

## Blood Indices in Patients with Androgenetic Alopecia

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### Abstract

Hair is a marvelous structure with cosmetic function. Androgenetic alopecia [AGA] is the most common hair loss condition affects both sexes; AGA is thinning of scalp hairs that initiated by androgens in susceptible patients. Complete blood count [CBC] parameters have been introduced as diagnostic biomarkers for many diseases associated with the inflammatory process: This study aimed to assess blood indices in patients with androgenetic alopecia. This case control study was included thirty male and twenty female patients complaining of androgenetic alopecia, and thirty age and BMI matched healthy volunteers. Patients were recruited from outpatient clinic of Dermatology, Venereology and Andrology Department of Benha University Hospitals during the period from December 2018 to June 2019. All participants were tested for determination of blood indices. Results: PLT count was found to lower in AGA patients compared to controls without significant difference. AGA group showed significantly higher MPV, NLR and PLR were found to be significantly higher in AGA patients compared to controls. Patients with AGA showed high level NLR, PLR and MPV.

**Key words:** Androgenetic alopecia, Blood indices, Diagnosis.

### 1. Introduction

Hair is a marvelous structure with cosmetic function. Androgenetic alopecia [AGA] is the most common hair loss condition affects both sexes; AGA is thinning of scalp hairs that initiated by androgens in susceptible patients [1].

The onset of AGA mostly in late adolescence, gradual and slowly develops over years. The frequency and the grade of severity of AGA increases with age. Up to 30% of males will have AGA by 30 years, 50% by 50 years, and 80% by 70 years [2].

Complete blood count [CBC] parameters have been introduced as diagnostic biomarkers for many diseases associated with the inflammatory process: Red cell distribution width [RDW] demonstrates the size variability of circulating erythrocytes and is calculated by dividing the standard deviation of red blood cell [RBC] volume by mean corpuscular volume [MCV] and is used to identify the causes of anemia [3].

Mean platelet volume [MPV] has been identified as a platelet activation marker and plays an important role in inflammatory reactions [4].

Among the other parameters, the ratio of neutrophils to lymphocytes [NLR] and the ratio of platelets to lymphocytes [PLR] are simple markers of systemic inflammatory response [5].

Recently, these markers have been studied, individually or together, in relation to various dermatologic diseases such as psoriasis, rheumatologic diseases of dermatology,

cutaneous vasculitis, atopic eczema, pityriasis rosea, Behçet's disease, recurrent aphthous stomatitis, and pemphigus vulgaris [6].

There are no studies that investigate the relationship between androgenetic alopecia and these inflammatory markers, and to the best of our knowledge, this is the first study to examine the association between these markers and disease severity.

The study aimed to assess blood indices in patients with androgenetic alopecia.

### 2. Patients and methods

#### 2.1 Patients

This case control study was included thirty male and twenty female patients complaining of androgenetic alopecia, and thirty age and BMI matched healthy volunteers. Patients were recruited from outpatient clinic of Dermatology, Venereology and Andrology Department of Benha University Hospitals during the period from December 2018 to June 2019.

#### 2.1.1 Inclusion criteria

The inclusion criteria for patients with AGA were: being over 18 years of age, and being willing to participate in the study.

#### 2.1.2 Administrative Design

This study was approved by the research ethical committee of Benha Faculty of Medicine.

#### 2.1.3 Ethical consideration

Before taking blood samples, a written informed consent was taken from each subject included in the current study.

**All participants were divided into two groups**

- **Group A:** thirty male and twenty female patients with an AGA.
- **Group B:** thirty age and BMI matched healthy volunteers as controls group.

## 2.2 Methods

**All patients were subjected to the following**

### Full history taking

#### 2.2.1 Clinical Examination

- Measure of the body height and weight to calculate the body mass index

#### 2.2.2 Laboratory investigations

All participants were tested for determination of blood indices.

Sample analysis complete blood picture was performed on system XN cell counter [System Corporation, Japan].

**The following parameters were recorded:**

Platelets count.

- 1- Absolute lymphocyte count.
- 2- Absolute neutrophils count.
- 3- Mean platelet volume [MPV] .

**In addition, the following ratios were calculated from previous results:**

- 1- Neutrophil/ Lymphocyte [N/L] ratio=absolute neutrophils count/ absolute lymphocyte count.

- 2- Platelet/ Lymphocyte [P/L] ratio=platelet count/absolute lymphocyte count.

