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Is atopy and autoimmunity more prevalent in patients with alopecia areata? A comparative study

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Abstract

Objective We aimed to determine whether there was a difference between adult and paediatric alopecia areata patients with respect to the severity and pattern of the disease, nail changes and personal and family history of autoimmune diseases and also in comparison with controls.

Methods Two groups were included: patients with onset of alopecia before the age of ≤18 years and >18 years. The total number of the patients were 124. The control group was comprised of 114 age- and gender-matched patients.

Results There were 81 adults and 43 children. No statistically significant difference was present between disease severity and gender, age, personal and family history of autoimmune disease in the adult and paediatric group ($P > 0.5$). Thirteen adults with scalp involvement had nail changes. 61.5% had mild and 38.46% had severe disease ($P > 0.5$). Of the 43 paediatric patients, 10 patients had nail changes. Severe alopecia was present in 40% of patients with nail changes; however, 9.1% had severe alopecia in patients without nail changes ($P = 0.04$). There was no statistical significance in patients with and without familial autoimmune diseases when compared with pattern and severity of the diseases between the two groups.

Conclusion The frequencies of autoimmune and atopic diseases were not different between adult and paediatric patients and the control group. We did not find a statistically significance between disease severity and personal and family history of autoimmune disease in the two groups. Disease severity was not related to nail changes in the adult group. However, severe alopecia areata was more prevalent in children with nail changes. Furthermore, ophiasis pattern was more prevalent in the paediatric group with nail changes compared with the adult group.

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Conflict of interest

None.

Introduction

Alopecia areata (AA) is an unpredictable, usually patchy, non-scarring hair loss condition and present in 1% of the general population.[1,2] AA is hypothesized to be an organ-specific autoimmune disease mediated by T-lymphocytes directed to hair follicles. Although environmental factors may trigger the initiation of the disease in genetically predisposed individuals, the exact cause is still unknown.[1] AA is reported to be associated with autoimmune diseases, such as autoimmune thyroiditis, lupus erythematosus, vitiligo, myasthenia gravis, diabetes mellitus type 1 and pernicious anaemia.[2]

We aimed to determine the demographical and clinical characteristics of AA patients; to compare the severity and pattern of the disease and nail involvement between adult and children groups; and to compare the personal and family history of atopic and autoimmune diseases of these patient groups with those of controls.

Materials and methods

Records of AA patients seen at Mustafa Kemal University Department of Dermatology outpatient clinic from 2008 to 2010 were retrospectively studied. Age, gender, duration of the disease, pattern, severity, attack number, nail changes and personal and family history of autoimmune and diseases of patients were recorded or noted via telephonic conversation. The personal and family history of atopy and autoimmune diseases were assesed for the following: atopic dermatitis, allergic rhinitis, asthma, thyroid disease, diabetes mellitus, vitiligo, lupus erythematosus, pernicious anaemia, rheumatoid arthritis, ulcerative colitis, celiac disease, psoriasis, Down syndrome and immunodeficiency.[3]

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We included two groups: patients with onset of alopecia before the age of ≤18 years and >18 years. To compare personal and family history of atopy and autoimmune diseases in these groups, we also performed control group. The control group comprised of 114 age- and gender-matched patients without AA who were referred to the dermatology outpatient clinic.

The severity of the disease was assessed according to Olsen *et al.* (3). Mild AA was defined as <50% (S1–S2), and severe AA was defined as 50–99% (S3–S4), alopecia totalis and alopecia universalis.

Statistical analysis

Data were analysed using SPSS for Windows (version 11.5; SPSS Inc., Chicago, IL, USA). Student's *t*-test, chi-squared and Fisher's exact test were used for statistical analysis. Values were given as mean ± SD, and $P < 0.05$ was considered significant.

Results

Demographical data

The total number of AA patients were 124. There were 81 adults (50 men, 31 women) and 43 children (19 boys, 24 girls), mean age 33.27 ± 11.28 (19–76 years) and 11.55 ± 4.19 (1–18 years) respectively. There was no statistical difference in respect to gender distribution between adult and paediatric groups ($P = 0.061$). Of these patients, 108 had scalp involvement. There were two female patients with alopecia totalis in the adult group and two males in the paediatric group, one with alopecia totalis and the other with alopecia universalis.

