Stress and Alopecia Areata: A Psychodermatologic Study

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Psychosocial stress has been reported to play a role in the onset and/or exacerbation of alopecia areata. Little is known about the clinical characteristics of alopecia areata patients whose alopecia is stress-reactive. We examined the relation between the stress reactivity of alopecia areata and a wide range of psychosocial measures among 16 patients with alopecia areata/ totalis and 28 patients with alopecia universalis. The degree to which the alopecia was exacerbated by stress was measured by patient ratings on a 10-point scale. A wide range of psychologic measures correlated ($p < 0.05$) with the stress reactivity score. Stepwise logistic regression analysis revealed that patients with higher depression scores were more likely to be in the high-stress reactor group. Patients whose alopecia is stress-reactive may suffer from depressive illness, a potentially important consideration in the overall management of such patients. *Key words: hair loss; depression; mental disorder; psychologic.*

Psychosocial stress has been reported to play an important role in the onset and/or exacerbation of symptoms in alopecia areata (AA) (1–7). However, the nature of the association between stress and AA remains unclear, in part because of lack of a direct correlation between the severity of the emotional stressor and the severity of the AA (8–10). The percentage of patients whose alopecia was reported to be exacerbated by stress in the various studies ranges from 6.7% (8) to 96% (7). In this study, in order to further understand the role of stress in AA in practical clinical terms, we firstly examined the relation between various measures of psychosocial stress and AA severity, using operational definitions of stress. Secondly, we examined the dermatologic and psychologic characteristics of patients who reported an association between stress and their AA versus those that did not report such an association.

MATERIAL AND METHODS

Forty-four consenting AA patients (11 males, 33 females; mean $\pm$ SD age: 44.7 ± 11.6 years; mean $\pm$ age at onset of AA: 27.7 ± 16.8 years), who were all outpatients in the Department of Dermatology, University of Michigan, completed a battery of questionnaires addressing both dermatologic and psychologic aspects of their disorder, as part of a larger survey of psychosocial factors in AA. The study was approved by the Institutional Review Board at the University of Michigan, and informed consent was obtained from all study subjects. All patients had been diagnosed as having AA by dermatologic examination. Thirteen patients had AA (i.e. patchy loss of scalp hair), 3 patients had alopecia totalis (i.e. total loss of scalp hair) and 28 patients had alopecia universalis (i.e. loss of scalp and body hair). For our study, the patients were grouped according to the severity of their AA, i.e. the patients with alopecia areata/totalis ($n =$

16) were compared with the more severely affected patients with alopecia universalis ($n = 28$).

Measures of psychologic stress

Major life events. We used the Social Readjustment Rating Scale (SRRS), a major life events inventory adapted from Holmes & Rahe (11). In our study, the patients indicated which of a list of major life events had occurred over the previous 6 months. Rather than assigning a stress score to one event and asking the patients to assign a stress score to the other events in relationship to a reference event (11), we modified the SRRS by asking the patients to rate the degree of stress associated with each event that had occurred 6 months previously. The patients rated their stress on a 4-point scale, where a rating of "0" denoted "no" stress, "1" denoted "a slight degree" of stress, "2" denoted "moderate" stress, and "3" denoted "a great deal" of stress. Two stress-related scores were derived: (a) the total number of major life events experienced over the previous 6 months, and (b) a global stress score associated with these life events, which was obtained by adding all of the individual stress scores that were rated on the 4-point scale described above.

