 70 patients analyzed, 37,1% increased rates of Lymphocyte Monocytes Ratio, 44,3% normal and 13,5% showed a decrease in Lymphocyte-Monocyte Ratio.
Conclusion: In a retrospective study of 70 paents of colorectal cancer showed significant results that 44,3% patients have a normal Lymphocyte-Monocyte Ratio (LMR). Based on gender, it is more affected by men than women with a ratio of 4: 3. The most age distribution is at the age of 51-60 years and the rarest at the age above 70 years. Half of the patients studied showed an increase in lymphocyte count, and only a small proportion had a decreased lymphocyte count.

Keywords: The lymphocyte and monocyte profil; lymphocyte-monocytes ratio; colorectal patients.

1. BACKGROUND

Colorectal cancer is a multifactorial disease process, with etiology encompassing genetic factors, environmental exposures (including diet), and inflammatory conditions of the digestive tract. Colorectal carcinoma is the fourth most common malignancy in the world and the second leading cause of death in the United States. From Globocan (2012) data, the incidence of colorectal cancer in Indonesia is 12.8 per 100,000 adult population, with a mortality rate of 9.5% of all cancer cases [1,2].

Risk factors for colorectal cancer include age, genetics, smoking history, low physical activity, obesity, alcohol consumption, and excessive consumption of red meat. The prognosis of colorectal cancer is highly dependent on the stage of cancer at the time of diagnosis.

In general, the earlier diagnosis of cancer is established, the prognosis of colorectal cancer will be better. The 5-year survival rate reaches 90% if the cancer is at an early stage, 70% if the cancer is in advanced stage and 10% if the cancer is in late stage and the discovery of metastasis [3].

The relationship of cancer and inflammation was first proposed in 1863 by Rudolf Virchow [4]. Chronic inflammation is the basis of the pathology of malignancy in humans. Cancer appears at 17 sites of chronic inflammation, and inflammatory cells are found at the time of biopsy of tumor tissue. Virchow suggests that irritants cause tissue injury, inflammation, and increase cell proliferation [5].

Many epidemiological studies have shown that chronic inflammation is a predisposing factor for the development of various cancers [6]. Cancer and inflammation are linked by two pathways, intrinsic and extrinsic pathways. The intrinsic pathway is activated by a genetic event that produces neoplasia. These events include the activation of different types of oncogenes by mutation, amplification, and inactivation of tumor suppressor genes. Cells altered in this way produce an inflammatory mediator, thus forming an inflammatory microenvironment in the tumor. Conversely, in extrinsic pathways, inflammation or infection increases the risk of cancer progression in a particular anatomic location [7].

It is known that the variation in the outcome of carcinoma sufferers is not only determined by the characteristics of the tumor but also the host response factor. The inflammatory state can accelerate tumor growth, invasion, angiogenesis, and even metastasis. Increased inflammation markers associated with decreased survival of colorectal cancer patients There is also a link between simple inflammatory markers (such as neutrophils, lymphocytes and peripheral blood platelets) and carcinoma outcomes [8]. There have been several studies using the ratio of the number of inflammatory cells to cancer patients prognosis, one of them lymphocyte to monocytes ratio. In some studies, the low Lymphocyte to Monocytes Ratios (LMR) was associated with low survival rates of colorectal cancer patients [9].

2. PURPOSE

The purpose of this research is to know the description of lymphocyte, monocyte and Lymphocyte-Monocyte Ratio in colorectal cancer patients at Dr.Moewardi Hospital.

3. METHODS

A retrospective study during the period March to April 2019, at Dr. Moewardi Hospital, Surakarta, Indonesia found 226 colorectal cancer patients. With Slovin sample formula, $n = \frac{N}{1 + Ne^2}$ we got 70 samples for this study.

Data recorded in patients with colorectal cancer were classified by sex, age, type of cancer, lymphocyte features, monocyte features and lymphocyte-monocyte ratio (LMR). The normal value of Lymphocyte number is 20-40%, Monosit 2-8%, and Lymphocyte-Monocyte Ratio 2.1 - 3.8% [9,10].

4. RESULTS

During the period of March-April 2019 from 70 patients were found 40 male patients (57.1%) and 30 female patients (42.9%).

Based on age, there were 9 patients aged 31-40 years (12.9%), 10 patients aged 41-50 years (14.3%), 34 patients aged 51-60 years (48.6%), 13 patients aged 61 -70 years (18,6) and 4 patients were over 70 years old (5.7%). Most have colorectal cancer in the age range 51-60 years.