There were 76 adults and 38 children in the control group. Mean age was 33.47 ± 11.28 (19–73 years) in the adult group and 11.17 ± 4.2 (1.5–18 years) in the paediatric group. The gender ratio and age were not significantly different between patients and controls.

The duration of the disease in both groups is shown in Table 1. There was no statistically significant difference in the duration of AA between the groups ($P = 0.057$). There was also no significant difference between duration of the disease and gender between the adult ($P = 0.994$) and paediatric ($P = 0.174$) groups. Statistical assessment of disease duration used categories of ≤1 year and >1 year.

Forty-seven patients had two and more than two attacks in the whole group. Of these, 25 patients (20.2%) had second, seven patients (5.6%) had third and six patients (4.8%) had fourth attack. There was no relation between number of attack and gender ($P = 0.75$), age ($P = 0.62$), personal ($P = 0.43$) and family ($P = 0.12$) history of autoimmune and atopic disease. Statistics was made according to attack number one, two and above.

Table 1 Duration of the disease in paediatric and adult group

Duration of AA (months)	Adult (%)	Paediatric (%)
<3	44.4 (22 M, 14 F)	62.8 (13 M, 14 F)
3–12	29.2 (15 M, 9 F)	27.9 (3 M, 9 F)
>12	25.9 (13 M, 8 F)	9.3 (3 M, 1 F)

AA, Alopecia areata.

Severity and Type of AA

Eighty-six (79.6%) patients had mild AA and 22 (20.4%) patients had severe AA with scalp involvement in the whole group. Fifty-one patients (27 men, 24 women) had mild and 15 patients (eight men, seven women) had severe AA in adult group. Thirty six patients had mild (15 boys, 21 girls) and seven patients had severe AA (four boys, three girls) in paediatric group. There was no significant association between disease severity and gender, age, personal and family autoimmune and atopic disease in the whole group, adult and paediatric group ($P > 0.05$). Severe disease was more prevalent in patients with disease duration over 1 year in both the adult ($P = 0.003$) and paediatric ($P = 0.001$) groups.

Of the 22 patients with severe disease, 40.9% ($n = 9$) of patients had patch pattern, 40.9% ($n = 9$) had patch and ophiasis pattern and 18.2% ($n = 4$) of patients had alopecia totalis and/or universalis. Of these patients, only two adult patients had a personal history of autoimmune disease, one with thyroid disease and the other with psoriasis and vitiligo. Of the 86 patients with mild disease, 89.5% ($n = 77$) had patch form and 10.5% ($n = 9$) had patch and ophiasis form.

We also analysed whether there was a relationship between nail involvement and severity of AA between the two groups. Thirteen adults with scalp involvement had nail changes. In this group, 61.5% ($n = 8$) had mild AA and 38.46% ($n = 5$) had severe AA ($P > 0.05$). Of the 43 paediatric patients, 10 (23.2%) had nail changes; of these 60% ($n = 6$) had mild AA and 40% ($n = 4$) had severe AA. In other words, severe alopecia was present in 40% ($n = 4$) of patients with nail changes and 9.1% ($n = 3$) of patients without nail changes ($P = 0.04$). We also analysed whether there was a relationship between nail changes and pattern of AA between the two groups. Alopecia totalis and alopecia universalis was not included in the statistical analyse because of lower number of the patients. Eight patients (61.5%) with nail involvment had patch pattern and five patients (38.5%) had patch and ophiasis pattern in the adult group. There was no statistical significance ($P = 0.08$). Five patients (55.6%) had patch and four patients (44.4%) had patch and ophiasis pattern with nail involvement in the paediatric group ($P = 0.006$). There was no association between nail involvement and disease severity in adult patients. However, severe alopecia was more frequent in paediatric patients with nail involvement.

