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ORIGINAL ARTICLE

Ocular Manifestations Associated With Alopecia Areata

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Abstract

Background: **Refractive errors (RE) and other ocular diseases are main causes of stress, which may affect alopecia areata (AA), and therefore diagnosis and treatment of RE and ocular diseases in patients with AA are important for the prognosis of AA.**

Objective: **To detect the presence of REs and other ocular changes in patients with AA and effect of correction of RE and treatment of ocular diseases, if found, on the prognosis of AA.**

Patients and methods: **Sixty patients suffering from AA were included. Patients had full ophthalmic examination including RE, anterior segment, posterior segment, and examination for dry eye by Schirmer's test and tear breakup time (TBUT) test. They were followed up after 6 months of correction of RE and having medical treatment for alopecia.**

Results: **The study showed that 66.7 % of the included patients had error of refraction, 50 % had lens abnormalities (23.3 % punctate lens opacities, 20 % posterior subcapsular cataract, and 6.7 % cortical cataract), 36.7 % had posterior segment abnormalities (21.7 % tigroid retina, 10 % peripapillary atrophy, and 5 % macular retinal pigment epithelium (RPE) alteration), 60 % had dry eyes, 35 % had madrosis, and 20 % had partial lash loss. Regrowth of hair occurred in 80 % of patients.**

Conclusion: **The current study showed that the most prevalent error of refraction was hypermetropia followed by astigmatism and then myopia. The commonest ocular findings were dry eye followed by lens abnormalities (punctate lens opacities, posterior subcapsular cataract, and cortical cataract) and posterior segment abnormalities (tigroid retina, peripapillary atrophy, and macular RPE alteration).**

Keywords: Alopecia areata, Disease, Dry eye

1. Introduction

Targeting anagen hair follicles, alopecia areata (AA) is a complicated genetic and immune-mediated illness. Both children and adults can develop the condition, which is characterized by round or oval patches of hair loss, loss of all scalp hair (alopecia totalis), loss of all body hair (alopecia universalis), or ophiasis pattern hair loss. Individuals may also exhibit patchy hair loss in several body areas where there is hair.[1]

Retinal images get distorted because of refractive errors (RE), which are caused by an imbalance between the optical power of the eye and its axial length. RE can be divided into three main forms: myopia and hyperopia which are called spherical errors, and astigmatism which represents an optical asymmetry.[2]

Several studies have found varied degrees of importance when linking emotional and/or physical stress to AA. Corticotropin-releasing hormone, which is secreted in the skin by immune cells or dorsal root ganglia, may have a role in mediating this impact.[3]

Lenticular and retinal abnormalities may be found more in alopecia patients than healthy people, but these lenticular and retinal abnormalities which are

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associated with AA do not affect visual acuity. In these patients, a close monitoring for early onset of cataract is crucial.[4]

It is necessary to send children with alopecia for routine eye examinations to assess their refraction with cycloplegic refraction to search for REs. Errors of refraction might be thought of as a cause of AA (especially hypermetropic and astigmatic errors of refraction).[5]

In this prospective observational study, our purpose is to detect the presence of REs and other ocular changes in patients with AA and the effect of correction of RE and treatment of ocular diseases, if found, on the prognosis of AA.

2. Patients and methods

This prospective observational study included 60 patients. Patients were selected from those suffering from AA and referred to the ophthalmology clinic in Sayed Galal Hospital, Al-Azhar University and Ahmed Maher Teaching Hospital from the dermatology clinic.

Inclusion criteria in our study were: patients with AA, age from 3 to 40 years and both sexes were included, while exclusion criteria were: patients with a history of ocular trauma or intraocular surgery, patients using antineoplastic, immunosuppressive, antidepressant and anxiolytic drugs, and patients with systemic diseases which may be associated with those ocular complications.

Detailed history was obtained from all patients including personal history, family history, past medical and surgical history, and disease history.

