



## The effect of Hashimoto's thyroiditis on platelets in terms of the their number, size, and distribution

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### Abstract

**Objective:** The aim of our study was to investigate whether platelet indices were affected in patients with Hashimoto's thyroiditis (HT).

**Method:** 11 patients (10 female, 1 male) with HT and 26 subjects with nodular goiters (19 female, 7 male) selected as control group were included in the study. All cases were examined for complete blood count parameters (leukocyte count, neutrophil count and percentage, lymphocyte count and percentage, platelet count, plateletcrit, platelet distribution width (PDW), and mean platelet volume (MPV)).

**Results:** Leukocyte count, neutrophil count and percentage, lymphocyte percentage, platelet count, plateletcrit, and MPV in the patient group were not statistically different from the control group. Lymphocyte count and PDW were significantly higher in patients with HT than in the control group.

**Conclusion:** Our results suggest that patients with HT have higher PDW levels. Increased PDW in HT may be helpful in diagnosis, follow-up, and prognosis of the disease.

**Keywords:** Thyroid, Hashimoto, platelet.

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## Hashimoto tiroiditinin trombositler üzerine sayı, büyüklük ve dağılım açısından etkisi

### Öz

Amaç: Çalışmamızın amacı, Hashimoto tiroiditi olan hastalarda trombosit endekslerinin etkilenip etkilenmediğini araştırmaktır.

Yöntemler: HT'li 11 hasta (10 kadın, 1 erkek) ve kontrol grubu olarak seçilen nodüler guatrılı 26 kişi (19 kadın, 7 erkek) çalışmaya dahil edildi. Tüm olguların tam kan sayımı parametreleri (lökosit sayısı, nötrofil sayısı ve yüzdesi, lenfosit sayısı ve yüzdesi, trombosit sayısı, trombosit yüzdesi, trombosit dağılım genişliği (PDW) ve ortalama trombosit hacmi (MPV)) incelendi.

Bulgular: Hasta grubunda lökosit sayısı, nötrofil sayısı ve yüzdesi, lenfosit yüzdesi, trombosit sayısı, platelet yüzdesi ve MPV değerleri kontrol grubundan istatistiksel olarak farklı değildi. Lenfosit sayısı ve PDW, HT'li hastalarda kontrol grubuna göre anlamlı derecede yüksekti.

Sonuç: Bulgularımız HT'li hastaların PDW düzeylerinin daha yüksek olduğunu göstermektedir. HT'de artmış PDW, hastalığın tanısı, takibi ve prognozu açısından anlamlı olabilir.

**Anahtar kelimeler:** Tiroid, hashimoto, trombosit.

### INTRODUCTION

Hashimoto's thyroiditis (HT), part of the spectrum of autoimmune thyroid diseases, is the most common form of inflammatory thyroid disorders and the most common cause of hypothyroidism<sup>1,2</sup>. An increase in the incidence of HT has attracted attention in recent years<sup>3</sup>. It is known that a number of genetic and environmental factors are responsible for the development of HT, while there are still many unexplained points in the etiopathogenesis<sup>4</sup>. Many studies showed that both cellular and humoral immunity are important in HT<sup>5,6</sup>. Activation of follicular helper T cells and disturbance of T regulatory cells may play a role in initiation/perpetuation of the disease<sup>3</sup>. There is a growing interest about the effects of platelets on immunological and inflammatory processes<sup>7-10</sup>. There is a limited number of studies in the literature on the relationship between HT and platelet indices<sup>11-13</sup>. Inflammatory condition in HT can affect the number, the size, and the distribution of blood platelets<sup>7,11-13</sup>. The aim of our study was to investigate whether platelet indices were affected in patients with pathologically diagnosed HT.

### METHODS

This study started with the approval of the Ethics Committee of the Faculty of Medicine of our University (31.05.2017/101). Between 01.03.2014 and 28.02.2017, 11 patients (10 female, 1 male) with HT diagnosis in the pathology clinic of our University Research and Practice Center Hospital and 26 cases of nodular goiters (19 female, 7 male) selected as control group were included in the study. The aim of that we selected the patients with nodular goiter as control group was to ensure that they didn't have pathologically HT. Exclusion criteria were as follows: a chronic disease such as asthma, chronic obstructive pulmonary disease, and hypertension and/or concomitant thyroid carcinoma.