Atopic disorders and autoimmune diseases

Nine patients (11.1%) had personal history of autoimmune diseases and other related conditions in the adult group including asthma ($n = 2$), psoriasis ($n = 1$), psoriasis and vitiligo ($n = 1$), thyroid disease ($n = 4$), ulcerative colitis and allergic rhinitis

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($n = 1$). Three patients (6.97%) had personal history of atopic disorder including asthma and allergic rhinitis in paediatric group. Of the adult 14.47% ($n = 11$) and of the paediatric control group 2.63% ($n = 1$) had personal history of autoimmune and atopic disease. There was no statistical significance between patients and controls with respect to personal autoimmune disease. Family history of autoimmune and atopic disorders in AA patients and controls were given in Table 2.

There was no statistical significance in patients with and without familial autoimmune and atopic disorder when compared with pattern and severity of the disease in the two groups. There was also no statistically difference between adult and paediatric group with respect to family history of autoimmune and atopic disorder.

Of the male patients 56.5% ($n = 39$) and of the female patients 81.8% ($n = 45$) had family history of autoimmune and atopic disorder in the whole group ($P = 0.003$). Sixty-three per cent ($n = 51$) of adults and 76.7% ($n = 33$) of children had family history of autoimmune and atopic disorder. A statistical significance was present between family history and gender in the adult group ($P = 0.009$). However, there was no statistical significance between autoimmune family history and gender in the paediatric group ($P = 0.25$).

Discussion

Although several studies have reported the demographical and clinical characteristics of AA patients, relatively few studies compared the severity and pattern of the disease, and nail involvement and personal and family history of autoimmune diseases between adults and children.[4]

Van der Spek *et al.* reported that juvenile AA was more severe and had a less favourable prognosis than the maturity onset disease.[4] However, we did not find statistically significant differences between the adult and paediatric groups in terms of disease severity. The authors also reported that age of onset, atopy and ophiasis and and/or onychodystrophy were bad prognostic signs.[4]

We did not find a statistical significance between disease severity and gender, age, personal and family history of autoimmune disease in the whole group, adult and childhood group. In our study, ophiasis pattern was more frequent in patients with severe disease. Similar to our findings, Kavak *et al.* found that ophiasis was more frequent in severe group patients. The authors also found no correlation between severity of disease and age of onset.[5] Tan *et al.* reported that of the patients with onset of alopecia before the age of 40 years, 36.5% presented with extensive alopecia compared with 55% after the age of 40 years. Although we did not find an association between the severity of disease and gender, the authors reported that females had extensive AA when compared with males.[6]

Alopecia areata had been reported to be associated with atopy and several autoimmune diseases.[7] In our study, 1.6% ($n = 2$) of patients had psoriasis, 0.8% ($n = 1$) had vitiligo, 3.2% ($n = 4$) had thyroid disease, 4.8% ($n = 6$) had atopic disease and 0.8% ($n = 1$) had ulcerative colitis across the whole group. There was no statistical significance between patients and controls in the means of personal history of autoimmune diseases and atopy in our study. There was also no statistically significant difference in the pattern and severity of the disaeses between the patient groups with and without familial autoimmune diseases. There was no significant difference between adult and childhood groups in the means of autoimmune family history.

The prevalence of personal autoimmune disease and atopy were 9.67% in our patients. Barahmani *et al.* reported that 16% of their patients had personal history of autoimmune and related disorders.[8] Similar to our findings, Kakourou *et al.* did not find a statistical significance between patients and controls with respect to personal history of autoimmune disease and atopy.[9] Tosti *et al.* also did not demonstrate a higher incidence of autoimmune diseases or related conditions in patients in whom AA had developed during childhood.[10]

In our study, 76.7% of paediatric patients had family history of autoimmune disease. In contrast to our study, Kakourou *et al.* had found a significantly high prevalence of familial autoimmune diseases in the children with AA compared with the controls.[9]

Table 2 Family history of autoimmune and atopic disorders in Alopecia areata patients and control group