During the March period until April 2019 there were 13 patients (18.6%) with colon Colonrcinoma and 57 (81.4%) patients with rectal adenocarcinoma.

Obtained 21.4% of patients had elevated lymphocyte count, 15.7% of opiates had decreased lymphocyte count, while 52.9% of patients had lymphocyte numbers within normal limits.

From 70 patients studied, 44.3% still had a normal Lymphocyte-Monocyte Ratio (LMR). 37.1% had an increased LMR value and the remaining 18.5% were decreased.

Of all samples studied 52.8% of patients had a decrease in the number of monocytes, and 47.2% were normal.

5. DISCUSSION

Chronic inflammation is the basis of the pathology of malignancy in humans. Damage to tissues, whether physical, chemical or infection will trigger an inflammatory response. The response is an important mechanism to counteract agents responsible for the occurrence of tissue damage and then begin the process of tissue repair by forming an immune response (Eiró & Vizoso, 2012).

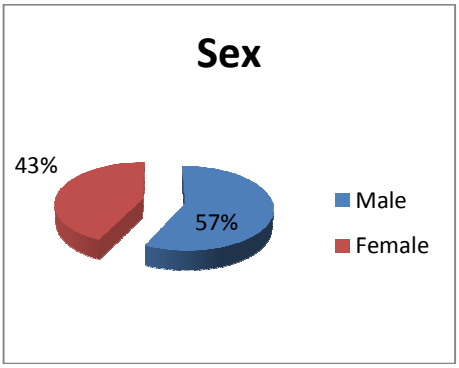

Fig. 1. Distribution by sex

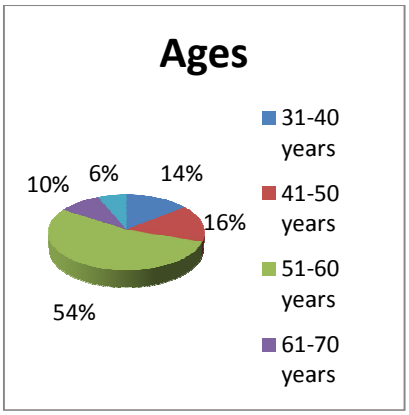

Fig. 2. Distribution by ages
By age, 9 patients aged 31-40 years

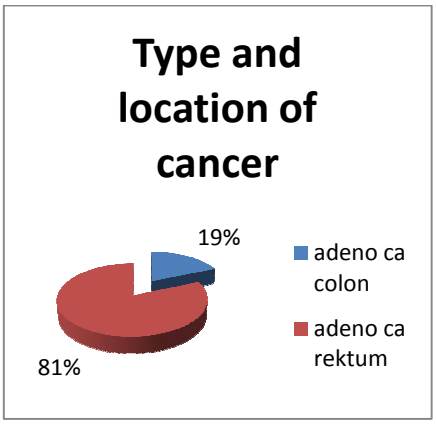

Fig. 3. Distribution by type and location of cancer

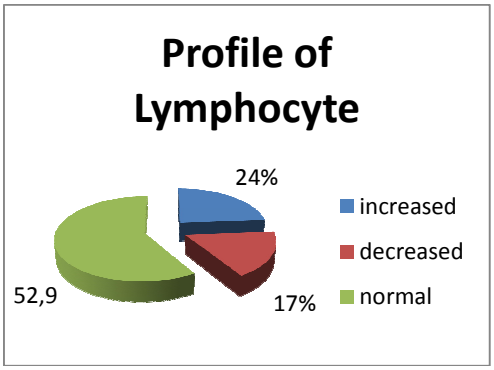

Fig. 4. Distribution by lymphocyte patient colorectal cancer

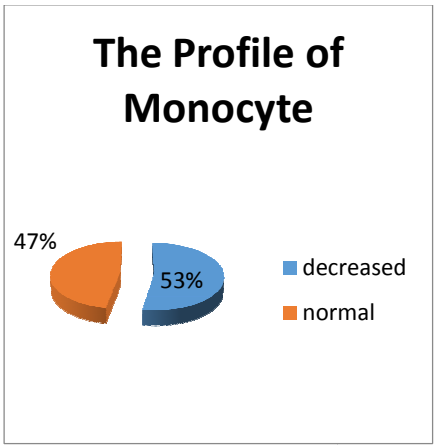

Fig. 5. Distribution based on the profile of monocyte

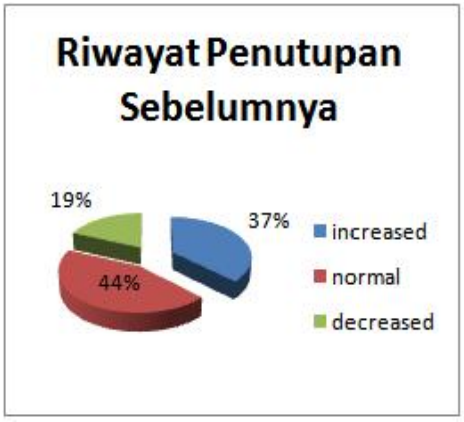

Fig. 6. Distribution based on the profile of limphocyte to monocyte ratio

Cancer-associated inflammatory markers include the presence of inflammatory cells and the generation of inflammatory mediators (eg chemokines, cytokines and prostaglandins) in tumor tissue, tissue remodeling and angiogenesis [11].

Many epidemiological studies have shown that chronic inflammation is a predisposing factor for the development of various cancers. Various factors can trigger inflammation in cancer [11].

The purpose of this study is to determine the profile of lymphocyte, monocyte and lymphocyte-monocyte ratios in colorectal carcinoma patients at. Moewardi Hospital during March-April 2019. Of the 70 patients studied the composition of 40 male patients and 30 female patients, this is consistent with that described in some literature that colorectal cancer is less common in women, previous research conducted by Imaduddin et al. [12], it was stated that colorectal cancer patients were more common in men than all patients studied (1.13).