Measure of stress reactivity of AA. To our knowledge, there are no published pre-validated measures of stress reactivity for AA. In the previous studies (1–7), the stress reactivity of the AA was ascertained by whether or not the patient associated a stressful event with the onset and/or exacerbation of their AA. Since psychologic stress is a largely subjective experience, the patients were asked to rate the degree to which they believed that stress played a role in the onset and/or exacerbation of their AA by responding to the following 2 items, using a 10-point scale (rating of "0" denoted "not at all" and a rating of "9" denoted "very markedly"): "Stressful situations frequently *bring on a bout* of alopecia" and "Stressful situations frequently make my alopecia *worse*". It was observed that the two items were highly correlated (Pearson $r = 0.94$, $p = 0.00001$). Therefore, only one of the two items was used in the final analyses. We chose the more conservative item, i.e. the item addressing the association between stress and the worsening of alopecia, rather than the association between stress and the onset of AA. The stress reactivity score was a general overall index of the reaction of the AA to stress, i.e. an index of whether or not the alopecia was made worse by stress both historically and in relation to the most current episode. Therefore, the response of patients who had the most severe form of AA, i.e. alopecia universalis, at the time of the study, provided an indication of how their AA reacted to stress in general, both in the past and in association with their most recent exacerbation. In our analyses, we used this 10-point measure of the stress reactivity of AA and also categorized the patients into two groups of low (i.e. patients with ratings between 0–4 on the 10-point stress reactivity scale) and high (i.e. patients with ratings of 5–9) stress reactivity. The two groups were labelled as low (LSR) ($n = 37$) and high (HSR) ($n = 7$) stress reactors, based on the overall pattern of stress reactivity of the AA.

Psychologic measures

Because of the exploratory nature of the study, we obtained a wide range of psychologic measures with a focus on the symptom dimensions of depression and anxiety, since the literature suggests that there is a higher prevalence of psychopathology related to depression and anxiety (6, 12) in AA. All the psychologic measures were patient self-ratings. The following psychologic instruments were used, resulting in 16 psychologic symptom dimensions: (i) the *Brief Symptom Inventory (BSI)* (13), a 53-item instrument that measures 9 psychologic symptom

dimensions including depression, anxiety, phobic anxiety, paranoid ideation, obsessive compulsiveness, somatization, interpersonal sensitivity, hostility and psychoticism; (ii) the *Spielberger State-Trait Personality Inventory (STPI)* (14), which consists of two 30-item instruments and measures state and trait anxiety, anger and curiosity, respectively; and (iii) the *Carroll Rating Scale for Depression (CRSD)* (15), a 52-item instrument used to screen for clinical depression. A CRSD score greater than 10 is considered to be in the pathologic range for clinical depression (15).

Statistical analysis

The relation between the two stress-related measures, i.e. (i) stress from major life events and (ii) stress reactivity of AA and the severity of AA (i.e. the two categories of alopecia areata/totalis and alopecia universalis) was examined using two sample *t*-tests. Secondly, the relation between stress reactivity of the AA (rated on a 10-point scale) and certain demographic and psychosocial factors (stress from major life events and the 16 psychologic measures described above) was examined using Spearman rank-order correlations. The demographic and psychosocial measures that were significantly ($p < 0.05$) correlated with the stress reactivity score were then entered in a stepwise logistic regression analysis using the dichotomous stress reactivity variable (i.e. the LSR versus the HSR, obtained as a result of cutting the stress reactivity scale at mid-point as described above) as the dependent variable. These variables were also entered in a non-parametric discriminant function analysis, to determine which were the best discriminators of the low- (i.e. LSR) versus high- (i.e. HSR) stress reactors in AA. Furthermore, using appropriate analysis of covariance (ANCOVA) models, least squares means were obtained for the psychologic variables that were significant in the logistic regression for the LSR and the HSR groups. It was then determined if there was a significant difference in the psychologic scores between the HSR and LSR.

RESULTS

Examination of the relation between the severity of AA (patients were classified into two groups of alopecia areata/totalis and alopecia universalis) and the two stress-related measures revealed that the two groups did not differ with respect to the number of major life events and stress associated with the major life events over the previous 6 months, or the stress reactivity of their AA. The alopecia areata/totalis group (i.e. the less severely affected group) had an older mean age at onset of AA in comparison to the more severely affected

alopecia universalis group (mean $\pm$ SD: 34.4 ± 15.7 years versus 23.8 ± 16.9 years, respectively, $p = 0.04$). The two severity groups did not differ with respect to age or sex.

