



## Clinical Value of Platelet Count and Platelet-Lymphocyte Ratio (PLR) in Patients with Thyroid Malignancy

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**Abstract:** Platelet count index may be used as useful clinical markers in the differential diagnosis of benign and malignant thyroid disorders. Platelet-lymphocyte ratio (PLR) has recently been introduced as prognostic markers of thyroid cancer and strong inflammatory markers. This study aimed to evaluate the clinical value of the platelet count and PLR in thyroid malignancy. Subjects were 61 patients with thyroid nodule who were followed up at the General Surgery Clinic of Prof. Dr. R. D. Kandou Hospital, and underwent ultrasound examination, FNAB, thyroidectomy, and histopathological examination. Categorical scale data were described through frequencies and percentages, while numerical scale data were presented in the form of min, max, mean and standard deviation. The results showed that thyroid nodules predominantly occurred in females (60.65%); 25 of 37 patients (67.57%) of whom had malignancy. Meanwhile, of 24 male patients (39.3%), there were 17 patients (38.64%) who had thyroid malignancy. In this study, the platelet count and PLR were no significantly higher in patients with papillary thyroid malignancy than in those with non-malignancy. As many as 42 patients (68.85%) with thyroid malignancy had normal platelet count and as many as 44 patients (72.13%) had low PLR; these results were the same with non-malignancy thyroid. In conclusion, thyroid malignancy is predominantly comprising between age 40-59 years old, dominated by females. Laboratory results shows that the majority have normal platelet count and low platelet-lymphocyte ratio. Further research and patient follow-up are needed to evaluate the platelets and platelet-lymphocyte ratio in patients with thyroid malignancy.

**Keywords:** platelet count; platelet-lymphocyte ratio; thyroid malignancy

## INTRODUCTION

Thyroid hormones are necessary for the normal growth, differentiation, metabolic balance, and physiological function of all tissues. All cells are targets of thyroid hormone. Alterations in haematological parameters, especially platelet and white blood cell count, could be associated with thyroid dysfunction. Previous reports have suggested that thyroid malignancy is associated with alteration in platelet count and platelet-lymphocyte ratio (PLR), which are recently introduced as prognostic markers of thyroid cancer and strong inflammatory markers.<sup>1</sup>

Papillary thyroid malignancy is the most common type of thyroid carcinoma. Although PLR is currently accepted as a prognostic marker for thyroid cancer, this parameter is also increased in patients with inflammatory conditions of the thyroid. Since there has no association between papillary cancers and thyroiditis been proven so far, inflammation is the common point of these diseases.<sup>2,3</sup> Therefore, this study aimed to describe the clinical value of platelet count and platelet-lymphocyte ratio on thyroid malignancy cases.

## METHODS

This was an analytical study to evaluate the correlation between platelet count and PLR in thyroid malignancy. Samples were 61 patients with thyroid nodule who were followed up at the General Surgery Clinic of Prof. Dr. R. D. Kandou Hospital. A total of 61 patients (24 males and 37 females) attended the monitoring visit starting in the phase prior to thyroid general surgery clinic. Patients with diabetes mellitus, hypertension, chronic inflammatory disease or autoimmune disease, acute or chronic infection, haematologic disease, heart failure, myeloproliferative disorders, hepatic or renal disorders and patients on anticoagulation therapy were excluded from this study.

The study involved patients with thyroid malignancy that had data of age, sex, and fine needle aspiration biopsy (FNAB) results and visited the General Surgery Clinic at Prof. Dr. R. D. Kandou Hospital from 2021 to 2022. All patients with thyroid nodules that were histopathologically diagnosed, and detailed demographic data were recorded. Biochemical analyses and blood counts were measured on the day of surgery. The PLRs were calculated from the neutrophil, platelet, and lymphocyte ratios after performing a full blood count.

## RESULTS

Table 1 showed that the total research subject were 61 patients, consisting of 37 females (60.7%) and 24 males (39.3%). From 37 female patients, 27 patients (61.36%) experienced thyroid malignancy and 10 patients (58.82%) with non-malignancy. Meanwhile, from 24 male patients, 17 patients (38.64%) experienced thyroid malignancy and seven patients (41.18%) with non-malignancy. There were 16 patients (36.36%) in the age group <50 years with thyroid malignancy and 10 patients (58.2%) with non-malignancy, whereas in the age group >50 years there were 28 (63.64%) peoples with thyroid malignancy and seven patients (41.18%) people with non-malignancy. The mean age of the patients was  $49.54 \pm 15.01$  years, with the highest age being 76 years and the lowest age being 13 years. The subject age was divided into two groups; most of which were >50 years (high risk) totaling 34 patients (55.7%), followed by <50 years (low risk) as many as 27 patients (44.3%).