The patients were examined by a dermatologist and divided into AA less than 50 % and AA more than 50 %. Diagnosis of AA was made based on patient history and clinical findings. The ambiguous cases were excluded by performing a biopsy.

All patients underwent ophthalmic examination by an autorefractometer (2016; Topcon KR-800, Heraklion, Crete, Greece) or a retinoscope (Heine Beta 200, Heraklion, Crete, Greece) as required. Uncorrected and best-corrected visual acuity using the Landolt C (broken ring) chart and Snellen letters, slit lamp for anterior segment and posterior segment using the Volk 90 D double aspheric lens and by Keeler indirect ophthalmoscope and Volk 20 D double aspheric lens and examination for dry eye using Schirmer test and tear breakup time (TBUT) test. The study was approved by the Institutional Review Board (IRB) of Al-Azhar University Hospital. The study follows the tenets of Declaration of Helsinki; written informed consent was obtained from all patients who participated in the study.

2.1. Statistical analysis

Data collected were reviewed and coding of the collected data was done manually. These numerical codes were fed to the computer where statistical analysis was done using the Statistical Package for the Social Sciences, version 20 (IBM SPSS 20, IBM Corp Corp., Armonk, New York). Quantitative data were presented as mean and SD (mean ± SD), and qualitative data were expressed as numbers and percentage.

c^2 test and paired *t*-test were used for significance. The coefficient interval was set to 95 %. The level of significance was calculated and *P* value less than 0.05 was considered statistically significant, *P* value less than 0.001 was highly significant while *P* value more than 0.05 was considered nonsignificant.

3. Results

The current study included 60 patients (120 eyes); 51.7 % were males and 48.3 % were females. Their mean age was 25.017 ± 8.763 years as observed in Table 1 and Figs. 1 and 2. Of the studied population, 60 % had AA less than 50 %, 40 % had AA more than 50 %, as illustrated in Fig. 3. Their mean duration of illness was 7.300 ± 2.997 months. According to Table 2 and Fig. 4, error of refraction was present in statistically significant percentage of patients (66.7 % $P = 0.002$), 50 % had lens abnormalities (23.3 % punctate lens opacities, 20 % posterior subcapsular cataract, and 6.7 % cortical cataract and these findings were significant $P = 0.001$); 36.7 % had statistically significant posterior segment abnormalities (21.7 % tigroid retina, 10 % peripapillary atrophy. and 5 % macular retinal pigment epithelium (RPE) alteration $P = 0.001$), 60 % had dry eyes ($P = 0.02$), 35 % had madrosis ($P = 0.02$), and 20 % had partial lash loss ($P = 0.001$).

Regarding RE, the spherical values ranged between −6.04 and 4.5 D, and the cylindrical values ranged between −5.55 and 2.00 D. The most frequent statistically significant error of refraction was hypermetropia in 41.7 % of studied eyes and astigmatism in 23.3 %. Myopia was detected in 15 % of the studied eyes as shown in Table 3 and Fig. 5

Table 1. Descriptive data of age and sex of the studied population.

	$N = 60$ patients			
	Mean	SD	Minimum	Maximum
Age (years)	25.017	8.763	7	39
			n (%)	
Sex				
Male			31 (51.7)	
Female			29 (48.3)	