All patients who were included in the study were examined for complete blood count parameters (leukocyte count, neutrophil count and percentage, lymphocyte count and percentage, platelet count, plateletcrit, platelet distribution width (PDW), and mean platelet volume (MPV)). These parameters were measured by a hematology analyzer (ABX Pentra DX 120, HORIBA, France).

## Statistical Analyses

The Kolmogorov-Smirnov test was used to determine whether the variables were distributed normally. Fisher's exact test was used to determine whether there is a gender difference between the groups and Mann-Whitney U test to determine whether there is a difference in terms of age, leukocyte count, neutrophil count and percentage, lymphocyte count and percentage, platelet count, plateletcrit, PDW, and MPV. A p value less than 0.05 was considered statistically significant.

## RESULTS

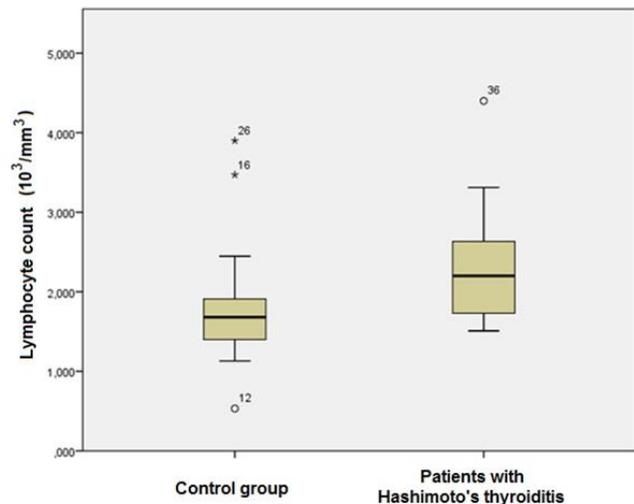
There was no significant difference between the groups in terms of age and gender (Table 1). Leukocyte count, neutrophil count and percentage, lymphocyte percentage, platelet count, plateletcrit, and MPV in the patient group were not statistically different from the control group (Table 1). Lymphocyte count and PDW were significantly higher in patients with HT than in the control group (Figures 1, 2, and 3).

## DISCUSSION

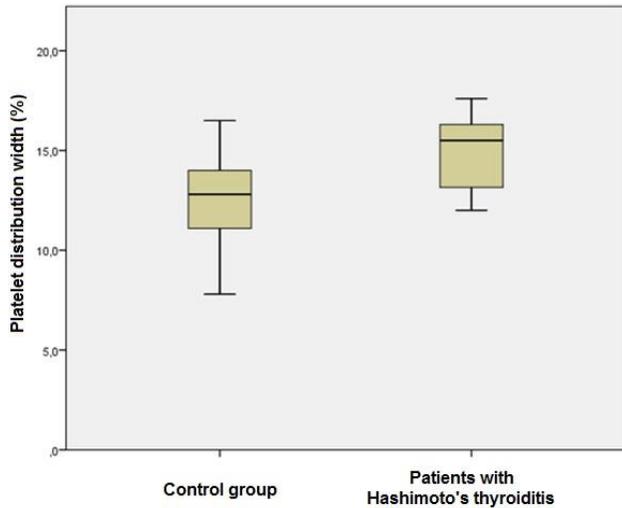
HT is an autoimmune disease characterized by the infiltration of the thyroid gland by both B and T lymphocytes. For this reason, there is a role for both cellular and humoral immunity in its pathogenesis<sup>3</sup>. We found that lymphocytes count in peripheral blood of patients with HT was significantly higher than in the control group (Figure 1). Lymphocytosis is a nonspecific finding that is common during the healing period of many acute infectious diseases. It is known that HT is one of non-infectious diseases associated with lymphocytosis<sup>14</sup>.

**Table 1:** Comparison of age, gender distribution, and complete blood count parameters between control group (nodular goiter) and patients with Hashimoto's thyroiditis.

