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Effect of Minoxidil at different concentrations on treatment of androgenetic alopecia using Dermapen injector

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Abstract

Introduction: Androgenetic alopecia (AGA) is a genetically predisposed disease that causes increasing follicular shrinkage and is chronic, increasing, and androgen-dependent. Only topical minoxidil and oral finasteride are now authorized treatments for it. Minoxidil is a pro-drug that is transformed into minoxidil sulfate, its active form, by sulfotransferase enzymes found in the outer root sheath (ORS) of the hair follicle (HF). Dermoscopy is a non-invasive test that is easy to perform and can contribute to the diagnosis of AGA, especially in the early stages of the illness.

Aim of the study: To ascertain the effect of minoxidil at different concentrations on the treatment of androgenetic alopecia using the Dermapen injector.

Subjects and Methods: Forty Egyptian patients were diagnosed with AGA based on clinical evaluation and dermoscopic examination by dermlite 4 dermoscopy.

Results: Minoxidil and Dermapen injectors were effective in treating AGA, whatever the treatment protocol. There were mild significant adverse effects were noted of the treated patients but all the patients tolerated procedures

Conclusions: Androgenetic alopecia is the most common type of progressive, noncicatricial alopecia resulting from the miniaturization of terminal hair into vellus hair in individuals with a genetic predisposition. Minoxidil is the only topical drug approved by the FDA. Minoxidil and dermapen injectors are effective in treating AGA. Mild, significant adverse effects were noted in the treated patients, but all patients tolerated the procedure well. We strongly recommend the routine use of dermoscopy in the early diagnosis of AGA, the evaluation of treatment success, and the follow-up of patients to detect the degree of improvement.

1. Introduction

Androgenetic alopecia (AGA) is a genetically predisposed condition that causes growing follicular shrinkage and is chronic, progressive, and androgen-dependent. Only topical minoxidil and oral finasteride are currently approved treatments [1, 2]. Minoxidil (MS) is a pro-drug that is converted into minoxidil sulfate, the active form, by sulfotransferase enzymes present in the hair follicle's outer root sheath (ORS) [3-6]. Dermoscopy is a non-invasive, simple examination that can aid in the diagnosis of AGA, particularly in the early stages of the disease [7].

The current study aimed to ascertain the effect of minoxidil at different concentrations on the treatment of androgenetic alopecia using the Dermapen injector.

2. Subjects and methods

2.1. Subjects

This study comprised forty Egyptian patients who were diagnosed with AGA based on clinical evaluation and dermoscopic testing using dermlite 4 dermoscopy. The Faculty of Medicine, Fayoum University Research Ethical Committee accepted this work. The objectives of the study were conveyed to the participants. The confidentiality of personal information, as well as their right to decline participation in the study.

Inclusion criteria

Age: 20-45 years, Sex: Both males and female, Diagnosis clinically and confirmed by Trichoscopy.

Exclusion criteria

Patients having a history of any other dermatological or systemic diseases as psoriasis or lichen plannus. Patient on treatment with drugs that could affect the hair cycle during the past 3 months, Patient who had undergone surgery for alopecia (e.g. hair trans-plantation).

2.2. Study design

- History taking: Name, Age, Sex, Marital Status, Phone Number, Address, Particular Medically Important Habits, Particularly Smoking, Onset, Course, and Duration of the Disease.
- Precipitating factors (psychogenic stress, ill- ness, fever or diet), Previous treatment and date of its stoppage, Drug intake (oral contraceptive pills, anticoagulant or antihypertensive), History of menstrual irregularity, Presence of hirsutism or acne. Family history of similar condition.
- Local scalp evaluation: Confirm the diagnosis of AGA and rule out other alopecia kinds. Trichoscopic examination: to confirm diagnosis. Hair shaft diversity more than 20%, Single hair pilosebacous units, Peripilar sign.

Ethical consideration

The approval to conduct this study was obtained from the Department of Dermatology, Sexually Transmitted Diseases (STDs), Faculty of Medicine, Fayoum University. Written consents were taken from all patients before treatment where the method of treatment was explained. All participants had the right not

to participate in the study. All collected data were kept confidential. Treatment was prescribed when indicated and method of use was explained.

Each participant received complete explanation of the nature, risk & purpose of the study. They were warned about hyperpigmentation and infection that may occur after procedures. Any unexpected risk appeared during the course of the research will be cleared to the participants & the ethical committee on time.

There will be adequate provision to maintain privacy of the participants and confidentiality of the data through:

- Using code number for every participant.
- Take pictures for the affected site only.
- The results of the research will be used only in scientific purpose.

2.3. Statistical Methods

Data was collected and coded to ease data manipulation before being double entered into Microsoft Access and analyzed using the Statistical Package for Social Science (SPSS) software version 22 in Windows 7. Simple descriptive analysis of qualitative data in the form of numbers and percentages, and arithmetic means as a measure of central tendency, standard deviations as a measure of dispersion of quantitative parametric data.

