INTRODUCTION

The word “alopecia areata” (AA) was introduced by Sauvages in his “Nosologica Medica” published in 1760, in France. It is a common, recurrent form of nonscarring alopecia which often presents as circumscribed patches of spontaneous hair loss. The global prevalence of this disease varies from 0.1% to 0.2% in general population and 7–30 cases per 1000 dermatological patients. The etiology of AA still remains uncertain; however, genetic or environmental factor and autoimmunity are claimed responsible for it. Various autoimmune diseases, such as Hashimoto’s thyroiditis, diabetes mellitus, vitiligo, and lupus erythematosus, have been reported in association with AA. Hence, the index case–control study was conducted to observe any correlation between AA and serum T3, T4, thyroid-stimulating hormone (TSH), and antithyroid peroxidase (TPO) antibodies.

Key words: Alopecia areata, thyroid hormone, thyroperoxidase antibody
MATERIALS AND METHODS

Study design

This was a hospital-based observational analysis.

Study duration

This study was conducted from June 2015 to June 2016.

Sample size

A total of 110 cases of clinically diagnosed AA and 110 persons of other dermatoses (without any known immunological disorders) were subjected to serum T3, T4, TSH, and anti-TPO antibody estimation. Written informed consent from every AA case and control was taken. The college Ethical Committee’s permission was also taken before starting the study.

Sampling method

Blood samples from antecubital vein of every selected AA case and control were collected in sterilized vial, taking all aseptic precaution. The blood samples were kept at room temperature for 1 h. Then, sera were separated using test tubes and rotated in a centrifuge machine at 3000 rpm for 30 s. These sera were then subjected to enhanced chemiluminescence immunoassay - chemiluminescence (real-time polymerase chain reaction technique) for estimation of T3, T4, TSH, and anti-TPO antibodies. Important tests, such as hemogram, blood sugar, venereal disease research laboratory, and antinuclear antibody test, were performed to exclude possibility of any other diseases.

Statistical method

Continuous data were summarized in the form of mean and standard deviation. The differences in mean were analyzed using Student’s t-test. Count data were expressed in the form of proportion. The difference in proportion was analyzed using “Chi-square test.” The level of significance was kept 95% for all statistical analysis.

OBSERVATIONS

Statistical analysis was performed with SPSS trial version 20 for Windows statistical software package (SPSS Inc., Chicago, IL, USA). The test normality was done by Kolmogorov–Smirnov test. The categorical data were compared as percentage and were compared among groups using “Chi-square” test. The differences among groups were analyzed using “Student’s t-test.” Probability \( P < 0.05 \) was considered statistical significant.

The age-wise distribution of AA patients indicated highest percentage among 21–30 years’ age group (39, 35.5%), while in controls, it was 48 (43.6%) patients [Figure 1]. The mean age of AA patients and controls was 23.64 ± 11.2 and 24.78 ± 10.51 years, respectively. It showed insignificant age difference among both groups (\( P = 0.270 \)). However, any age may be affected by AA, with a peak between the second and fourth decades.

The sex distribution indicated male predominance among AA patients (71, 64.5%) and in controls (62, 56.4%) (\( P = 0.270 \)). The students were predominantly affected in both groups (AA patients were 64, 54.5% while controls were 57, 51.8%, respectively). However, all occupational groups may be affected.

The family history of atopy was evident in 24 (21.8%) AA patients while in 6 (5.4%) controls. Atopic disease, especially atopic eczema, is also a common association with AA. Majority of AA patients (90, 81.8%) evidenced localized patches of alopecia (number 1–5) [Figure 2] while majority of controls (99, 90%) had acne vulgaris. Other variants of AA patients evidenced ophiasis in 6, diffuse hair loss in alopecia universalis in 2, totalis in 2, subtotalis in 2 and sisaipho in 1 case, respectively [Figures 3 and 4]. Nail pitting in AA patients was an additional finding in 24 cases (21.8%).

The mean serum T3 level in AA patients was 3.30 ± 0.84 pg/ml with the range of 1.8–4.2 pg/ml, while in controls, it was 3.27 ± 0.67 pg/ml (\( P = 0.302 \), Figure 5). The mean of serum T4 level in AA group was 1.23 ± 0.76 ng/dl, while in controls, it was 1.17 ± 0.34 ng/dl (\( P = 0.522 \)) [Figure 6]. The mean anti-TPO level in AA patients was 21.52 ± 35.09 IU/ml, while in control group, it was 56.43 ± 240.72 IU/ml (\( P = 0.176 \), Figure 7).

