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ORIGINAL ARTICLE

Therapeutic Efficacy of Liquid Nitrogen Cryotherapy for Treatment of Alopecia Areata

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ABSTRACT

Objective: To assess the therapeutic efficacy of liquid nitrogen cryotherapy for treatment of alopecia areata.
Study Design: Descriptive Case Series.
Place and Duration of Study: Department of Dermatology at Mayo Hospital, Lahore from 15-10-2020 to 14-04-2021.
Methodology: A total of 95 patients were included in the study. A photograph was obtained at baseline. Then, patients were treated with superficial liquid nitrogen cryotherapy spray once weekly for 6 weeks. A cryogun was used to spray the lesion with liquid nitrogen for 2–3 s till the appearance of mild frost. After the frozen area was thawed (3–5 s), a second spray was done in the same manner. After 6 weeks, session was stopped and patients were followed-up at 3 months and 6 months.
Results: Patients ranged between 16-70 years of age with mean age of 29.5±11.9 years. Out of 95 patients, 43 (45.3%) were male while 52 (54.7%) were female. Mean duration of disease was 9.8±4.9 months. Therapeutic efficacy of liquid nitrogen cryotherapy was found to be significant in 26 patients (27.4%). Stratification for age, gender and duration of disease was carried and no association was found (p >0.05).
Conclusion: In conclusion cryotherapy with liquid nitrogen is a therapeutic option with a good treatment outcome. It has the privilege of being a simple, convenient, short-term, and office-based technique.
Key Words: Alopecia Areata, Liquid Nitrogen Cryotherapy, Treatment.

INTRODUCTION

Alopecia areata is a common autoimmune non-scarring alopecia. Alopecia areata presents heterogeneously and is influenced by both environmental and genetic factors. The prognoses of patients are very diverse. The larger the area of hair loss, the poorer the treatment response and greater the probability of chronic disease progression.[1] Diagnosis is clinical after ruling out other local or systemic causes of alopecia. Standard first-line therapy is typically topical steroids, but the response can be frustrating. Novel treatment options have shown great promise in the management of the refractory disease.[2]

Alopecia areata is a prevalent autoimmune skin disease with no cure or indicated treatment options.[3] In the absence of an approved treatment, some patients are eager to try unconventional therapies, despite the very limited research evaluating their safety and efficacy. Recently emerging such unconventional therapies for alopecia areata discussed include antihistamines, cryotherapy and low-dose naltrexone.[3] Cryotherapy devices are readily accessible in dermatological offices where the typical patient with alopecia areata will seek help. The potential mechanism by which cryotherapy modulates hair regrowth appears to be of immune-regulatory nature.[4]

Several studies have assessed the efficacy of cryotherapy in the treatment of alopecia areata. A study done on cryotherapy showed response rates of 80% hair regrowth.[5] In another study, regrowth of more than 50% was seen in 23.3% of patients with alopecia areata treated with cryotherapy.[6] One study found that liquid nitrogen cryotherapy is effective in producing >75% hair re-growth in 46.5% cases within 6 months.[7] However, another study found that liquid nitrogen cryotherapy can be effective in >75% hair re-growth in 25% cases within 6 months.[8] Yet another study showed only 22.4% efficacy of liquid nitrogen cryotherapy for treatment of alopecia areata.[9]

MATERIALS AND METHODS

After approval from hospital ethical committee, a total of 95 patients fulfilling selection criteria, were enrolled from Outpatients Unit of the Dermatology Department, Mayo Hospital Lahore. After taking informed consent, demographics (name, age, sex and duration of alopecia) were noted. At baseline, patients were evaluated and SALT score was measured by researcher. A photograph was obtained at baseline (and at each subsequent visit). Then, patients were treated with superficial liquid nitrogen cryotherapy spray once weekly for 6 weeks. A cryogun was used to spray the lesion with liquid nitrogen for 2–3 s till the appearance of mild frost. After the frozen area was thawed (3–5 s), a second spray was done in the same manner. After 6 weeks, session was stopped and patients were followed-up at 6 months. If there was more than 50% reduction in SALT score from baseline then efficacy was labelled. Quantitative variables like age, duration of disease, pre- and post-treatment lesion size was measured in the form of mean and standard deviation. Qualitative variables like gender and efficacy was presented as frequency and percentage. Data were stratified for age, gender, duration of disease and pre-treatment lesion size. Post stratification, Chi-square test was applied to compare efficacy in stratified groups. P-value ≤0.05 was considered as significant.