## 2.3 Statistical analysis

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science [IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.]. Data were presented and suitable analysis was done according to the type of data obtained for each parameter.

### Descriptive statistics

Mean Standard deviation [ $\pm$  SD] for numerical data. Frequency and percentage of non-numerical data.

### Analytical statistics

**Student T** Test was used to assess the statistical significance of the difference between two study group means. **Chi-Square test** was used to examine the relationship between two qualitative variables. N.B: p is significant if  $<0.05$  at confidence interval 95%.

## 3. Results

The mean age of AGA patients was 36.6 years. Male patients represented 60%, while females represented 40%. In addition to 30 healthy control subjects of matched age and gender. BMI did not differ significantly between both groups, [P value =0.562]. Patients with AGA showed significantly higher NLR, PLR and MPV when compared to control group [p<0.001 for each] as shown in Table [1].

**Table [1]** Sociodemographic data and blood indices of both studied groups.

		Control group N=30		Patients group AGA N=50		P-value
Age [years]	Mean $\pm$ SD	36.1	9.5	36.6	9.3	0.826 <sup>T</sup>
Male	N, %	15	50%	30	60.0%	0.373 <sup>C</sup>
Female	N, %	15	50%	20	40.0%	
BMI [kg/m <sup>2</sup> ]	Mean $\pm$ SD	24.2	2.8	24.5	2.7	0.552 <sup>T</sup>
Normal weight	N, %	17	56.7%	26	52.0%	0.685 <sup>C</sup>
Over weight	N, %	13	43.3%	24	48.0%	
NLR	Mean $\pm$ SD		1.1 $\pm$ 0.3		2.2 $\pm$ 0.7	<0.002 <sup>T</sup>
PLR	Mean $\pm$ SD		70.8 $\pm$ 20.3		131.3 $\pm$ 44.4	<0.001 <sup>T</sup>
Platelets [X10 <sup>9</sup> /L]	Mean $\pm$ SD		262.5 $\pm$ 82.0		254.2 $\pm$ 53.7	0.574 <sup>T</sup>
MPV [fL]	Mean $\pm$ SD		8.0 $\pm$ 0.7		9.6 $\pm$ 0.8	<0.011 <sup>T</sup>

SD, standard deviation; T, Student t test; C, chi square.

## 1. Discussion

This study showed that, there was no statistical significant difference found between the two groups regarding sex. There was a

male predominance of [60%] of the cases. This agrees with [7] who found that in a population-based study in India of 1005 participants showed 58% AGA in males.

In the present work, the mean the age of the AGA patients was  $36.6 \pm 9.3$  years for the cases and  $36.1 \pm 9.5$  years for the controls with no statistical significant difference noted between the two groups. These findings were in consistence with [8] who found that, there was no statistical significant difference between the two groups regarding age.

This study showed that, BMI was comparable in the two groups; there was 48% of the studied AGA patients were overweight. This agrees with [9] demonstrated higher BMI in men with alopecia compared to men with little or no alopecia.

However, [10] found that BMI did not differ between AGA cases and normal controls.

In our study, PLT count was found to lower in AGA patients compared to controls without significant difference. Current results were consistent with that of [11] who reported that platelets count in AGA patients  $238.16 \pm 59.70 \times 10^3$  platelet/ $\mu\text{L}$ , that was lower than that in control group with  $267.79 \pm 68.23 \times 10^3$  platelet/ $\mu\text{L}$  [P value < 0.01]. It is well accepted that platelets are necessary for normal hair growth and differentiation, the decrease in platelet count can be incriminated as an important factor causing or worsening AGA baldness.

This study showed that, AGA group showed significantly higher MPV when compared to control group [p<0.001 for each].This disagrees with İslamoğlu and Demirbaş, [12] who found that the MPV values did not show any significant difference between the two groups.

In our study, NLR and PLR were found to be significantly higher in AGA patients compared to controls.

A factor suggested to mediate hair fall is an increased autoimmune reaction against hair follicles. This hypothetical mechanism was confirmed by a significant increase in WBC count and lymphocyte percent in contrast to other WBC cells. This allergic reaction could be mediated by proinflammatory effects of prostaglandin D2 released by WBC cells like lymphocytes with inhibitory effects on hair growth in AGA patients [13].

## 5. Conclusion

Patients with AGA showed significantly higher NLR, PLR and MPV when compared to control group.

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