Table 2 showed that the platelet count category was grouped into three groups, where most of the subjects in this study had a platelet count of  $15-450 \times 10^3$  cells/ $\mu$ l as many as 42 patients (68.85%) people with thyroid malignancy and 17 patients (28.78%) with non-malignancy, followed by a platelet count  $<150 \times 10^3$  cells/ $\mu$ l as many as one patient (1.63%) with thyroid malignancy and platelet count  $>450 \times 10^3$  cells/ $\mu$ l as many as one (1.162%) patient with thyroid malignancy ( $256,97 \pm 68,51$ ).

Table 3 showed that the value of PLR was mostly low. As many as 44 patients (72.13%) with thyroid malignancy had low PLR, and 17 patients (27.89%) with non-malignancy had low PLR.

## DISCUSSION

From the data, thyroid nodules were common in females (60.7%) than in males (39.5%). The mean age of the patients was  $49.54 \pm 15.01$  years, with the highest age being 76 years and the lowest age being 13 years (Table 1). These results are consistent with previous studies that found thyroid nodules are common in female and their frequencies increases with age. Estrogen hormone and its receptors play a pivotal role in the pathogenesis and increases the growth of benign and malignant thyroid nodules by binding to estrogen receptors nuclei through activation of mitogen protein kinase pathways (MAP) there by mediating mitogenesis<sup>1,3</sup>.

Most of the patients in this study had platelet count of  $15-450 \times 10^3$  cells/ $\mu$ l; 42 patients (68.85%) with thyroid malignancy and 17 patients (28.78%) with non-malignancy. The value of PLR was mostly low. As many as 44 patients (72.13%) with thyroid malignancy had low PPLR. This result is not in accordance with research conducted by Rianto *et al*<sup>7</sup> at Sardjito Hospital from 2015 to 2017 involving 72 patients. They compared platelet count and PLR in malignant and non-malignant patients, and found no statistically significant difference of PLR and mean platelet volume between benign thyroid nodules and malignant thyroid nodules ( $p=0.031$  and  $p=0.007$  respectively). Platelets contribute to tumor growth, invasion and angiogenesis. Moreover, platelets protect tumor cells from destruction by NK cells, thereby facilitating metastasis.<sup>6,7</sup>

Study of Martin *et al*<sup>8</sup> reported that the neutrophil and platelet counts of patients with thyroid malignancy were significantly different than that of patients with benign nodules. Fibrinogen and platelet counts could be promising, inexpensive, and independent predictors for the present of papillary thyroid carcinoma compared to benign thyroid disorders. The PLR is a valuable inflammatory index, and being accepted as another novel inflammatory marker that has been reported to be biochemically involved in the progression of tumor invasion.<sup>9</sup> Recent studies have shown the potential for use of the PLR in a diagnostic approach to inflammatory events and malignancy. In the current study, the PLRs were higher in patients with papillary carcinoma than in healthy individuals.<sup>10</sup>

## CONCLUSION

Thyroid malignancy is predominantly comprising between age 40-59 years old and mostly dominated by females. Laboratory results in this study show that majority of patients have normal platelet count and low platelet-lymphocyte ratio (PLR). Further research and patient follow-up are needed to evaluate the platelet count and PLR in patients with thyroid malignancy, therefore, PLR can become a tumor marker for thyroid malignancy.

### Conflict of Interest

The authors affirm no conflict of interest in this study.

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**Table 1.** Correlation of age and histopathological result

Characteristics of subjects	Histopathological results		Total	Total	Min	Max	Mean	SD
	Malignancy	Non malignancy						
Sex	Male	17 (38.64%)	7 (41.18%)	24	61	-	-	-
	Female	27 (61.36%)	10 (58.82%)	37		-	-	-
Age (years)	<50	16 (36.36%)	10 (58.82%)	26	61	13	76	49.54
	>50	28 (63.64%)	7 (41.18%)	35		-	-	15.01

**Table 2.** Clinical value of platelet count in thyroid malignancy and non-malignancy cases

Characteristics of subjects	Histopathological results		Total	Mean	SD
	Malignancy	Non malignancy			
Platelet Count	<150	1 (1.64%)	0	1	68.51
	150-450	42 (68.85%)	17 (27.87%)	59	
	>450	1 (1.64%)	0	1	
Total		44 (72.13%)	17 (27.87%)	61	

**Table 3.** Clinical value of platelet to lymphocyte ratio in thyroid malignancy and non-malignancy cases

Characteristics of subjects	Histopathological results		Total	Min	Max	Mean	SD
	Malignancy	Non malignancy					
Platelet to lymphocyte count	High	0	0	3.1	153	29.53	23.86
	Low	44 (72.13%)	17 (27.89%)				
Total			61				

Note: SD, standard deviation