DISCUSSION

AA is a common, recurrent form of nonscarring hair loss.\(^1\)

The global statistic reports show its incidence 0.1%–0.2% in general population, with lifetime risk 1.7.\(^2\) In the index study, the incidence of AA was 0.07% (110 cases out of 165,708 patients), which is quite less than Sharma et al. (1.3%).\(^3\)

The majority of AA patients (56%) and controls (68.2%) in this study were in the age group of 11–30 years. The mean
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Age of AA patients was 23.6 years, while in controls, it was 26 years. It indicates that AA affects predominantly young persons, just other previous studies.\cite{16} It may be because of the fact that AA preferably affects pigmented hair and graying of hair usually starts at 35 years.\cite{17,18} However, many authors have reported its peak at the third to fourth decade.\cite{19,21}

The sex distribution of AA patients is often equal in both the genders.\cite{20,21} However, Sharma et al.\cite{22} reported...
male preponderance. The index study also showed male preponderance.

Besides genetic predisposition\(^{[3,4]}\) and autoimmunity\(^{[12‑15]}\) psychological stress\(^{[18]}\) may play important role in the pathogenesis of AA. It is also indicated in the index study which showed that majority of AA patients were students. There is a complex correlation of stress and AA. Probably, sympathetic system stimulation and substance \(P\) secretion during stress of study and job, the vascular supply to scalp hair may be altered or there is an alteration of hair cycle which ultimately leads to hair loss.\(^{[18]}\)

Patch(es) over the scalp is the most common form of involvement in AA,\(^{[20‑23]}\) which was also substantiated in the index study also (84, 76% patients). However, certain uncommon forms, such as diffuse alopecia (seven cases), ophiasis/sisapho (five cases), total/subtotal alopecia (three cases) and universal alopecia (one case), were also reported. Beard and moustache were also involved in some cases. Various authors have also reported uncommon forms of AA.\(^{[14,24]}\) The National Alopecia Areata Foundation Committee has devised “Severity of Alopecia Tool Score.”\(^{[25]}\) Occasionally, nails may be affected in AA in the form of fine/coarse pitting and dystrophy of nail plates. Similarly, the index study has also reported nail pitting in 21% AA patients.

The severity of AA may depend on family/personal history\(^{[25‑27]}\) of atopy, autoimmune disorders such as Hashimoto’s thyroiditis, vitiligo, pernicious anemia, diabetes mellitus, lupus erythematosus, and other diseases.\(^{[24,28‑31]}\)

Serum T3 and T4 levels were reported to be similar in AA cases and controls in index study \((P = 0.302 \text{ and } 0.136, \text{ respectively})\). However, Ahmed \(et\ ali\) have reported thyroid dysfunction in AA patients (hypothyroidism in 8.9% and hyperthyroidism in 1%). Rahnama \(Z\ et\ ali\)\(^{[32]}\) have also reported insignificant difference of thyroid disorders in AA cases and controls.

Bakry \(et\ ali\) have concluded that most of AA patients screened for thyroid functions may show thyroid autoantibodies in the absence of clinical manifestations of thyroid affection. The anti-TPO antibodies were found to be insignificant in AA patients and controls in index study. It may be because the herd population in this geographical area which may not have high prevalence of autoimmunity. However, Sharma \(et\ ali\)\(^{[22]}\) and others have also detected antithyroid antibodies in AA patients.\(^{[32]}\)

Seyrafi \(et\ ali\)\(^{[33]}\) conducted a retrospective analysis over 123 AA patients. Thyroid function abnormalities were found in 8.9% of patients. Positive autoantibodies were associated in 51.4% patients; however, insignificant correlation was found between severity and duration of AA and the titer of antibodies.

Kasumagic-Halilovic\(^{[34]}\) conducted a study on seventy AA patients and thirty healthy volunteers. He reported thyroid dysfunction in 8 (11.4%) patients. Positive autoantibodies were associated in 18 (25.7%) patients only. The frequency of thyroid autoantibodies was significantly higher than controls \((P < 0.05\%)\).

Bakry \(et\ ali\)\(^{[35]}\) conducted a study on 55 AA patients and 50 controls regarding TSH, \(fT3\), \(fT4\), thyroglobulin antibody (TgAb), and anti-TPO antibody levels. They found subclinical hypothyroidism in 16% cases. They also found statistically significant difference in the values of thyroid hormones and TgAb and anti-TPO antibodies in AA patients and controls.

Saylam Kurtipek \(et\ ali\)\(^{[36]}\) studied 92 patients of AA and 108 vitiligo patients and found elevated TSH level in 7.6% of patients and 1.1% of AA patients. About 5.4% of AA patients had raised \(fT3\) levels, 2.2% had raised anti-Tg, and 14.1% had anti-TPO antibody levels in AA patients.

Wang \(et\ ali\)\(^{[37]}\) studied the association between AA and thyroid autoimmunity in 158 Chinese patients. They reported anti-TPO antibody in 22 patients while \(fT3\), \(fT4\), and TSH were comparable in AA patients and controls.

**CONCLUSION**

We found insignificant correlation between thyroid profile and anti-TPO antibody levels in Alopecia Areata patients.
Declarations of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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