doi:10.36849/JDD.6346

BRIEF COMMUNICATION Journal of Drugs in Dermatology

A Potential Alternative Treatment for Vitiligo: An Observational Study on Tacrolimus 0.3% Lotion

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INTRODUCTION

Vitiligo is a complex multifactorial disorder of depigmentation affecting 0.5 to 2% of the world's population without specific gender or racial prevalence.[1] Though no treatments are FDA approved to re-pigment vitiligo, topical medications along with phototherapy alone or in combination remain the mainstay of therapy. While Janus Kinase inhibitors and other agents are in development, current topical options are mainly limited to steroid formulations of various potencies or immunomodulatory steroid- sparing agents such as tacrolimus 0.03% or 0.1%.

A particularly challenging area of vitiligo to treat is when it affects the scalp or beard as phototherapy as well as creams and ointments have their drawbacks in hair bearing areas. Thus, options are limited and usually include steroid solutions, lotions, foams, or oils. While commercially available forms of tacrolimus and pimecrolimus have been proven to re-pigment and maintain pigmentation in vitiliginous lesions over time, there is no vehicle appropriate for hair bearing areas. Furthermore, concentrations above 0.1% have yet to be used to treat vitiligo.[2] Tacrolimus has been long proven to be a safe and effective topical treatment for vitiligo. It is a macrolide immunosuppressant derived from the fungus *Streptomyces tsukubaensis*. As a calcineurin inhibitor, it helps down-regulate T cell proliferation and CD 8^+ cytotoxic T cells are considered key players in the pathogenesis of vitiligo. This in turn reduces cytokines such as Interferon gamma (IFN-γ) found in lesional skin. IFN-γ induced chemokines like CXCL10 have been shown to recruit autoreactive CD8+ T cells which leads to further destruction of melanocytes and progression of disease.[3]

In this retrospective observational study, we describe three patients in whom conventional potent topical steroids failed to induce noticeable re-pigmentation in affected areas. Significant improvement in re-pigmentation was noticed after these patients switched to tacrolimus 0.3% lotion, especially when applied to hair-bearing areas like scalp and beard. We present our clinical findings in Table 1. Adverse effects experienced by patients were mild burning on application. The study was approved by the Tufts Institutional Review Board.

Tacrolimus 0.3% lotion is an off-label preparation where patients are instructed to add the contents of 36 Tacrolimus 5mg capsules to 60 mL of 70% isopropyl alcohol and vigorously shake the mixture until the powder was completely in suspension. Twice daily application was recommended to affected areas. When feasible, we also tried to substitute isopropyl alcohol vehicle with equal quantity of brand name moisturizer with good effect.

Tacrolimus 0.3% lotion was reported to be successful as an adjunct treatment of recalcitrant scarring alopecia associated with discoid lupus erythematosus. Reduced erythema, burning sensation, and hair regrowth were noted six months after addition of tacrolimus 0.3% lotion to ongoing oral antimalarial treatment.[4] Given shared pathogenesis of lupus erythematosus

TABLE 1.

Characteristics and Clinical Findings of Patients Treated With Tacrolimus 0.3% Lotion

Sample size =3	Gender	Age	Race	Location of vitiligo	Previous treatments	Time to response after tacrolimus 0.3% application	Response to treatment (re-pigmentation %)
Patient 1	F	25	Caucasian	Scalp	Tacrolimus 0.1% ointment Prednisone 50 mg daily x 4 days CO2 fractionated laser	2 months	35
Patient 2	M	53	Asian	Beard area/chin	Hydrocortisone 2.5% Valproic acid 8.2% topically BID	5 months	45
Patient 3	M	62	Caucasian	Scalp	Tacrolimus 0.1% ointment Clobetasol propionate 0.05%	1 month, plateaued	20

and vitiligo wherein interferon gamma is a key player, the use of tacrolimus 0.3% lotion was extrapolated to help treat recalcitrant scalp and beard vitiligo.

Advantages of using tacrolimus 0.3% lotion may be increased penetration, possible application in hair-bearing areas, and easier application over larger surface areas. The drawback of this study is limited sample size, lack of therapeutic controls, and unknown long-term safety.

We hope this study will encourage larger scale research trials to help provide alternative topical therapeutic non-steroidal options for patients with long-standing vitiligo in challenging areas such as scalp and beard.

DISCLOSURES

David Rosmarin has received honoraria as a consultant for AbbVie, Abcuro, AltruBio, Boehringer-Ingelheim, Bristol Meyers Squibb, Celgene, Concert, Dermavant, Dermira, Incyte, Janssen, Kyowa Kirin, Lilly, Novartis, Pfizer, Regeneron, Sanofi, Sun Pharmaceuticals, UCB, VielaBio; has received research support from AbbVie, Amgen, Bristol Meyers Squibb, Celgene, Dermira, Galderma, Incyte, Janssen, Lilly, Merck, Novartis, Pfizer, and Regeneron Pharmaceuticals Inc; and has served as a paid speaker for AbbVie, Amgen, Celgene, Janssen, Lilly, Novartis, Pfizer, Regeneron Pharmaceuticals Inc., and Sanofi. No other authors have any conflicts of interest to report.

IRB approval status: Reviewed and approved by Tufts Health Sciences Institutional Review Board; approval # 00001292

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