RESEARCH LETTER

Intralesional Corticosteroid Versus Cryotherapy for Alopecia Areata: A Systematic Review and Meta-analysis

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To the Editor,

Alopecia areata (AA) is a common T-cell-mediated nonscarring hair loss. The global prevalence of AA is approximately 0.1–0.2%. AA tends to affect the younger population and is equally likely among male and female individuals (1). Intralesional corticosteroid injection is the first-line treatment for patchy AA, and its common side effects include injection pain and cutaneous atrophy (2). Cryotherapy has been proposed as a therapeutic option for AA due to its local reactive vasodilation and immune modulation effects (3). Several studies have compared the therapeutic efficacy of these 2 modalities, but the study design has been highly variable. Hence, we conducted a systematic review and meta-analysis to elucidate the clinical efficacy of intralesional corticosteroid therapy vs cryotherapy for AA.

A systematic review was conducted. On 25 February 2025, we searched PubMed, Web of Science, Embase, and Cochrane Library databases (Table SI). The search protocol was registered on PROSPERO (CRD420251001120), and no language restriction was applied. We included studies comparing hair regrowth in patients with AA after treatment with intralesional steroid or cryotherapy. The quality of the included studies was assessed using version 2 of the Cochrane risk-of-bias tool for randomized trials or Risk Of Bias In Nonrandomized Studies of Interventions tool for randomized controlled trials (RCTs) or non-RCTs, respectively. The primary outcome was the clinical response of hair regrowth, categorized into 3 groups – mild, moderate, or complete response – on the basis of definitions in the included articles. The pooled estimates are reported as risk ratios (RRs) with 95% confidence intervals (CIs) and were obtained using a random-effects model. Heterogeneity across the included studies was assessed using χ^2 and I^2 tests, and publication bias was measured using Egger's test; $p < 0.05$ indicated statistical significance. All analyses were conducted using Comprehensive Meta-Analysis version 3.0 (Biostat, Englewood, NJ, USA).

We included 2 RCTs and 3 non-RCTs in the final quantitative analysis (Fig. S1) (4–8); these studies involved 510 patients with patchy AA. The basic characteristics and risk of bias of the included studies are listed in **Table I** and Table SII. A single intervention was applied to different patient groups in 3 studies, and different treatments were applied to independent AA lesions in the same patients in the other studies. Patients undergoing cryotherapy received superficial liquid nitrogen for 2–5 s for 1 to 4 cycles every 1–6 weeks. The treatment protocol for intralesional steroids was injection with

Table I. Basic characteristics of included studies in quantitative synthesis

Study	Country	Study design	Patients, *n*	Male, *n*	Age, year (mean±SD)	Protocol of intervention	Definition of outcomes	Timing of outcome evaluation
Studies applying single intervention in different patients								
Ban et al., 2014	China	RCT	C: 60 I: 60	NA	32.8±9.6	C: superficial liquid nitrogen (2–3 s*1 cycle), every 1 week I: intralesional triamcinolone acetonide (~13 mg/mL), every 2 weeks	MiR (10–50% regrowth) MoR (>50% regrowth) CR (100% regrowth)	Week 24
Amirnia et al., 2015	Iran	Non-RCT	C: 120 I: 120	C: 68 I: 68	C: 31.8±7.1 I: 30.2±6.8	C: superficial liquid nitrogen (3–5 s*2 cycles), every 3 weeks I: intralesional triamcinolone acetonide (5 mg/mL), every 3 weeks	MiR (30–60% regrowth) MoR (60–90% regrowth) CR (90–100% regrowth)	Week 12
Sardana et al., 2022	India	RCT	C: 50 I: 50	67 among all patients	NA	C: superficial liquid nitrogen (3–5 s*unknown cycles), every 4–6 weeks I: intralesional triamcinolone acetonide (10 mg/mL), every 4–6 weeks	MiR (30–60% regrowth) MoR (60–90% regrowth) CR (90–100% regrowth)	Week 12
Studies applying different interventions on independent lesions in the same patient								
El Sayed et al., 2022	Egypt	Non-RCT	20	6	25±11.2	C: superficial liquid nitrogen (2–3 s*3–4 cycles), every 2 weeks I: intralesional triamcinolone acetonide (5 mg/mL), every 4 weeks	MiR (20–50% regrowth) MoR (50–75% regrowth) CR (>75% regrowth)	Week 16
Mohammed et al., 2022	Egypt	Non-RCT	30	26	30.5±12.1	C: superficial liquid nitrogen (3–5 s*2 cycles), every 3 weeks I: intralesional triamcinolone acetonide (5 mg/mL), every 3 weeks	MiR (>20–50% regrowth) MoR (>50–75% regrowth) CR (>75% regrowth)	Week 16

C: cryotherapy; CR: complete response; I: intralesional corticosteroid; MiR: mild response; MoR: moderate response; NA: not available; RCT: randomized controlled trial.