In this study with the age range between 30 to more than 70 years, the highest prevalence of colorectal cancer occurrence was at the age of 51-60 years that is equal to 34%, and 41 - 50 years (14.3%). This is by research conducted Aimaddudin et al in 2013 that the prevalence of most colorectal cancer patients is at the age of 41 s.d 60 years of 59.38%.

The average of colorectal cancer patients we studied, the value of lymphocyte numbers is still within the normal limit of 52.9% as well as the number of monocytes, some still within the normal limit of 47.2%. From some previous studies, one of them, conducted by Z Mei [13] in China, to 2900 patients, that the spread of inflammatory cells of tumors, especially high lymphocytes associated with a good prognosis marker in patients with colorectal cancer. Koch et al. [14] also conducted a study on the distribution of T lymphocytes associated with stages of colorectal cancer patients, eith result, the higher rate of T lymphocyte distribution, associated with the lower of the cancer stage.

Of all the samples analyzed in this study 26 of patients had increased rates of Lymphocyte-Monocyte Ratio (RLM), 31 within normal limits and 13 decreased RLM. Some studies on Lymphocyte - Monocyte ratio in colorectal cancer patients have been done, one of which is done by Wei Song with analyzed 8,626 patients, obtained the result that low rates of RLM associated with a poor prognosis in patients with colorectal cancer [5]. This conclusion is

Table 1. Patient recapitulation

Number	Age	Sex	Location of Cancer Type	The number of Lymphocite (%)	The number of Monocyte (%)	The Lymphocite to Monocyte Ratio (%)
1	35	Male	Rectum	21,3	9	2,4
2	60	Female	Rectum	37	7,5	4,9
3	75	Male	Rectum	41,7	8,7	4,5
4	65	Male	Rectum	27,0	7,0	3,8
5	56	Male	Rectum	19,2	4,9	3,9
6	59	Female	Colon	22,1	8,8	2,5
7	52	Female	Rectum	5,1	4,0	1,3
8	53	Female	Rectum	52,4	11,7	4,5
9	56	Female	Rectum	7,4	5,6	1,3
10	57	Male	Rectum	26,2	8,1	3,2
11	63	Male	Colon	46,7	13,17	3,5
12	52	Male	Colon	47,5	4,3	11,1
13	45	Male	Rectum	24,0	8,0	3
14	36	Male	Rectum	8,4	5,7	1,5
15	69	Male	Rectum	11,6	12,7	0,9
16	49	Female	Colon	46,2	12,4	3,8
17	59	Male	Rectum	24,2	5,7	4,2
18	70	Male	Rectum	37,4	10,3	3,6
19	52	Male	Colon	48,6	10,5	4,6
20	57	Female	Rectum	21,4	6,4	3,4
21	66	Female	Colon	23,1	4,8	4,8
22	52	Male	Rectum	8,8	6,4	1,4
23	55	Male	Rectum	9	6,6	1,4
24	56	Male	Rectum	12,3	8,3	1,5
25	57	Female	Rectum	36,1	22,6	1,6
26	33	Female	Colon	22,4	8,6	2,6
27	47	Female	Colon	53,0	4	13,3
28	36	Female	Rectum	36,1	6,2	5,8
29	43	Female	Rectum	46,1	8,2	5,6
30	63	Male	Rectum	24,3	6,3	3,8
31	37	Male	Rectum	52,4	2,3	22,8

