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Disturbed sleep quality and increased depression scores in alopecia areata patients

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Abstract
Alopecia areata (AA) is a chronic inflammatory disease that affects the hair follicle and sometimes the nails. Comorbidity between alopecia areata and psychiatric disorders is well known. The aim of this study is to evaluate the relationship between the clinical characteristics of AA and sleep quality and depression. This study included 52 patients above 18 years of age who admitted to the dermatology clinic and diagnosed as alopecia areata, and 51 healthy volunteers. Sociodemographic data form, Beck Depression Inventory (BDI), and the Pittsburgh Sleep Quality Index (PSQI) were filled by the patients. Information about the severity of AA, the duration of the disease, the treatments they received, and comorbid illnesses were also recorded. The median BDI total score of the AA patients was higher than that of the control group. In AA patients, PSQI total score and most of the subscale scores were significantly higher than those of the control group. No difference could be found in BDI or PSQI scores according to the presence or absence of poor prognostic criteria. The results of our study support the long-standing relationship between AA and psychiatric disorders and indicate that sleep quality is impaired in addition to the increase in depression level. In particular, a more careful assessment of female AA patients and patients with comorbid atopic dermatitis is important in order not to miss comorbid psychiatric problems.

Keywords: Alopecia areata, depression, sleep quality, hair

Introduction

The etiology of alopecia areata (AA), a chronic inflammatory disease that affects the hair follicle and sometimes the nails, has not yet been fully understood. Besides the genetic background, non-specific immune response, organ-specific autoimmune reactions, and environmental factors are among the most frequently discussed issues in the pathogenesis of this disease [1].

It has long been claimed that AA is a psychosomatic disease triggered by stressful life events [2]. In a study investigating comorbid diseases in patients with AA, prevalence of depression and anxiety was found to be high (25.5%) in an 11-year period [3]. On the other hand, depression may be present before AA [4].

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Family problems, work-related problems, and mourning have also been reported by AA patients [4]. It has been suggested that neuroendocrine immunology as well as psychosocial factors may be responsible for the association between AA and depression [5].

It is well known that sleep has important effects on immunity. There is evidence of a relationship between sleep disorders and autoimmune diseases including rheumatoid arthritis, ankylosing spondylitis, Sjögren's syndrome and systemic lupus erythematosus [6]. It has been reported that patients with sleep disorders, especially young people, had an increased risk of AA [7]. In the same study, sleep disorders were also associated with other autoimmunity related diseases such as Graves' disease, Hashimoto's thyroiditis, vitiligo and rheumatoid arthritis.

Alopecia areata may occur in different clinical types. In the most common type, there is hair loss in the scalp[8]. If all of the scalp hair is involved, it is called alopecia totalis and, if all of the body hair is involved, it is called alopecia universalis. In the ophiasis type hair loss is seen at the junction of occipital hair line and

dermis, and in the reticular type the hair loss is reticular [8].

Nail changes are seen in 30% of patients with AA [9]. The most common nail finding is small pits, and the other findings are the Beau line, longitudinal line, koilonychia, onychorhexis, onychomadesis, leukonychia, red-staine lunula, and other nail defects can [9]. It has been suggested that nail change is related to the severity of the disease and indicates possible resistance [10].

It is hard to predict natural course in alopecia areata. In some patients, hair completely reappears, in some others, some improvement in AA occurs, and, in still others, the hair loss further increases [11]. Poor prognostic criteria include presence of atopia, extensive involvement, family history, onychodystrophy, presence of disease for more than 5 years, autoimmune disease, ophiasis type, asthma, and the presence of nevus flammeus, allergic rhinitis, and atopic dermatitis [12].

The aim of our study was to evaluate the frequency of depression and sleep quality in patients with AA, and to investigate the relationship between the clinical characteristics of the disease such as duration, severity, and type of illness and depression, and sleep quality.

Material and Methods

Sample

This study was conducted in Skin and Venereal Diseases Department of the Medical School of Hitit University. This study included 52 patients above 18 years of age who admitted to the dermatology clinic and were diagnosed as alopecia areata and 51 healthy volunteers. Healthy volunteers were selected from hospital staff and the relatives of hospital staff who didn't have any history of psychiatric, systemic or dermatological disease and agreed to participate in the study. The patients and control group included in the study were informed about the study, and the questionnaires were completed after obtaining their written informed consents. Illiterate patients and those couldn't fill the scales due to cognitive dysfunction were not included in the study. Patients who were being treated for a systemic disease or who had treatment for a psychiatric disease during the last year were excluded. This study was approved by the local ethics committee and performed in accordance with the ethical standards of the Helsinki Declaration.

