

Thyroid Disease in Alopecia Areata, Lichen Planopilaris, and Frontal Fibrosing Alopecia—A Case Control Study of 144 Patients

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Background: Hair loss can be a troublesome aspect of thyroid disease for some patients. In addition to diffuse hair thinning, thyroid disease has been associated with clinically significant forms of alopecia, including alopecia areata (AA) and telogen effluvium. The role of thyroid disease in other causes of alopecia, such as lichen planopilaris (LPP) and frontal fibrosing alopecia (FFA), remains unclear. This study retrospectively assessed the role of thyroid dysfunction in AA, LPP and FFA. **Methods:** A systematic chart review of 144 patients was performed from September 2010 to July 2013. Data were analyzed using multivariate logistic regression to test for a relationship between thyroid disease and type of alopecia. **Results:** A total of 113 alopecia patients were analyzed. A positive history of thyroid disease was found in 16.0% of AA, 25.0% of FFA, 17.1% of LPP, and 15.1% of control patients. After controlling for age and sex, alopecia was not found to be a statistically significant predictor of thyroid disease. **Conclusions:** Although alopecia patients in this study had rates of thyroid dysfunction higher than the U.S. population, there were no significant differences in rates of thyroid dysfunction compared to the control group.

Keywords

Hair loss, alopecia areata, frontal fibrosing alopecia, lichen planopilaris, thyroid disorders

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Thyroid disease has commonly been associated with hair loss, predominantly manifesting as diffuse thinning of the scalp and the lateral eyebrows. This can be of particular concern to patients, and may motivate some to seek medical evaluation. Indeed, thyroid disease has also been linked to clinically significant types of alopecia, including alopecia areata (AA)^{1–3} and telogen effluvium.^{4–6} The role of thyroid disease in other causes of alopecia including lichen planopilaris (LPP) and frontal fibrosing alopecia (FFA) remains unclear. AA is an autoimmune process involving non-scarring hair loss that affects between six to seven million individuals in the US.⁷ LPP and FFA are clinical variants of scarring alopecia that are indistinguishable on histopathology. LPP is a follicular form of lichen planus that results in scarring hair loss generally in multifocal regions of the scalp. In contrast, FFA is a variant of LPP that causes gradually progressive hair loss at the frontotemporal hairline of postmenopausal women. This study retrospectively assessed the role of thyroid dysfunction in AA, LPP and FFA.

Methods

A systematic chart review of all patients seen in the UCLA Hair Disorders Clinic from September 2010 to July 2013 was performed. All patients with a diagnosis of FFA or LPP and a randomized subset of 50 patients with AA were included in the study. An age- and sex-matched control group was randomly selected from other patients seen in the UCLA Dermatology Clinic who did not have alopecia. Data obtained from chart review included gender, age, history of dermatologic conditions, TSH levels, and history of thyroid dysfunction. Patients were defined as having thyroid dysfunction if they had been diagnosed with hypothyroidism, hyperthyroidism, Hashimoto's thyroiditis, thyroid cancer, and other/not specified thyroid dysfunction. Univariate and multivariate logistic regression models were constructed to predict thyroid disease using alopecia group, gender, age, and TSH.

Results

The UCLA Hair Disorders Clinic served more than 5,548 patients between 2010 and 2013, including 28 patients with FFA, 35 with LPP, and 269 with AA. A total of 113 alopecia patients were analyzed (Table 1). Of the 81 alopecia patients with documented thyroid-stimulating hormone (TSH) levels, the average level was 2.12 mIU/L, whereas the control group had an average of 1.93 mIU/L among 19 patients. A positive history of thyroid disease was found in 16.0% of AA, 25.0% of FFA, 17.1% of LPP,

Table 1: Study demographics

Category	n (%)	Mean Age
AA	50 (34.7%)	43.2
FFA	35(24.3%)	59.2
LPP	28 (19.4%)	53.5
Control	31 (21.5%)	49.5
Gender		
Female	103 (71.5%)	
Male	41 (28.4%)	
Thyroid Dysfunction	26 (18.1%)	
Total patients	144	

AA = alopecia areata; FFA = frontal fibrosing alopecia; LPP = lichen planopilaris

Table 2: Association between thyroid disease and alopecia

Subgroup	Thyroid Disease n (%)	Risk for thyroid dysfunction (odds ratio, confidence interval)
AA	8 (16.0%)	1.28 (0.36, 4.56)
FFA	7 (25.0%)	1.05 (0.27, 4.08)
LPP	6 (17.1%)	0.82 (0.21, 3.17)
Control	5 (16.1%)	

AA = alopecia areata; FFA = frontal fibrosing alopecia; LPP = lichen planopilaris

and 15.1% of control patients. After controlling for age and sex, alopecia was not found to be a statistically significant predictor of thyroid disease (see Table 2).

Discussion

Thyroid disorders may have physiologic effects on the skin and hair follicles due to the direct action of thyroid hormone within the skin. Hair follicles have been demonstrated to have thyroid hormone receptors⁸ that are involved in regulating the hair growth cycle. In cultured human hair follicle models, thyroxine promotes follicle proliferation by prolonging the active

growth phase.⁹ Thyroid hormone also participates in signaling pathways to induce stem cells at the base of hair follicles to regenerate hair growth and turnover of the epidermis.¹⁰

While some studies suggest that thyroid autoimmune disease is associated with AA,^{1-3,11,12} other case-control studies have been conflicting. Two large case control studies recently found no statistically significant associations with thyroid dysfunction and AA.¹³⁻¹⁴ Atanaskova et al. reported a higher rate of thyroid disease in LPP of 34%, as compared to the 11% found in their control group.¹⁵ Regardless, a positive history of hypothyroidism in AA patients has been shown to be a predictor of more severe alopecia. AA patients with hypothyroidism are at a threefold increased risk for a more involved form of AA, such as alopecia totalis, alopecia universalis, or persistent patchy AA.¹ Research has shown that AA is an autoimmune T-lymphocyte mediated process directed toward hair follicles.¹⁶

Autoimmunity may play a role in LPP and FFA as well. In vitro studies of LPP affected skin suggest that interferon- γ mediates autoimmune destruction of epithelial hair follicle stem cells.¹⁷ FFA has been associated with other autoimmune conditions such as vitiligo, and its histopathologic characteristics of a perivascular lymphocytic infiltrate may also suggest an autoimmune process.¹⁸ Our study neither supports nor refutes that LPP and FFA could be autoimmune diseases.

The rate of thyroid disease in our control group was higher than that of nationwide reported rates, however, the rates of thyroid disease within our alopecia groups were in accordance with previously published data.^{1,8,9,19-20} Our study population included a higher proportion of female patients (71.5%) compared to data from the local West Los Angeles region (which is 51.6% female).²¹ Thyroid dysfunction more commonly affects women,²² and thus this may affect our observed rate of thyroid dysfunction. However, we have no reason to believe that our study population differs largely from populations served by other healthcare institutions. Data regarding free T4 levels and thyroid peroxidase antibodies were not analyzed in our study, and could be an avenue for future research. Further investigation at other institutions may be warranted to confirm the results of our study. □

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