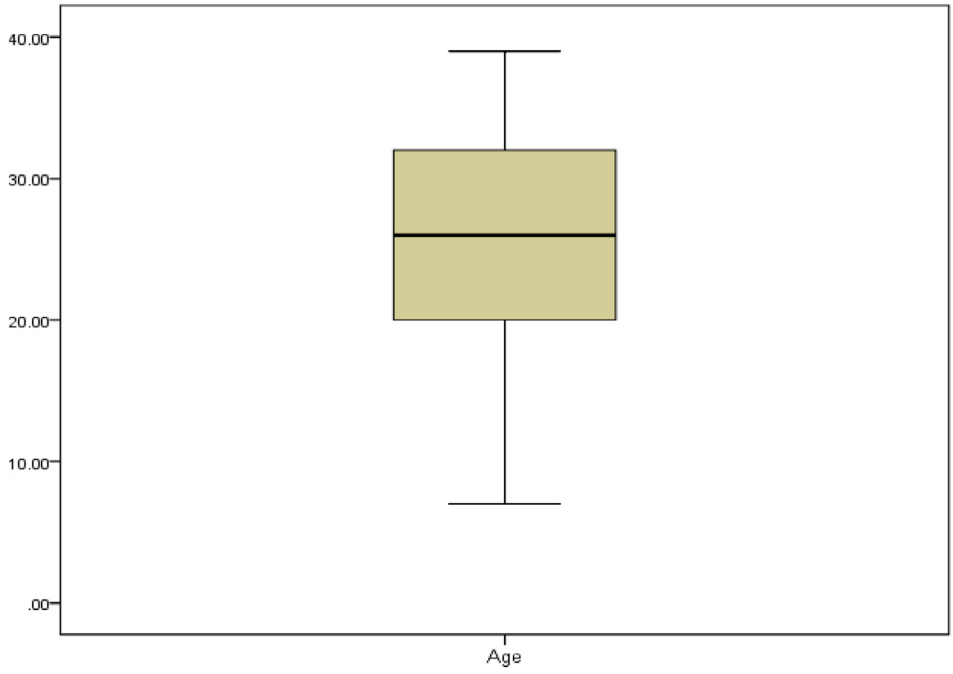

Fig. 1. Age of the studied population.

($P = 0.001$). No error of refraction was detected in 33.3 % of the studied eyes.

Regrowth of hair after correction of RE and treatment of alopecia occurred in 80 % of patients, and this percent was highly significant ($P = 0.0001$), as demonstrated in Figs. 6–9.

The commonest ocular findings were dry eye in 60 % of studied eyes ($P = 0.02$), followed by lens abnormalities including punctate lens opacities ($P = 0.001$), posterior subcapsular cataract ($P = 0.02$), and cortical cataract in 43.3 %, as described in Table 4 and Fig. 10. Posterior segment abnormalities ($P = 0.001$) including tigroid retina, peripapillary atrophy and macular RPE alteration, and madarosis were found in 30 %.

We found that astigmatism was statistically significantly higher in patients with AA more than 50 %. Also, our study showed that posterior subscapular cataract, punctate lens opacities, tigroid retina, peripapillary atrophy, dry eye, madarosis, and lash loss were statistically significantly higher in patients with AA more than 50 %.

The mean visual analog scale score was 0.12 ± 0.1 pretreatment increased to 0.43 ± 0.3 post 6 months of treatment, and this finding was statistically significant ($P = 0.0001$) as shown in Table 5.

4. Discussion

Regarding the demographic data of the studied patients, we found that among the 60 included patients 51.7 % were males and 48.3 % were females. Their mean age was 25.017 ± 8.763 years; 60 % have AA less than 50 %, and 40 % have AA more than 50 %. Their mean duration of illness was 7.300 ± 2.997 months.

Our sample was relatively large compared with the study by Esmer et al.,[4] which aimed to

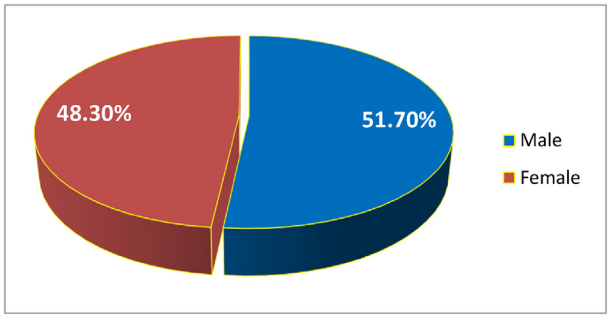

Fig. 2. Sex of the studied population.