Instruments

Beck Depression Inventory (BDI): This scale has been developed by Beck et al and aims to measure the severity of depression[13]. The scale consists of 21 items and is scored between 0 to 3.

Pittsburgh Sleep Quality Index (PSQI): It was developed by Buysse et al.[14] and consists of 24 questions, 19 questions are filled by the subject himself and 5 questions are filled by the spouse or a room partner. From the scored questions of the scale 7 subscale scores are obtained: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications, and daytime dysfunction. The total score of seven subscales gives total scale score which varies between 0 and 21.

Severity of Alopecia Areata Tool; SALT: This scale was developed by Olsen et al. [15] and calculated by measuring how much of the total body surface is affected considering involved body parts. In this study, patients with hair loss below 25% were classified as mild, 25-50% moderate and above 50% as severe loss.

Procedures

All of the included cases were informed about the study, informed consent forms were obtained, and then sociodemographic data form, BDI, and PSQI were filled by the patients. In addition to these, information about the severity of alopecia areata, duration of the disease, treatments they received, and information about their illnesses were also recorded.

Statistical Analysis

To summarize data obtained from the study, descriptive statistics were given as mean ± standard deviation or median and interquartile ranges depending on the distribution for continuous variables. The normality of the numerical variables was checked by the Kolmogorov-Smirnov test. Independent Samples t test was used in the comparison of two independent groups when the numerical variables showed normal distribution, and Mann Whitney U test was used otherwise. In comparison of more than three independent groups, one-way ANOVA was used where the numerical variables were normally distributed and Kruskall Wallis test was used otherwise. For between group differences, Tukey's test was used when the distribution of the data was homogenous and Games-Howell test was used otherwise. Between group differences in nonparametric tests were evaluated with Dwass-Steel-Critchlow-Fligner test. Pearson Chi-Square test was used for categorical variables, and Fisher's exact test was used for RXC tables. To evaluate the associations between numerical variables, Pearson test was used when the data were normally distributed and Spearman's Rho was used otherwise. Statistical analyses were performed with Jamovi Project software (2019; Version 0.9.5.12) and $p<0.05$ was considered to be significant in statistical analyses.

Results

This study included 52 AA patients and 51 controls. There was no significant difference in age, sex, education status, cigarette smoking, height, weight, and body mass index (BMI) values between the groups (Table 1).

Alopecia areata was localized only to scalp hair in 24 patients (%46.2). In 20 (38.5%) patients the disease duration was less than 1 month. In 29 patients (55.8%) single, patchy AA was found. According to SALT, the severity of AA was mild in 46 (86.4%) of the patients. The number of patients who had at least one poor prognostic criteria was 28 (53.8%). The most common poor prognostic criterion was family history (n=10, 19.2%). Beginning age of the disease was mean 27.5 (± 7.8) (Table 2).

Median BDI total score of AA patients (8.5) was higher than that of the control group (2) ($p<0.001$). In AA patients, besides PSQI total score, subjective sleep quality, sleep latency, sleep disturbance, and daytime dysfunction subscale scores were statistically higher than those of the control group ($p<0.001$, $p=0.002$, $p=0.001$, and $p<0.001$ respectively).

Table 1. Comparisons of age, sex, education status, cigarette smoking, height, weight, and BMI values between the groups

		Group		
		Patient (n=52)	**Control (n=51)**	**p**
Age, Mean ± SD		28.8 ± 7.7	29.3 ± 8.7	0.792
Sex	Male. n (%)	40 (76.9)	40 (78.4)	0.854
	Female. n (%)	12 (23.1)	11 (21.6)	
Education status	Primary school. n (%)	6 (11.5)	4 (7.8)	0,637
	Secondary school. n (%)	6 (11.5)	5 (9.8)	
	High school. n (%)	19 (36.5)	15 (29.4)	
	University. n (%)	21 (40.4)	27 (52.9)	
Cigarette smoking	No. n (%)	27 (51.9)	31 (60.8)	0.365
	Yes. n (%)	25 (48.1)	20 (39.2)	
Height (cm), Mean± SD		174.3 ± 9.3	171.4 ± 8.6	0.107
Weight (kg), Mean ± SD		70.5 ± 11.6	71.3 ± 11.6	0.741
BMI (kg/m2), Mean ± SD		23.2 ± 3.3	24.1 ± 2.6	0.103

