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A Case Report on Minoxidil Induced Allergic Contact Dermatitis

[1]* Sreehari R,[1] Layana Roy, [1] Hannah Joseph
[1]*Pharm D. Department of Pharmacy Practice. Nazareth college of Pharmacy, Othera, Thiruvalla*

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ABSTRACT
Topical minoxidil solution has proven to be a safe and effective treatment for androgenic alopecia. Minoxidil promotes hair growth by increasing the duration of anagen phase, shortening telogen, and enlarging miniaturized follicles. However, some patients present with complaints of pruritus and scaling of the scalp. The most common causes of these symptoms include irritant contact dermatitis, allergic contact dermatitis, or an exacerbation of seborrheic dermatitis. The patients found to be allergic to minoxidil are no longer candidates for topical treatment of their alopecia with any preparations of minoxidil. This case study discusses about a 24-year-old male who developed allergic contact dermatitiswhen initiated ontopical minoxidil therapy for his androgenic alopecia.
Keywords: minoxidil, dermatitis, androgenic alopecia

I. INTRODUCTION

Androgenic alopecia is a genetically predetermined disorder due to an excessive response to androgens. This condition affects up to 50 percent of males and females and is characterized by progressive loss of terminal hair of the scalp any time after puberty [1].

Androgenic alopecia patients have higher production of dihydrotestosterone due to higher levels of 5 alpha-reductase and androgen receptors in balding scalp.

There are two major isoforms of the 5 alpha-reductase enzyme namely Type 1 & Type 2.The 5 alpha-reductase convert's testosterone to DHT (dihydrotestosterone), which has a much greater affinity for the androgen receptor. Type 2 - 5 alpha-reductase enzyme plays a greater role in androgenic alopecia [2].

The normal hair growth cycle consists of four phases: anagen (growth), catagen (involution), telogen (resting), and exogen (shedding of hair). Eighty percent to 90% of hair is in the anagen phase which lasts 2 to 6 years and determines the hair length; less than 5% are in catagen, and the rest are in telogen. Shedding of 100 hairs a day (exogen) is normal.

Topical minoxidil and oral finasteride are the therapeutic agents that have been most extensively studied for the treatment of androgenic alopecia in men. Both drugs have demonstrated efficacy and high tolerability in placebo-controlled randomized trials, supporting their status as first-line agents. The response to treatment with finasteride or minoxidil varies. While some men achieve cosmetically significant regrowth, others benefit most from the slowing of additional hair loss. Continuation of these drugs is required to maintain the results of therapy [3].

Topical minoxidil is available over-the-counter and in various strengths, up to 10% solution. Minoxidil promotes hair growth by increasing the duration of anagen phase, shortening telogen, and enlarging miniaturized follicles. The pathophysiologic mechanism through which minoxidil influences follicular structure and follicular cycling is unclear, and the interpretation of the available literature is complicated by studies with conflicting results. Minoxidil is a vasodilator, and the induction of vascular endothelial growth factor (VEGF) may be a mechanism by which minoxidil helps to maintain the vascularity and size of dermal papillae (collections of mesenchymal tissue beneath follicles that contribute to follicular development). Since the volume of a dermal papilla correlates with the size of the emerging hair follicle, minoxidil - induced support of the dermal papilla may be relevant. In addition, minoxidil is a regulator of potassium ion channels. This function may also contribute to the drug's beneficial effects [4].

The most common side effect of topical minoxidil are contact dermatitis and irritant dermatitis with the typical symptoms of itching and scaling. These symptoms are a result of an allergic reaction to minoxidil [5].

Here, we present a case of a 24-year-old male who developed allergic contact dermatitis on frontal hair line receding area to minoxidil 5% lotion.

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II. CASE PRESENTATION

A 24-year-old male presented with complaints of itching over the area of recession of hair for 1 week along with lesions, not aggravated by sun exposure. He was previously diagnosed with androgenic alopecia and was prescribed on topical minoxidil 5% solution once daily for 4 months. After continuously applying for 4 months, he started itching over the applied area and 1-week later lesions were developed. Regarding these effects he stopped using it but the symptoms haven't subsided. He presented to dermatology OPD and prescribed with topical steroids to be applied at the area of itching and rashes along with antihistamines, also was advised to stop minoxidil for 1 month, then to review after the symptoms gets subsided. After 2 weeks the patient presented to the OPD with improved symptoms and he was advised for test application of minoxidil topically over a single area behind ear for 2 weeks. The patient revisited after 2 weeks and he was examined for any itching or lesions behind the ear where the test application was done but there was none. Thus, he was advised to wait for 10 days for any side effects and to reapply in the scalp if no itching were present. However, he presented in the OPD after 2 weeks with the same symptoms as earlier over the forehead when he started reapplying Minoxidil Topical for 3 days. Following the recurrence of symptoms,He was advised to avoid topical minoxidil as a treatment for his Androgenic Alopecia.

III. DISCUSSION

Androgenic alopecia is a common form of hair loss in both men and women. In men, this condition is also known as male-pattern baldness. Hair is lost in a well-defined pattern, beginning above both temples. Over time, the hairline recedes to form a characteristic "M" shape. They have higher production of dihydrotestosterone, and higher levels of 5 alpha-reductase and androgen receptors in balding scalp.

Minoxidil is an orally effective direct acting peripheral vasodilator that reduces elevated systolic and diastolic blood pressure by decreasing peripheral vascular resistance. Minoxidil is also used topically to treat androgenic alopecia. Minoxidil is thought to promote the survival of human hair cells by activating both extracellular signal-regulated kinase (ERK) and protein kinase B (Akt) and by preventing cell death. Minoxidil may stimulate the growth of human hairs by prolonging anagen through these proliferative and anti-apoptotic effects on Dermal papilla cells (DPCs). Minoxidil, when used as a vasodilator, acts by opening adenosine triphosphate-sensitive potassium channels in vascular smooth muscle cells. This vasodilation may also improve the viability of hair cells or hair follicles. Topical minoxidil solution is currently available over the counter and has a good safety profile.

Minoxidil is available in 2 types of dosage forms - Foam and Solution

The most common side effects of topical minoxidil include exacerbation of seborrheic dermatitis, irritant contact dermatitis, or allergic contact dermatitis. Most commonly, these symptoms are a result of an allergic reaction to propylene glycol, or less commonly, to minoxidil itself. Thus a patch test can be provided to patients with allergic contact dermatitis to determine the causative allergen. If patients are found to be allergic to propylene glycol, compounded formulations containing minoxidil with alternative solvents can be used. However, patients who are found to be allergic to minoxidil itself cannot use topical minoxidil to treat their alopecia.In this case, patient developed allergic contact dermatitis after the use of minoxidil for 4 months.

IV. CONCLUSION

Allergic contact dermatitis to minoxidil has been reported in the literature. Patients who experience an allergic reaction to topical minoxidil are mostly advised to change to other types of management. Other treatments include 5α-reductase inhibitors, androgen receptor antagonists, prostaglandin analogs and antagonists, laser therapy, and platelet-rich plasma injections. Since other components like propylene glycol present in minoxidil can also cause allergic reactions, A patch testing should be considered if the patient reports itchiness or lesions following the application of topical minoxidil.

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