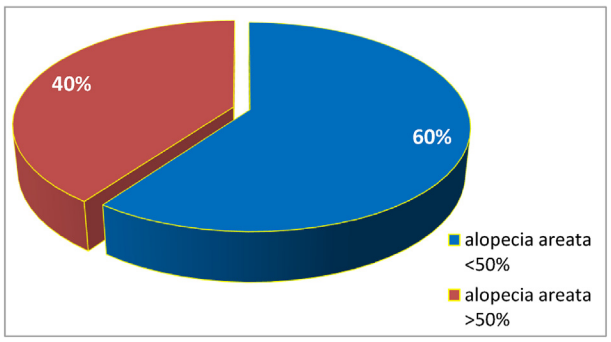

Fig. 3. Alopecia severity of the studied population.

Table 2. Descriptive ocular findings of the studied population.

	$N = 60$ patients [n (%)]	P value
Error of refraction		0.002*
No	20 (33.3)	
Yes	40 (66.7)	
Have error of refraction	40 (66.7)	
Myopia	9 (15)	0.008*
Hypermetropia	28 (46.7)	
Astigmatism	14 (23.3)	
Lens abnormalities	30 (50)	
Posterior subscapular cataract	12 (20)	0.001*
Cortical cataract	4 (6.7)	
Punctate lens opacities	14 (23.3)	
Posterior segment abnormalities	22 (36.7)	
Tigroid retina	13 (21.7)	0.001*
Peripapillary atrophy	6 (10)	
Macular RPE alterations	3 (5)	
Dry eye	36 (60)	0.02*
Madarosis	21 (35)	0.02*
Partial lash loss	12 (20)	0.001*

The same patient may have more than one error of refraction.
RPE, retinal pigment epithelium.
* P-value < 0.05: Significant.

Table 3. Descriptive error of refraction data in the studied eyes.

	$N = 120$ eyes [n (%)]	P
No error of refraction	40 (33.3)	0.0001*
	80 (66.7)	
Myopia	18 (15)	0.001*
Hypermetropia	50 (41.7)	
Astigmatism	28 (23.3)	

The same patient may have more than one error of refraction.
* P-value < 0.05: Significant.

investigate ocular findings in patients with alopecia. The study included 42 patients with alopecia (31 males, 11 females; 84 eyes) and 45 healthy individuals (28 males, 17 females; 90 eyes).

The current study showed that 66.7 % of patients had error of refraction, 50 % had lens abnormalities (23.3 % punctate lens opacities, 20 % posterior subcapsular cataract, and 6.7 % cortical cataract); 36.7 % had posterior segment abnormalities (21.7 % tigroid retina, 10 % peripapillary atrophy, and 5 % macular RPE alteration); 60 % had dry eyes; 35 % had madrosis; and 20 % had a partial lash loss.

The commonest ocular findings were dry eye in 60 % of eyes, followed by lens abnormalities (punctate lens opacities, posterior subcapsular cataract, and cortical cataract) in 43.3 %. Posterior segment abnormalities (tigroid retina, peripapillary atrophy, and macular RPE alteration) and madarosis were found in 30 % of studied eyes.

In agreement with the current study, Oltulu et al.[6] revealed that the frequency of dry eye disease was very high (91.3 %) in AA patients and accompanied by increased tear instability (91.3 %). Although there was no significant difference between AA patients and the control group in terms of tear production, it was demonstrated that there may be some cytological changes including squamous metaplasia.

Also, in concordance with our results, Ergin et al.[7] revealed that dry eye disease was diagnosed in 27 (84 %) of 32 AA patients and in only three (15 %) of 20 controls, and there was a significant difference between the groups ($P < 0.01$). Furthermore, they have reported that the prevalence of papillary hypertrophy (90 %), lenticular (28 %), and chorioretinal changes (18 %) was higher in the patient group.

However, El Gareh et al.[8] enrolled 31 AA patients and found that 77.5 % had lens abnormalities, three patients representing 7.5 % had dry eye, and 18 patients representing 45 % had fundus examination abnormalities. Also, Esmer et al.[4] revealed that the commonest ocular findings were lens abnormalities in 83 %, followed by punctate lens opacities in 52 %. The disagreement with our results may be due to the difference in genetic and environmental factors.