BMI: body mass index, SD: standard deviation

Table 2. Clinical features of the individuals

		n (%)
Localization of alopecia areata	Only scalp	24 (46.2)
	Only beard	18 (34.6)
	Only scalp, eyelashes	5 (9.6)
	Scalp+ beard	4 (7.7)
	Scalp + eyelashes + eyebrows	1 (1.9)
Type of alopecia areata	Single patch	29 (55.8)
	Multiple patches	23 (44.2)
Alopecia areata severity	(Mild) Hair loss < %25	46 (88.5)
	(Moderate) Hair loss %26-50	5 (9.6)
	(Severe) Hair loss %50	1 (1.9)
Onychodistrophy	No	45 (86.54)
	Yes	7 (13.46)
Poor prognostic criteria	No	28 (53.8)
	Yes	24 (46.2)
Atopy history		8 (15.4)
Family history		10 (19.2)
Longer than 5 years		3 (5.8)
Asthma		3 (5.8)
Allergic rhinitis		4 (7.7)
Atopic dermatitis		3 (5.8)
Age of onset of disease		27.5 ± 7.8
Previous treatments	No	36 (69.2)
	Topical	8 (15.4)
	Intralesion	7 (13.5)
	Systemic	1 (1.9)

Onychodystrophy was detected in 7 patients (13.46%). As onychodystrophy type, 5 patients (9.6%) had pitting, 1 patient had longitudinal striation, and 1 patient (1.9%) had opaque nail. No difference could be found between patients who had or who didn't have onychodystrophy in BDI, PSQI total score, and PSQI subscale scores.

Comparisons for Beck Depression Inventory scores demonstrated that the localization of alopecia areata didn't cause any effect (p=0.303). BDI scores of the patients who had moderate or severe alopecia areata were higher than those of the patients who had mild disease (p=0.023). No difference could be found in BDI score according to the presence or absence of poor prognostic criteria.

Evaluation for the presence of poor prognostic criteria separately demonstrated that the BDI score was higher in the presence of only atopic dermatitis (p=0.016). Prior treatment did not affect the mean BDI score (Table 3).

Comparisons for the Pittsburgh Sleep Quality Index (PSQI) revealed no difference for alopecia areata localization. Although scores were higher in patients with moderate or severe alopecia areata, the difference couldn't reach statistical significance (p=0.092). No difference could be found in PSQI scores according to the presence or absence of poor prognostic criteria. Evaluation of the PSQI scores in the presence of separate poor prognostic criteria revealed that the presence of alopecia areata for more than 5 years (p=0.001) and presence of atopic dermatitis (p=0.016) were associated with higher PSQI scores (Table 3).

Comparisons in terms of gender revealed that in the patient group the median BDI (16) and PSQI (7.5) scores in females were statistically significantly higher than BDI (7.5) and PSQI (6) scores in males (p=0.026 and p=0.012, respectively). Also in the control group the median BDI (9) and PSQI (4) scores in females were statistically significantly higher than BDI (1.5) and PSQI (2) scores in males (p=0.001 and p=0.035, respectively)

Table 3. Association between the clinical features of alopecia areata and BDI, PSQI scores

	BDI	p	PSQI	p
Localization of alopecia areata				
Limited to scalp, (n=24)	9 [3.5 – 16]		7.5 [4.5 – 9]	
Limited to beard, (n=18)	7 [4 – 16]		5.5 [5 – 8]	
Only eyebrows, eyelashes, (n=5)	17 [13 – 19]	0.303	7 [6 – 13]	0.740
Scalp + beard, (n=4)	11 [9 – 15]		7 [3 – 11.5]	
Scalp + eyebrows, eyelashes (n=1) α	1 [1 – 1]		5 [5 – 5]	
Severity of alopecia areata				
Mild hair loss 25%, (n=46)	8 [4 – 15]	0.023*	6 [4 – 8]	0.092
Moderate hair loss 26-50%, (n=6)	17.5 [12 – 18]		9 [9 – 9]	
Poor prognostic criteria				
No, (n=28)	8.5 [4.5 – 15.5]	0.576	6 [4.5 – 9]	0.372
Yes, (n=24)	9 [4 – 17.5]		7 [5 – 9]	
Poor prognostic criteria				
Atopy, (n=8)	12.5 [6.5 – 23]	0.361	8 [5.5 – 10.5]	0.417
Family history, (n=10)	6 [2 – 19]	0.862	8.5 [5 – 13]	0.160
Onychodystrophy (n=7)	17 [6 – 18]	0.243	7 [5 – 9]	0.639
More than 5 years (n=3)	6 [4 – 12]	0.569	5 [4 – 5]	0.001*
Asthma (n=3)	6 [0 – 15]	0.376	4 [2 – 7]	0.184
Allergic rhinitis (n=4)	8.5 [3.5 – 12.5]	0.570	7.5 [4.5 – 8]	0.671
Atopic dermatitis (n=3)	28 [18 – 39]	0.016*	12 [9 – 14]	0.016*
Previous treatments				
No, (n=36)	8 [4 – 15]	0.393	6 [5 – 8.5]	0.434
Yes, (n=16)	11 [5 – 18.5]		7 [4.5 – 10]	

