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RESEARCH ARTICLE

Analyzing the role of tofacitinib in treatment of alopecia areata: A retrospective analysis from a tertiary care center of North India

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ABSTRACT

Background: Alopecia areata is a disease, in which patients' loss hairs as random patches due to autoimmune complications. Tofacitinib acts as an inhibiter in the Janus kinase signal transducer and activator of transcription pathway and is an effective drug approved for the of rheumatoid arthritis treatment. Limited evidence is available on the role of tofacitinib in treatment of alopecia areata. **Aim and Objective:** The present study aims to evaluate the efficacy of tofacitinib in treatment of alopecia areata patients visiting the tertiary care center of North India. **Materials and Methods:** Total 17 patients with alopecia areata were recruited in this study and prescribed with the tofacitinib 5 mg twice daily for 6 months. Severity of alopecia tool (SALT) was used to analyze the severity of hair loss. The SALT score measures the total percent of hair loss in all area of scalp. A higher SALT score indicates higher hair loss. **Results:** The mean age of the patients was 27.88 ± 16.30 years with male-to-female sex ratio of 2.4:1. The mean duration of disease was 32.29 ± 22.14 months. There was a significant decrease in the SALT score ($P = 0.0001$) following the 6 months tofacitinib treatment. **Conclusion:** Tofacitinib was found to be effective in the treatment of alopecia areata. Further multicentric studies with ample sample size are required to establish tofacitinib as a standard treatment for the alopecia areata.

KEY WORDS: Tofacitinib; Alopecia Areata; Scalp; Hair Loss; Severity of Alopecia Tool Score

INTRODUCTION

Alopecia areata is a multidimensional, persistent, and autoimmune non-scarring alopecia that manifests as localized patches.[1,2] It is frequently defined as a self-limiting disorder that, in the majority of cases, causes spontaneous hair growth.[3] However, in some individuals, this regeneration may take several months or years to happen, which can induce psychological strain among patients. There are several off-label conventional therapeutic alternatives available for alopecia areata, but there is no one authorized therapy for the condition, despite the development and testing of a number of medicines.[4,5]

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Preclinical and genetic research recently put forward the molecular mechanism responsible the onset of alopecia areata. Based on the pathomechanisms of the disease, several molecular targets have been identified which could be the promising candidate to design drug for the treatment of the disease. One of the most promising molecular pathways for the developing the targeted drugs is the Janus kinase signal transducer and activator of transcription (JAK/STAT) pathway. The JAK/STAT signaling pathway involved in many biological processes, including cell growth and differentiation, and regulation of immune system. It has been proposed that by inhibiting the JAK/STAT pathway, JAK inhibitors stop the T-cell driven inflammatory response considered to be the primary cause of alopecia

areata pathogenesis, reversing hair loss in alopecia areata patients.[6]

Tofacitinib, a potent medication, licensed for the treatment of rheumatoid arthritis as it acts as a JAK/STAT pathway inhibitor. For cutaneous pathologies that are not responding to conventional immunosuppressives, oral tofacitinib is currently being intensively investigated due to its well-established effectiveness in systemic inflammatory illnesses.[7] A growing number of studies have shown that tofacitinib is effective in treating alopecia areata. These trials last anywhere between 2 and 18 months. The medication has a brief lifespan, with shedding starting on average 8.5 weeks after discontinuance.[8]

Since alopecia areata tends to impart significant psychological strain among the patients and limited evidence is available from the north India regarding the role of tofacitinib in the treatment of the disease, the present study was design to evaluate the efficacy of tofacitinib in treatment of alopecia areata patients visiting the tertiary care center of north India. We also reported the factor which is responsible for poor prognosis and adverse effects associated with the tofacitinib treatment. The present study will help in establishing the relevance of tofacitinib in the treatment of treatment alopecia areata for north India population.

MATERIALS AND METHODS

Study Design

The present study was a retrospective, observational, single centric, and hospital-based study conducted at a tertiary care hospital in the north India. Data were collected retrospectively from 17 patients clinically diagnosed with alopecia areata who were prescribed tofacitinib 5 mg twice daily and response to treatment was noted at 3 and 6 months of treatment.

Severity of Alopecia Tool (SALT) Score

SALT was used to analyze the severity of hair loss. To calculate the SALT score, the percentage of hair loss in each of the four areas of the scalp – the vertex (40%), right profile (18%), left profile (18%), and posterior (24%) – is measured. The composite score is then created by adding the results from each area. A higher SALT score indicates higher hair loss and a lower SALT score represents higher regrowth of hairs.

Statistical Analysis

Data were obtained using the predesigned pro forma and after completion of study a master chart in the Excel was prepared. Data were analyzed using the SPSS statistical software. Mean and standard deviation was used for quantitative variables and qualitative data were presented in fraction of total and percentage. Descriptive statistics was used to calculate 95% confidence of interval (95% CI) and one-way ANOVA was use to compare the multiple means. $P < 0.05$ was considered as statistically significant. Appropriate graphs and tables were used to represent the data.