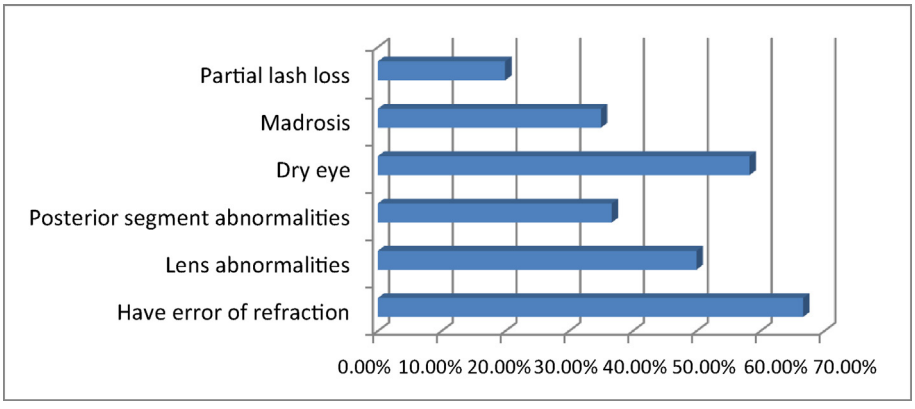

Fig. 4. Ocular findings in the studied population.

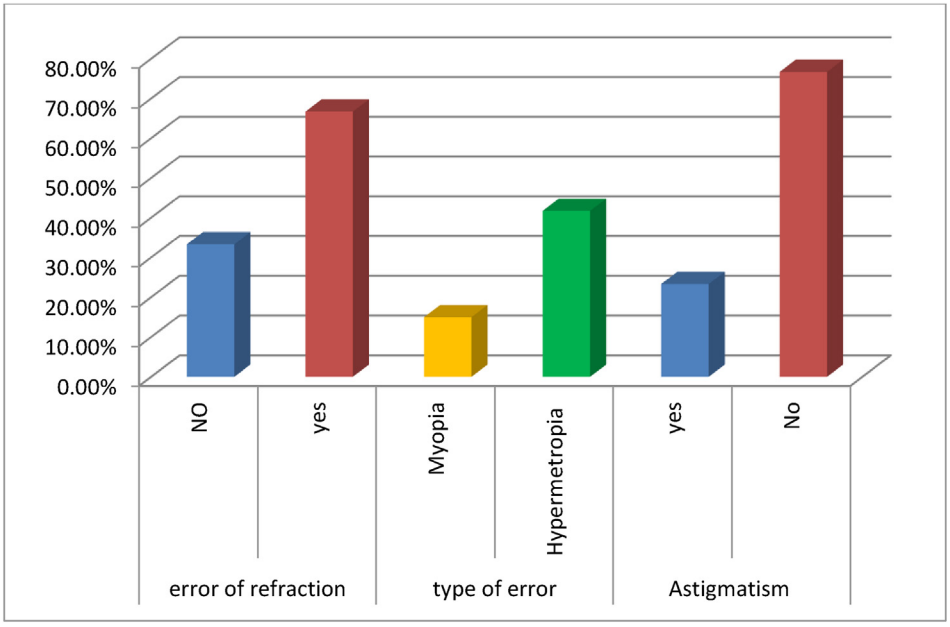

Fig. 5. Error of refraction of the studied eyes.

The current study showed that the most frequent error of refraction was hypermetropia in 41.7 % of eyes and astigmatism in 23.3 %. Myopia was detected in 15 % of the studied eyes. No error of refraction was detected in 33.3 % of the studied eyes.