*p<0.05 Mann Whitney U test was used. Descriptive statistics were given as median [IQR].
α: Not included in analyses. AA, alopecia areata; BDI: Beck Depression Inventory, IQR: Interquartile Range, PSQI: Pittsburgh Sleep Quality Index

Discussion

In our study sleep quality of alopecia areata patients which was measured by PSQI scale was lower than that of the control group. There may be a two-way relationship between sleep and AA. Sleep deprivation was reported to increase serum interleukin (IL)-1 and tumor necrosis factor in mice[16]. By this way, decreased sleep quality might induce autoimmunity and cause AA in addition to other autoimmune diseases. On the other hand, AA may increase susceptibility to depression by causing loss of self-esteem due to induction of a loss in self-esteem [3]. In a previous study which evaluated sleep quality in AA patients, the Epworth Sleepiness Scale was applied to 105 AA patients and the mean ESS score was found to be 5.66±3.93 [17]. Although there was no control group in this study, considering that no difference could be found from a previous study on the normal Japanese population, the sleep quality in AA patients was hypothesized to be normal. Absence of a control group is a major limitation of this study. This might have prevented finding a significant result. To the best of our knowledge, no previous study had evaluated sleep quality in AA patients with PSQI.

In our study, the BDI scores in the AA group was higher than the control group. This result suggests the findings of the previous studies in the literature. Sellami et al used the Hospital Anxiety and Depression Scale and found higher depression and anxiety scores in the AA group than the control group [18]. Another controlled study using the Hamilton Depression Scale found that depression scores of the AA patients were higher than the control group [19].

The prevalence of onyschodystrophy in AA patients was reported to be between 7-66% in previous studies [9]. The rate we detected (13.46%) was in accordance with previous studies. Pitting, which was the most common nail change in our study, has also been reported as the most frequent nail change in most of the previous studies[10]. Nail changes were more commonly reported in severe AA forms like AA totalis (AAT) and AA universalis (AAU) [20]. In our study, the absence of more severe AA types like AAU and AAT may have caused low rate of onychodystrophy and absence of a relationship between the presence of onychodystrophy and the PSQI and the BDI scores.

In our study, depression level was significantly higher in patients

with severe disease measured by SALT; the disturbance in sleep quality was also higher in these patients but the difference could not reach statistical significance. In most of the studies in the literature, severity of the psychiatric symptoms like depression and anxiety increased with increasing severity of the disease [18,19].

We couldn't find a relationship between the localization of AA and depression or sleep quality. Aghaei et al. reported higher rates of depression in AA patients with face involvement [21] which couldn't be found in other two studies [19,22].

No association could be found in our study between the beginning age of the study or disease duration and depression or sleep quality similar to the findings of previous studies [19,22]. Firooz et al. reported longer disease duration was associated with higher hopelessness about the treatment [23].

In most of the studies that evaluated depression and anxiety levels, women were found to have higher levels than men [18,19,22]. This finding was evaluated by some authors as that the aesthetic stress of women was higher than that of men [19]. In our study, the level of depression in female AA patients was higher and sleep quality was more impaired than male patients. However, we think that it would be wrong to interpret this finding as AA has more psychological effects in women. Because, in this age group, the level of depression is higher in females than that in males and sleep quality is more impaired [24]. However, the results emphasize the importance of screening for women with AA in terms of psychiatric symptoms.

In our study, the evaluation of the effect of poor prognostic criteria on AA patients in depression and sleep quality revealed that the presence of atopic dermatitis was associated with an increase in depression level and deterioration in sleep quality. Considering the association between atopic dermatitis and psychiatric symptoms, this finding is not a surprise. The evaluation of sleep quality in 100 patients with atopic dermatitis by PSQI revealed poor sleep quality [25].

Conclusion

The results of our study support the long-standing relationship between AA and psychiatric disorders and indicate that sleep quality is impaired as well as the increase in depression level. In particular, a more careful assessment of female AA patients and patients with comorbid atopic dermatitis is important in order not to miss comorbid psychiatric problems.

Competing interests
The authors declare that they have no competing interest.

Financial Disclosure
The authors received no financial support for this study.

Ethical approval
This study was approved by the local ethics committee and performed in accordance with the ethical standards of the Helsinki Declaration.

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