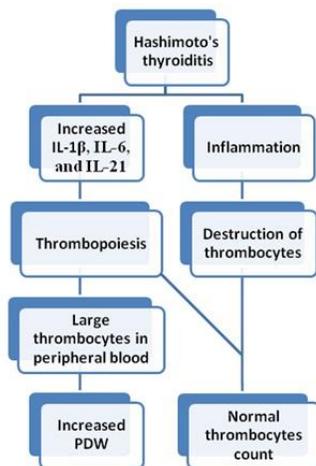
	Hashimoto's thyroiditis (n=11)	Nodular goiter (n=26)	p
Age	41.0 ± 14.1	46.4 ± 14.2	0.421
Gender	Female	10	0.391
	Male	7	
Leukocyte count (x10 <sup>3</sup> /mm <sup>3</sup> )	7.34 ± 2.13	7.00 ± 1.78	0.544
Neutrophil count (x10 <sup>3</sup> /mm <sup>3</sup> )	4.61 ± 2.08	4.65 ± 1.63	0.857
Neutrophil percentage (%)	60.3 ± 11.5	65.5 ± 8.5	0.181
Lymphocyte count (x10 <sup>3</sup> /mm <sup>3</sup> )	2.37 ± 0.87	1.77 ± 0.67	0.023
Lymphocyte percentage (%)	30.1 ± 10.1	26.2 ± 7.8	0.270
Platelet count (x10 <sup>3</sup> /mm <sup>3</sup> )	288.2 ± 61.7	288.6 ± 92.6	1.000
Plateletcrit (%)	0.276 ± 0.051	0.275 ± 0.114	0.402
Platelet distribution width (%)	14.8 ± 1.9	12.6 ± 2.2	0.005
Mean platelet volume (fL)	9.8 ± 1.8	9.6 ± 1.7	0.682



**Figure 1.** Comparison of lymphocyte count between control group and patients with Hashimoto's thyroiditis.



**Figure 2.** Comparison of platelet distribution width between control group and patients with Hashimoto's thyroiditis.

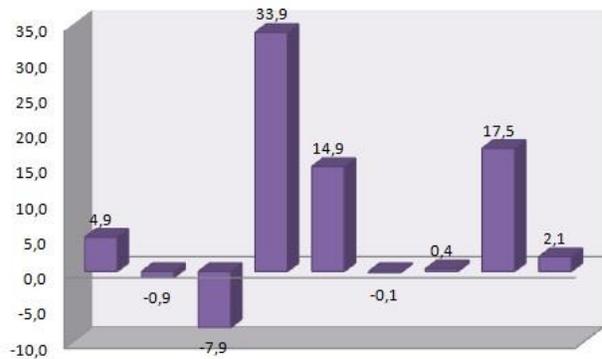


**Figure 3.** Percentage change of complete blood count parameters in patients with Hashimoto's thyroiditis compared to that of control group. The bars in the graph have been ordered from left to right as follows: leukocyte count, neutrophil count, neutrophil percentage, lymphocyte count, lymphocyte percentage, platelet count, plateletcrit, platelet distribution width, mean platelet volume.

Our study showed that the PDW values, a specific marker of platelet activation, were significantly increased in HT. Sit et al.<sup>11</sup> and Aktas et al.<sup>15</sup> found that PDW values in patients with HT did not differ from those in healthy controls. Atila et al.<sup>16</sup> reported that PDW values of patients with hypothyroid HT were similar to those of both healthy controls and patients with treated euthyroid HT. However,

Bilge et al.<sup>17</sup> found that PDW values were significantly increased in euthyroid women with HT compared with healthy controls. The findings of our study agree with those of Bilge et al. Zhu et al.<sup>18</sup> have determined elevated follicular helper T cells in the peripheral blood of patients with HT. It has been shown that follicular helper T cells produce high levels of IL-21 that is associated with the development of autoimmune diseases<sup>19,20</sup>. Cytokines such as IL-1 $\beta$ , IL-6, and IL-21 can play a role in the pathogenesis of HT<sup>20-22</sup> and also can enhance thrombopoiesis<sup>24</sup>. Accelerated thrombocytes generation leads to presence of large thrombocytes<sup>25</sup>, hence, to increased PDW.

We found that platelet count was not different in patients with HT compared with that of control group. This result agreed with previous studies<sup>11,12</sup>. During inflammatory process, there is a rapid recruitment of thrombocytes to the field of inflammation where they are consumed due to their destruction<sup>26</sup>. For this reason we consider that in patients with HT, platelet production increases, but, on the other hand, platelet consumption also enhances and thus platelet count remains unchanged (Figure 4).



**Figure 4.** Possible molecular mechanism of the increase in platelet distribution width in Hashimoto's thyroiditis.

In conclusion, our results suggest that patients with HT have higher PDW levels. Increased PDW in HT may be helpful in diagnosis, follow-up, and prognosis of the disease and for better understanding of mechanisms associated with the disease pathogenesis. However, further studies are need to confirm its validity in patients with HT.

**Conflicts of interest:** The authors have no conflict of interests to declare.

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