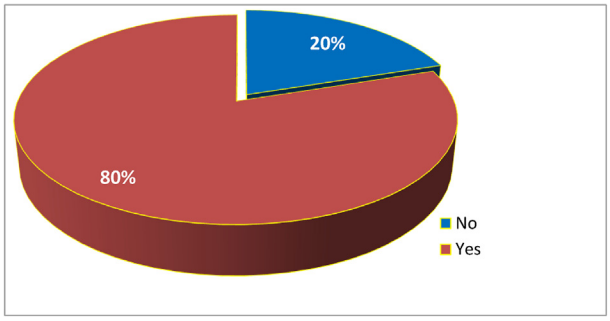

Fig. 6. Regrowth of hair after correction of RE and treatment of alopecia. RE, refractive error.

Our results were supported by Ziada,[5] who revealed that the most frequent error of refraction among AA patients was hypermetropia in 63.3 %, followed by astigmatism in 30 % and then myopia in 6.7 %. Furthermore, Nadheer Ahmed and Rafid Muhey Aldeen[9] enrolled 50 Iraqi patients who had AA and other 50 patients as the control group. Twelve (24 %) patients of the AA group had REs, while six [12 %] of the control group had these errors.

The current study showed that regrowth of hair after correction of RE and treatment of alopecia occurred in 80 % of patients. Our results were supported by Ziada,[5] who revealed that regrowth of

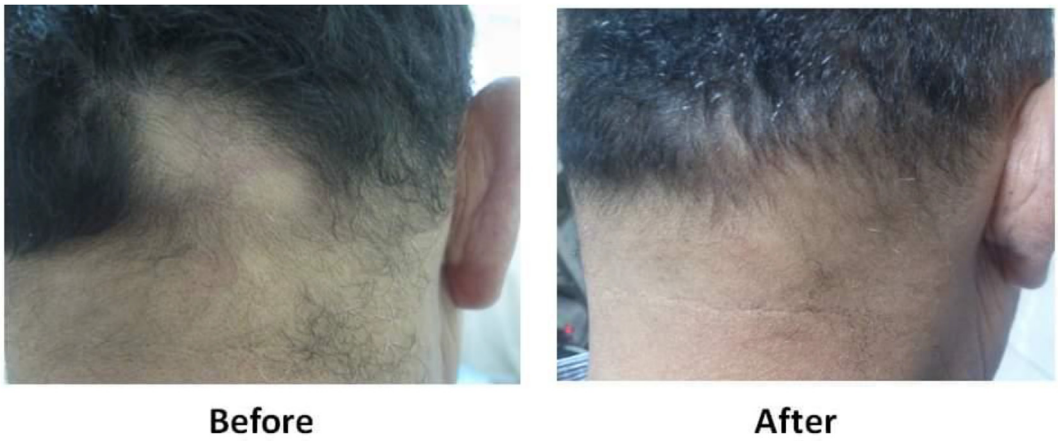

Fig. 7. Regrowth of hair after correction of RE and treatment of AA. AA, alopecia areata; RE, refractive error.