Examination of the psychosocial correlates of stress reactivity of the AA (measured on a 10-point scale) using Spearman rank-order correlations with age, age at onset and the various psychosocial measures (stress from major life events and 16 psychologic symptom dimensions) revealed that stress reactivity correlated significantly ($p < 0.05$) with 9 out of 17 psychosocial measures (results summarized in Table I). By chance alone, at $p < 0.05$ one would expect a significant correlation with no more than 1 out of 17 variables, which indicates that this was not just a chance finding. The measures of psychosocial stress, i.e. the number of major life events experienced and the stress from these life events (as measured by the SRRS), age, or age at onset of AA did not correlate significantly ($rho < 0.25$, $p =$ ns) with the stress reactivity score.

Seven out of 44, or 15.9% of patients, were classified as HSR when the stress reactivity variable was categorized by cutting it at mid-point. The 15.9% prevalence of high stress reactivity in AA is similar to previously reported prevalences of stress reactivity in AA (1, 5). In the stepwise logistic regression analysis using the two stress reactivity groups (i.e. the LSR and the HSR) as the dependent variable and the 9 significantly correlated (Table I) psychological symptom dimensions as independent variables, only the depression score (CRSD) emerged as being significant ($p = 0.005$). Nonparametric discriminant function analysis revealed that the CRSD score was the best discriminator of the HSR versus the LSR in AA ($p = 0.001$). The CRSD score correctly classified 100% of the HSR and 75% of the LSR. The least squares means (by ANCOVA) for the depression (CRSD) score in the HSR versus LSR, respectively, after controlling for stress from major life events (SRRS) were as follows: mean $\pm$ standard error: 15.5 ± 2.0 versus 6.1 ± 0.9, respectively, $p = 0.0001$. This final model using ANCOVA for the CRSD score explained 53% of the variance, i.e. $r^2 = 0.53$.

DISCUSSION

High stress reactivity in AA was associated with significantly higher ($p = 0.0001$) depression scores, which were in the range

Table I. *Correlation* of psychologic measures and overall stress reactivity of alopecia areata*

Psychologic measure	Spearman's rho	Significance level (*p* value)
Brief Symptom Inventory (13) (BSI) subscales		
Depression	0.45	0.04
Anxiety	0.46	0.003
Paranoid Ideation	0.36	0.02
Psychoticism	0.49	0.002
Interpersonal Sensitivity	0.32	0.048
Spielberger State-Trait Personality Inventory (14) (STPI) subscales		
State Anger	0.39	0.01
State Anxiety	0.36	0.03
Trait Anxiety	0.39	0.02
Carroll Rating Scale for Depression (15) (CRSD)†	0.39	0.01

* Nine out of 17 Spearman's rank-order correlations that were significant at $p < 0.05$ are listed in the Table.

† Only CRSD emerged as being significant ($p = 0.005$) in the stepwise logistic regression analysis, using all of the above 9 psychologic measures as independent variables and the dichotomous (i.e. HSR vs LSR) stress reactivity variable as the dependent variable.

for a major depressive disorder (15). AA has been previously associated with a higher prevalence of depressive disease (6, 12). A depressed clinical state can affect the immune function (16, 17). One can speculate that a significantly higher prevalence of depressive symptoms among the HSR is an indication that psychoneuroimmunologic factors contribute towards high stress reactivity in AA. The treatment of comorbid depressive psychopathology may be of benefit in the management of AA that is stress-reactive. In a study of 13 AA patients (18), 5 out of 7 patients taking the tricyclic antidepressant Imipramine, but none receiving placebo, had significant hair regrowth after 6 months, further emphasizing the role of depressive disease in AA.

The lack of a direct correlation between the measures of stress, including stress reactivity and AA severity, is consistent with previous findings (8, 9); however, it may in part be due to the fact that most of our patients were at least moderately to severely affected and therefore did not represent a wide range of AA severity. Alternately, psychological mechanisms such as denial may have affected the patients' self-reporting of stress-reactivity (19, 20). However, stress — being a largely subjective experience — has been measured primarily based upon patient self-reports in most of the literature on stress and AA (1–7). It is possible that the lack of a direct relationship between stress and AA severity both among our patients and in the previous literature indicates that stress, in association with a depressed clinical state, plays a role in triggering the disease process in AA, while other factors determine the severity of AA once the disease process is established.

ACKNOWLEDGEMENT

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