RESULTS

The mean age of the patients was 27.88 ± 16.30 years (95% CI: 19.50–36.26). There were 12 (70.59%) males and 5 5 (29.41%) females in the present study indicating a male-to-female sex ratio of 2.4:1. The mean duration of disease was 32.29 ± 22.14 months (95% CI: 20.91–43.68) [Table 1].

The mean SALT score at baseline was 81.89 ± 23.44 (95% CI: 68.11–95.35), at 3-month follow was 48.12 ± 27.25 (95% CI: 34.11–62.13), and after 6 month follow-up was 23.35 ± 35.42 (95% CI: 5.14–41.56) [Table 1]. There was a significant decrease in the SALT score ($P = 0.0001$***) following the 6 months tofacitinib treatment [Figure 1].

The poor prognosis factor involved the ophiasis in 3 (16.66%) patients, atopy in 7 (38.88%) patients, nail pitting in 4 (22.22%) patients, hypothyroid in 3 (16.66%) patients, and early age in 1 (5.55%) patient. No adverse effect was observed during the present study in any of the patients and no patient among all 17 patients was lost during follow-up.

Figures 2–5 show response of patients to tofacitinib.

DISCUSSION

Significant hair regrowth was observed in the present study in the patients of alopecia areata after 6-month treatment with

Table 1: Sociodemographic and clinical determinants of patients clinically diagnosed with alopecia areata

Variable	Subdomain	Mean±SD or N%	95% CI
Age		27.88±16.30 years	19.50–36.26
Gender	Male	12 (70.59%)	
	Female	5 (29.41%)	
Disease duration		32.29±22.14 months	20.91–43.68
SALT score	Baseline	81.89±23.44	68.11–95.35
	3 months follow-up	48.12±27.25	34.11–62.13
	6 months follow-up	23.35±35.42	5.14–41.56
Poor prognosis factor	Ophiasis	3 (16.66%)	
	Atopy	7 (38.88%)	
	Nail pitting	4 (22.22%)	
	Hypothyroid	3 (16.66%)	
	Early age	1 (5.55%)	

SALT: Severity of alopecia tool

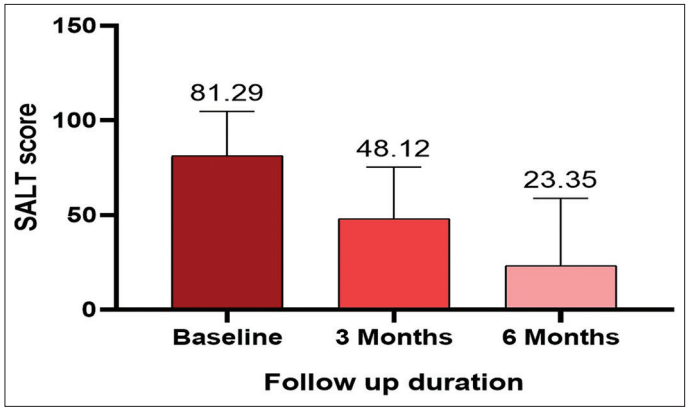

Figure 1: Severity of alopecia tool score showing significant decline over the follow-up period of 6 months

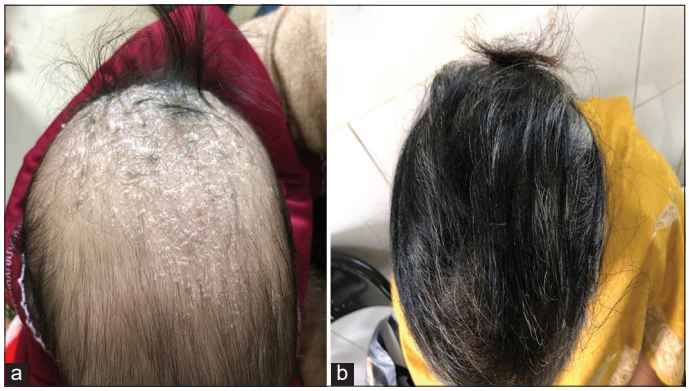

Figure 2: 49-year-old female suffering from alopecia areata for 18 months having severity of alopecia tool score of 84 at baseline (a) decreasing to 34 at the end of 3 months and (b) with tofacitinib

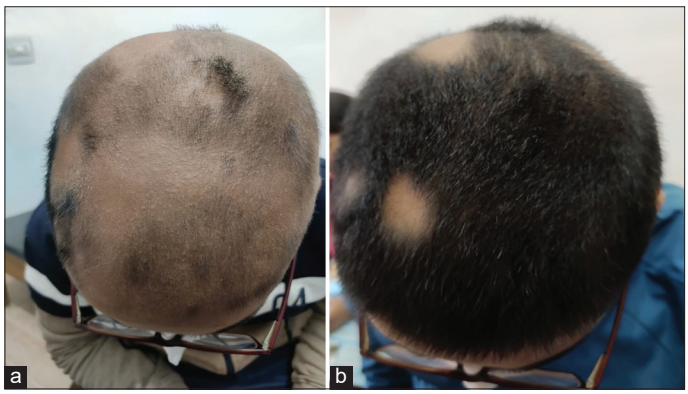

Figure 3: 16-year-old female suffering from alopecia areata for the past 6 months having severity of alopecia tool score of 100 at baseline (a) decreasing to 22 at the end of 6 months and (b) with tofacitinib