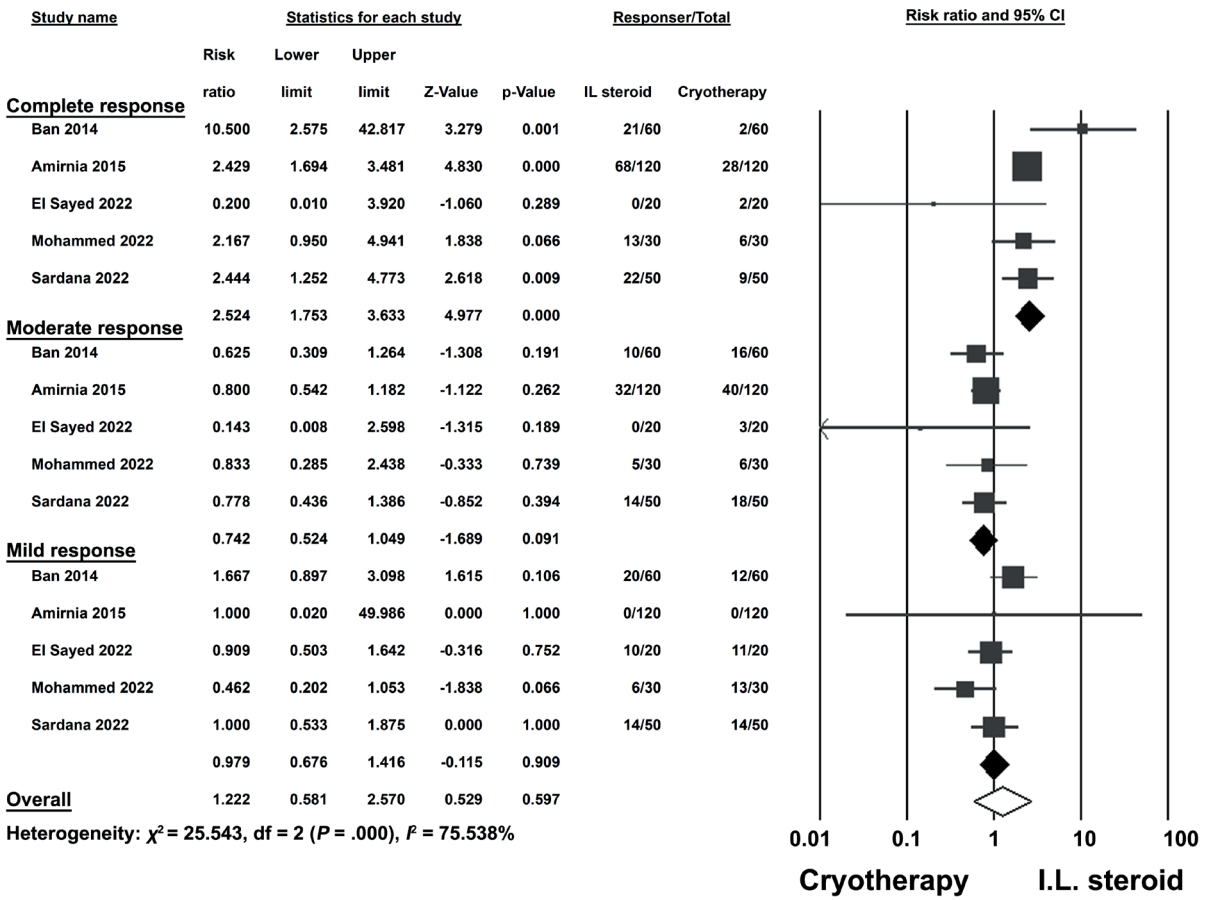

Fig. 1. Forest plots comparing different levels of hair regrowth response in patients with AA undergoing intralesional (IL) steroid therapy or cryotherapy.

triamcinolone acetonide at a concentration of 5–13 mg/mL every 2–6 weeks. Follow-up durations ranged from 12 to 24 weeks. Pooled estimates revealed no significant difference in overall hair regrowth between the intralesional steroid and cryotherapy groups (RR = 1.222, 95% CI = 0.581–2.570, $p = 0.597$, **Fig. 1**). Subgroup analysis based on different levels of response revealed similar trends for mild and moderate response. The intralesional steroid group had a significantly higher complete response rate than did the cryotherapy group (RR = 2.524, 95% CI = 1.753–3.633, $p < 0.001$, Fig. 1). Significant heterogeneity was discovered across the studies. No significant publication bias was detected.

A recent study conducted using an intrasubject split-lesion treatment design discovered a significant improvement in hair regrowth percentage after cryotherapy in which the skin's surface temperature was kept at 0°C for two 20-s cycles but no significant improvement after cryotherapy lasting 10 s per cycle. This study suggests that precise temperature control and cryotherapy of a certain duration are crucial for the effective treatment of AA (3).

Limitations of the present study include the variability in the definitions of treatment response, heterogeneity among intervention protocols, and interstudy differences in the timing of outcome assessments.

In summary, cryotherapy is less potent than intralesional steroid injections in treating AA but remains a viable therapeutic option, particularly for patients unable to tolerate injection pain or with steroid phobia.

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