Number	Age	Sex	Location of Cancer Type	The number of Lymphocite (%)	The number of Monocyte (%)	The Lymphocite to Monocyte Ratio (%)
32	61	Female	Rectum	38,1	8,6	4,4
33	77	Male	Rectum	52,8	9,8	5,4
34	66	Male	Rectum	28,2	8,3	3,4
35	57	Male	Rectum	60,2	5,9	10,2
36	58	Female	Colon	32,6	10,7	3,1
37	52	Female	Rectum	5,2	4,1	1,3
38	54	Female	Rectum	53,5	9,8	5,5
39	57	Female	Rectum	7,5	5,7	1,3
40	58	Male	Rectum	27,3	6,2	4,4
41	62	Male	Rectum	37,8	14,2	2,7
42	53	Male	Colon	42,6	4,3	9,9
43	46	Male	Rectum	25,0	9,0	2,8
45	37	Male	Rectum	21,5	5,8	3,7
46	70	Male	Rectum	22,7	13,8	1,6
47	50	Female	Colon	18,8	13,5	1,4
48	60	Male	Rectum	25,3	6,8	3,7
49	71	Male	Rectum	38,5	11,4	3,4
50	52	Male	Colon	38,1	12,7	3
51	38	Male	Rectum	23,5	3,4	6,9
52	62	Female	Rectum	39,2	9,7	4,1
53	78	Male	Rectum	46,4	10,9	4,3
54	67	Male	Rectum	29,3	9,4	3,1
55	58	Male	Rectum	21,3	6,1	3,5
56	59	Female	Colon	33,7	11,8	2,9
57	53	Female	Rectum	26,3	5,2	5,1
58	55	Female	Rectum	34,6	10,9	3,2
59	56	Female	Rectum	18,6	6,8	2,8
60	59	Male	Rectum	28,3	6,3	4,5
61	39	Male	Rectum	22,6	2,5	9,1
62	57	Female	Rectum	40,1	10,6	3,8
63	72	Male	Rectum	44,8	11,8	3,8
64	62	Male	Rectum	30,1	11,2	2,7
65	53	Male	Rectum	22,3	8,1	2,8

Number	Age	Sex	Location of Cancer Type	The number of Lymphocite (%)	The number of Monocyte (%)	The Lymphocite to Monocyte Ratio (%)
66	56	Female	Colon	55,2	10,9	5,1
67	49	Female	Rectum	28,2	7,1	3,9
68	50	Female	Rectum	35,5	11,8	3,0
69	53	Female	Rectum	10,5	9,7	1,1
70	54	L	Rectum	29,3	9,3	3,2

supported by research conducted by Lin et al. [14] for patients with previously untreated mCRC receiving FOLFOX chemotherapy, an elevated pre-chemotherapy LMR is an independent favorable prognostic factor for PFS and OS, and changes in the LMR before and after chemotherapy seem to predict the benefit of chemotherapy. Studies conducted by Tan et al. [15] study indicated that a high lymphocyte to monocyte ratio might be a useful marker for colorectal cancer prognosis.

6. CONCLUSION

Increased markers of inflammation are associated with decreased survival of colorectal cancer patients. Some simple markers include lymphocyte, monocyte profiles, and lymphocyte-monocyte ratios.

In a retrospective study of 70 colorectal cancer patients in Dr. Moewardi Hospital, 21.4% of patients had elevated lymphocyte count, 15.7% of patients had decreased lymphocyte count, while 52.9% of patients had lymphocyte numbers within normal limits. 52.8% of patients experienced a decrease in monocyte count, and 47.2% normal. The lymphocyte-monocyte ratio data shows results by previous studies where most patients with colorectal cancer have lymphocyte-monocyte ratios within normal limits, this indicates that some colorectal cancer patients at Dr. Moewardi Hospital show the possibility of still having a good prognosis. The limitations of this study are the relatively small number of samples and the analysis has not been carried out using statistical analysis to see the significance of the data. This study should be supported by research on a larger sample and statistical research to see the significance of the research data with the expected results.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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