tofacitinib. Previously in the study by Hogan *et al.*, majority of alopecia areata patients experienced 5–100% regrowth after tofacitinib treatment.[8] The results of the present study were also in consistent with the finding of Ibrahim *et al.*, who reported 2–90% hair regrowth in alopecia areata patients after tofacitinib treatment.[9] In the study by Dai *et al.*, 51.4% of patients achieving ≥50% hair regrowth over 4–24 months of tofacitinib treatment.[10] Esteves *et al.* reported a case of female

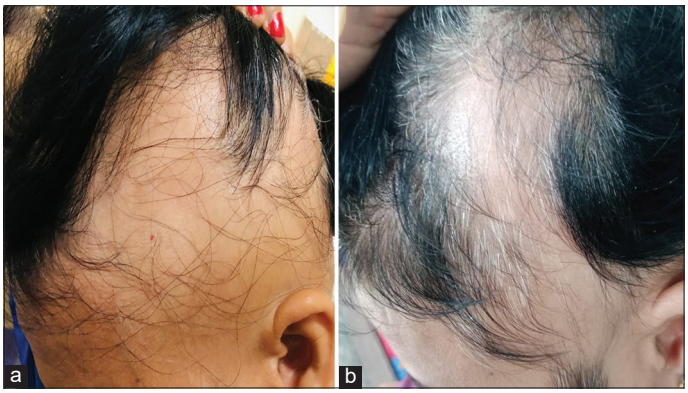

Figure 4: A 34-year-old female patient of alopecia areata for 4 years having severity of alopecia tool score of 79 at baseline (a) decreasing to 12 at the end of 6 months and (b) with tofacitinib

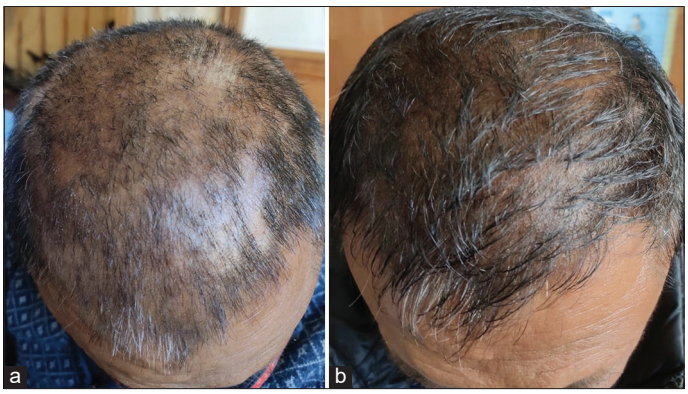

Figure 5: 49-year-old male patient of alopecia areata for the past 5 years having severity of alopecia tool score of 84 at baseline (a) decreasing to 40 at the end of 3 months and (b) with tofacitinib

patient who was successfully treated with oral tofacitinib for alopecia areata.[11] Shivanna *et al.* also reported significant hair regrowth in six patients by the end of 12 weeks who were treated with tofacitinib for alopecia areata.[12]

Adherence to treatment was very good in present study as no patient out of 17 was lost in follow up. In the study by Hogan *et al.*, six patients out of 20 experienced the medication interruption – four due to adverse effects and two due to lapses in prescription.[8] In the study by Ibrahim *et al.*, two patients out of 13 were lost in follow-up and adverse event was reported in one patient.[9] However, in the present study, no adverse effects were observed. Similarly, in the study by Dai *et al.*, no serious adverse event observed among patients over median duration of 8.8 months of tofacitinib treatment.[10]

Although the present study has a small sample size, the improvement in SALT scores was significantly high compared to the previously published studies. This result could be attributed to our larger dosages, longer therapy durations, shorter illness durations, and improved treatment adherence. The lack of a control group disallowed a tofacitinib versus placebo comparison, and the limited sample size

hindered subgroup analysis, both of which were limitations of this study. As greater dosages of more than 10 mg/day may be associated with a higher risk for severe infections and malignant neoplasms, we confined the daily dose of tofacitinib to 5 mg twice a day.[9]

CONCLUSION

Alopecia areata impart a significant psychological strain among patients due to stigma associated with the hair loss. Tofacitinib is a JAK pathway inhibitor which has been reported by few studies to have role in alopecia areata treatment. We conducted this study to evaluate the efficacy of tofacitinib in treatment of alopecia areata patients visiting the tertiary care center of north India. Significant hair regrowth was observed in patient in the present study. Overall, tofacitinib was found to be effective in the treatment of alopecia areata. Further multicentric studies with ample sample size are required to establish tofacitinib as a standard treatment for the alopecia areata.

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