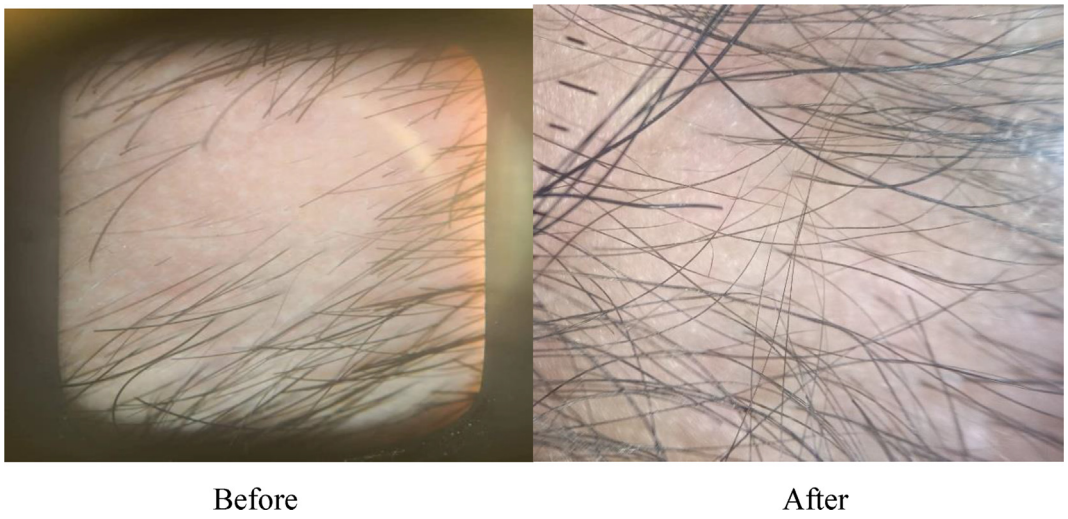

Fig. 8. Dermoscopy of alopecia patient in Fig. 7.

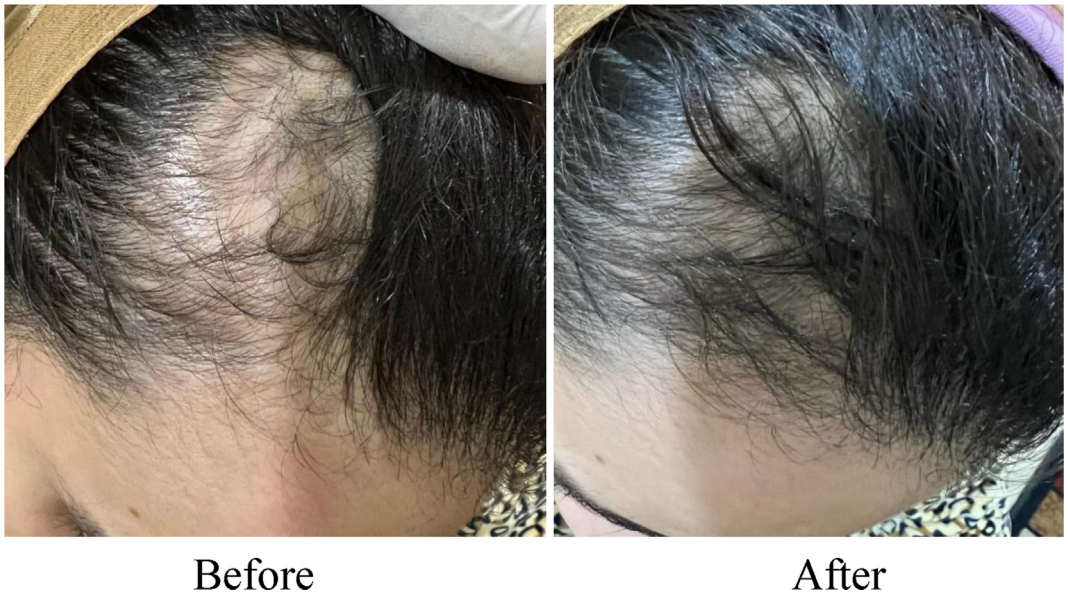

Fig. 9. Regrowth of hair after correction of RE and treatment of AA. AA, alopecia areata; RE, refractive error.

Table 4. Descriptive ocular findings data in the studied eyes.

	$N = 120$ eyes [n (%)]	P
Lens abnormalities	52 (43.3)	0.09
Posterior subscapular cataract	20 (16.7)	0.02*
Punctate lens opacities	26 (21.7)	0.001*
Cortical cataract	6 (5)	0.1
Posterior segment abnormalities	36 (30)	0.001*
Tigroid retina	21 (17.5)	0.001*
Peripapillary atrophy	10 (8.3)	0.01*
Macular RPE alterations	5 (4.2)	0.1
Dry eye	72 (60)	0.02*
Madarosis	36 (30)	0.001*
Partial lash loss	22 (18.3)	0.001*

* P-value < 0.05: Significant. RPE, retinal pigment epithelium.

hair has been achieved in 25 (83.3 %) of 30 patients, and failure was in five (16.7 %) patients. The current study showed that astigmatism, posterior subscapular cataract, punctate lens opacities, tigroid retina, peripapillary atrophy, dry eye, madarosis, and lash loss were statistically significantly higher in patients with AA more than 50 %.