RESULTS

A total of 95 patients were taken in this study during the study period of six months.Patients ranged between 16-70 years of age with mean age of 29.5±11.9 years. Out of 95 patients, 43 (45.3%) were male while 52 (54.7%) were female. Mean duration of disease was 9.8±4.9 months. Therapeutic efficacy of liquid nitrogen cryotherapy was found to be 26 (27.4%). Stratification for age, gender and duration of disease was carried and no association was found (p>0.05).

Table 1: Distribution of patients by age

Age (Year)	No.	%
≤ 40	78	82.1
41-70	17	17.9
Total	95	100.0
Mean±SD	29.5±11.9	

Table 2: Distribution of patients by gender

Gender	No.	%
Male	43	45.3
Female	52	54.7
Total	95	100.0

Table 3: Duration of disease (months)

Duration	No.	%
≤ 12	76	80.0
> 12	19	20.0
Total	95	100.0
Mean±SD	9.8±4.9	

Table 4: Therapeutic efficacy of liquid nitrogen cryotherapy

Efficacy	No.	%
Yes	26	27.4
No	69	72.6
Total	95	100.0

Table 5: Mean values of pre and post-treatment lesion size (cm)

Lesion size at	Mean	S.D
Pre-treatment	1.63	0.67
Post-treatment	1.24	0.66

Table 6: Stratification for age

Age	Efficacy		Total	P value
	Yes	No		
≤ 40	22	56	78	χ^2=0.154
41-70	4	13	17	P=0.695
Total	26	69	95	

Table 7: Stratification for gender

Gender	Efficacy		Total	P value
	Yes	No		
Male	10	33	43	χ^2=0.668
Female	16	36	52	P=0.414
Total	26	69	95	

Table 8: Stratification for duration of disease

Duration (months)	Efficacy		Total	P value
	Yes	No		
≤ 12	22	54	76	χ^2=0.477
> 12	4	15	19	P=0.490
Total	26	69	95	

DISCUSSION

Alopecia areata is a chronic inflammatory disease of the HF usually manifesting as round or ovoid patchy areas that show sudden hair loss with discrete borders.[10] Neither the efficacy of the available therapies nor the course and the prognosis of the disease is predictable.[11] Considering all the limitations and the risk-benefit balance, treatment options are limited.[12] Alopecia areata is a complicated multifactorial disease and has a variable prognosis. While many patients will heal spontaneously, some patients will have chronic disease. There are no treatments that are approved by FDA.[13] Because of its destructive nature, cryotherapy with liquid nitrogen has been used primarily to treat cancerous skin lesions.[14] Huang et al introduced liquid nitrogen cryotherapy for treatment of alopecia areata in 1986.[15]

Although cryotherapy has been reported for the treatment of AA, it is not a popular therapeutic option for this condition. In some previous case reports, the authors conducted a research on patients with limited scalp involvement or using liquid nitrogen cryotherapy in combination with other modalities.[16] Our study demonstrated that 27.4% of liquid nitrogen cryotherapy patients showed reduction in severity of alopecia tool (SALT) score more than 50% from baseline score. The results of our study were consistent with the study of Gita and Mohadadreza.[7] They found good results in 23% of the patients treated with cryotherapy. Similarly, Jun et al[9] also reported results comparable with current study. Jun et al[9] claimed 22.4% efficacy of liquid nitrogen cryotherapy for treatment of alopecia areata.

In contrast, Zawar and Karad[17] in their study of 11 patients with recalcitrant AA, reported better results; 80% of their patients indicated clinical response. These patients were treated with high-dose liquid nitrogen cryotherapy every 2 weeks till significant hair regrowth or maximum five sittings whichever was earlier. Every session contained dual freeze and thaw cycle of 15 s each with a cryo unit spray. These higher effects can be explained by longer treatment and longer cycles of freezing and thawing. Another study by Lei et al demonstrated clinical improvement of AA lesions in 97.2% of patients after superficial liquid nitrogen cryotherapy.[18] In study by Kim et al superficial cryotherapy was found to be effective in 66.7% of patients.[19] Hong et al in a large scale retrospective study showed that 68.5% of 153 patients achieved marked recovery of AA.[20]

The difference in results of our study and studies by Lei et al, Kim et al and Hong et al are due to the differences in the duration of freeze, thaw cycles and number of cycles in one sitting. In our study liquid nitrogen cryotherapy was well tolerated by all the patients and none of the patients had had any complaint pertaining to the procedure. In our study we have shown that superficial cryotherapy could be a meaningful treatment option for AA patient. Because of its less painful nature and easy technique it is worthy of application in patients of AA who find other conventional treatment modalities like intralesional corticosteroid a difficult option.

CONCLUSION

In conclusion cryotherapy with liquid nitrogen is a therapeutic option with a good treatment outcome. It has the privilege of being a simple, convenient and office-based technique.

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