	Patient group ($n = 124$)			Control group ($n = 114$)			*P*-value
	Adult (%)	Paediatric (%)	Total (%)	Adult (%)	Paediatric (%)	Total (%)	
Vitiligo	6 (7.4)	1 (2.3)	7 (5.6)	4 (5.3)	1 (2.6)	5 (4.4)	0.657*
Psoriasis	4 (4.9)	2 (4.6)	6 (4.8)	2 (2.6)	–	2 (1.8)	0.187*
Diabetes mellitus	35 (43.2)	23 (53.48)	58 (46.8)	36 (47.4)	21 (55.3)	57 (50)	0.619*
Thyroid disease	19 (23.5)	17 (39.5)	36 (29)	25 (32.9)	18 (47.3)	43 (37.7)	0.155*
Atopic disorder	22 (27.2)	15 (34.9)	37 (29.8)	27 (35.5)	10 (26.3)	37 (32.5)	0.663*
Lupus erythematosus	1 (1.2)	–	1 (0.8)	–	–	–	1†
Romathoid arthritis	–	2 (4.6)	2 (1.6)	3 (3.9)	–	3 (2.6)	0.673†
Pernicious anaemia	–	1 (2.3%)	1 (0.8)	4 (5.3)	1 (2.6)	5 (4.4)	0.107†

*Chi-squared test.

†Fisher exact test.

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Diabetes mellitus (DM) was not present in our patients. Reports generally show a <1% rate of DM in AA patients.[7] DM is said to occur more frequently in relatives of patients with AA rather than AA patients themselves.[11] However, there was no difference in our study when compared with controls. It was found that 46.8% of patients in our study had a family history of DM. In contrast to other studies,[4,11] a high rate of family history of diabetes mellitus (46.8%) was present in our study. Family history of diabetes mellitus was also high in our control group.

The frequency of thyroid disease differs within the literature. We found a prevalence of 3.2% in our study. Goh *et al.* found that 19% of probands had thyroid disease.[7] Wang *et al.* reported that 14.7% and Xiao *et al.* reported that 0.88% of patients had thyroid disease.[12,13] Kakourou *et al.* reported that 14.6% of patients had family history of thyroid disorder in children, and statistical significance had been present when compared with controls.[9] However, 39.5% of paediatric patients had a family history of thyroid disorder, which was not statistically significant when compared with controls in our study. The frequency of family history of thyroid disorder was also high when compared with other reports, which ranged from 4.2%[12] to 14.6%.[9]

In this study, 4.8% ($n = 6$) of patients had personal and 29.8% ($n = 37$) of patients had family history of atopic disease. There was no significant difference in the prevalence of atopy between patients and control groups. Tan *et al.* reported that 60.7% patients had personal and 53.4% of patients had family history of atopic disease.[11] Goh *et al.* reported that 46% of patients had atopy.[7] Although some studies reported a high frequency of atopy, such as 48%[7]and 20%,[14] others reported a low frequency of 0.88%.[13] The differing frequencies of atopic disorder reported in the literature may be due to variations such as genetical susceptibility, environmental factors etc. between the different study populations. Although several studies have associated atopy with earlier age of onset, longer duration and more severe disease, some recent studies have found no associations between atopy and early age of onset, long duration and severe disease.[7] Kakourou *et al.* found that 11.4% of patients had atopy, and it had been not significant when compared with controls.[9]

There was no association between nail involvement and disease severity in adult patients; however, severe alopecia was significantly higher in paediatric patients with nail involvement. The frequency of ophiasis pattern was higher in paediatric group with nail changes compared with the adult group, which was consistent with the findings of Spek *et al.* The authors reported that ophiasis pattern and onychodystrophies had been more frequently associated with severe than with mild AA. Both had been more often seen in the juvenile AA.[4] We found that 18.5% of patients had nail changes. Nail changes were previously reported in 35% by Ahmed *et al.*, 30% by Sharma *et al.* and 46% by Tosti *et al.*[14–16]

In conclusion, the frequencies of autoimmune and atopic diseases were not different between adult and paediatric patients and control group. However, certain conditions may manifest themselves later on in life, so that patients in the paediatric population may not have thyroid disease or other autoimmune diseases yet, but could develop it later. Furthermore, nail changes among paediatric patients with severe disease were more prevalent than in adult patients, and ophiasis pattern was more frequent in paediatric group with nail changes.

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