This was supported by Ziada,[5] who indicated that there was significant relation between the type of error of refraction and the severity of alopecia. In contrast to our results, Pandhi et al.[10] revealed that the ocular changes were not found to correlate with age, severity, or extent of the disease. However, the frequency and severity of lens changes in AA

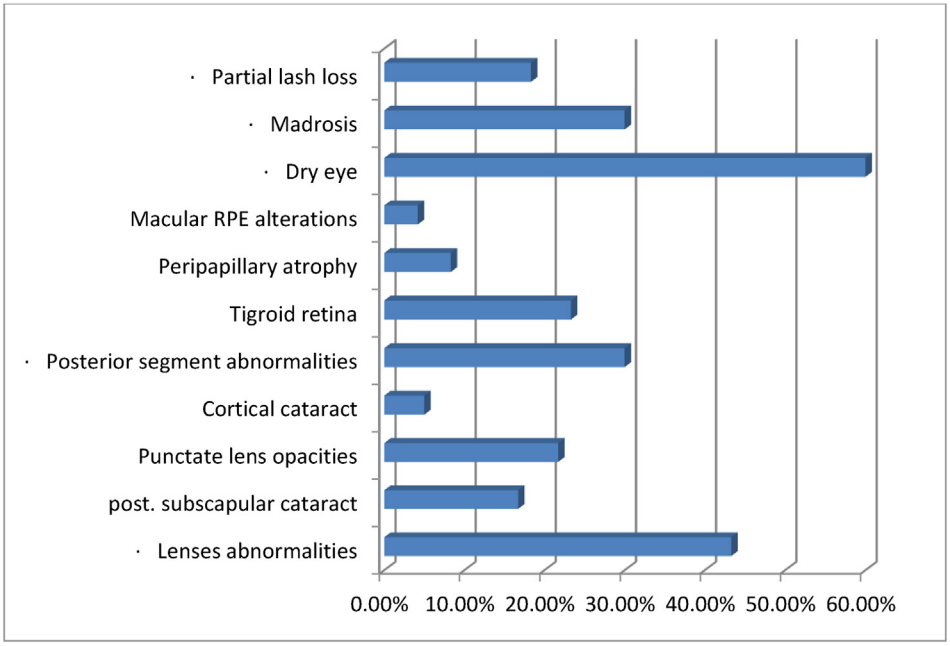

Fig. 10. Ocular abnormalities in the studied eyes.

Table 5. Visual analog scale score before and after 6 months.

	$N = 120$ eyes		P
	Pre	Post	
Range	0–0.4	0–1	0.0001*
Mean ± SD	0.12 ± 0.1	0.43 ± 0.3	

* P-value < 0.05: Significant. RPE, retinal pigment epithelium.

correlated significantly ($P = 0.034$) with the presence of atopy. Also, Ergin et al.[7] revealed that ocular findings were nonsignificantly correlated with patient's age, duration, family history, nail involvement, and extent of the disease. The disagreement with our results may be due to the difference in sample size, genetic factors, and comorbidities.

4.1. Conclusion

The current study showed that the most prevalent errors of refraction (associated with AA patients) were hypermetropia followed by astigmatism and then myopia. The commonest ocular findings were dry eye, followed by lens abnormalities including punctate lens opacities, posterior subcapsular cataract, and cortical cataracts, and posterior segment abnormalities including tigroid retina, peripapillary atrophy, and macular RPE alteration. There were significant associations between alopecia severity and type of REs (astigmatism) and eye abnormalities (posterior subscapular cataract, punctate lens opacities, tigroid retina, peripapillary atrophy, dry eye, madrosis, and lash loss). The sample size is relatively small size, which limits the generalizability of the findings. Further comparative studies with a larger sample size and longer follow-ups are needed to confirm our results and to identify the risk factors of AA.

Conflicts of interest

There are no conflicts of interest.

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