3. Results

Minoxidil and Dermapen injector are effective in treating of AGA, whatever the treatment protocol. There were mild significant adverse effects were noted of the treated patients but all the patients tolerated procedures Regarding dermoscopic data before MS injection, there was no statistically significant difference with a P>0.05 between different study groups, which indicated proper matching between study groups as regards these variables (Table 1).

Table 1: Comparisons of dermoscopic assessment before MS injection in different study groups.

Variables		Group I (N=10)	Group II (N=10)	Group III (N=10)	Group IV (N=10)
Hair shaft diversity	>20%	10 (100%)	10 (100%)	10 (100%)	10 (100%)
	<20%	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Single hair unit	>20%	10 (100%)	10 (100%)	10 (100%)	10 (100%)
	<20%	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Regarding dermoscopic data after MS injection, there was a statistically significant difference with P > 0.05 between different study groups, which proved that

higher concentrations of MS were associated with better results as regards hair shaft diversity, increased number of hairs per unit, and increased hair count (Table 2).

Table 1. Comparisons of dermoscopic assessment after MS injection in different study groups.

Variables		Group I (N=10)	Group II (N=10)	Group III (N=10)	Group IV (N=10)	*P-value*
Hair shaft diversity	No change	2 (20%)	2 (20%)	0 (0%)	0 (0%)	0.2
	Decreased	8 (80%)	8 (80%)	10 (100%)	10 (100%)	
Single hair unit	No change	0 (0%)	0 (0%)	0 (0%)	0 (0%)	----
	>1 hair/unit	10 (100%)	10 (100%)	10 (100%)	10 (100%)	
Hair count	No improvement	2 (20%)	0 (0%)	0 (0%)	0 (0%)	0.09
	Increased	8 (80%)	10 (100%)	10 (100%)	10 (100%)	

Regarding side effects after MS injection, there was no statistically significant difference with a *P > 0.05* between different study groups, which indicated different concentrations of MS (Table 3).

Table 2: Comparisons of side effects of the MS injection in different study groups.

Variables		Group I (N=10)	Group II (N=10)	Group III (N=10)	Group IV (N=10)	*P-value*
Scaling	Mild	10 (100%)	10 (100%)	9 (90%)	7 (70%)	0.6
	Moderate	0 (0%)	0 (0%)	1 (10%)	3 (30%)	
Scalp pruritus	No	1 (10%)	1 (10%)	0 (0%)	0 (0%)	0.6
	Yes	9 (90%)	9 (90%)	10 (100%)	10 (100%)	
Hirsutism	No	9 (90%)	7 (70%)	8 (80%)	7 (70%)	0.7
	Yes	1 (10%)	3 (30%)	2 (20%)	3 (30%)	

4. Discussion

This study aimed to detect the effect of MS at different concentrations on the treatment of AGA using dermapen injectors. Our study was conducted on 40 AGA patients from the outpatient clinic of Fayoum University Hospitals. This study included 40 patients, 9 males and 31 females, who were clinically and dermoscopically diagnosed as AGA and categorized into 4 groups: group I (injected with MS 2% using dermapen injector), group II (injected with MS 5% using dermapen injector), group III (injected with MS 8% using dermapen injector), and group IV (injected with MS 10% using dermapen injector). Each patient received six sessions with an interval of one week between the sessions. Clinical and dermoscopic photographic assessments were done before treatment, after each session, and 3 months after treatment.

Our results agreed with Abdel-Raouf et al.'s (2021) results, which also showed that topical MS 5% gel can prove to be an effective treatment option for AGA. In their study, 20 cases of AGA were treated with topical MS gel 5%. The patients were instructed to use the gel twice daily by gently massaging their scalps for 12 months. Patients were followed up monthly for efficacy and safety assessments. Clinical responses were found in 90% of the patients; four of them had excellent responses, six had good responses, two had fair responses, and six had poor responses. Only minimal and tolerable side effects were noted [8].

Also, McCoy et al., (2016) mentioned that 5% MS foam is only effective at re-growing hair in a minority of women (approximately 40%). They recruited FPHL subjects that were identified as non-responders to 5% topical MS utilizing the previously validated assay for MS response. Subjects were treated for 12 weeks with a novel 15% topical MS solution. At 12 weeks, 60% of subjects achieved a clinically significant response based on target area hair counts (>13.7% from baseline), as well as significant improvement in global photographic assessment [9].

On the other hand, Ghonemy et al. (2021) their study was a double-blinded, placebo-controlled, randomized trial. In which a total of 90 men with AGA were divided into 3 groups, first group have applied 5% MS solution, second group applied 10% MS solution; or third placebo group. Efficacy was evaluated clinically and by Trichoscopy. After 36 weeks of therapy; 5% topical MS (0.47±0.26) (0.59±0.64) was significantly superior to 10% topical MS (0.05±0.13) (0.45±0.74) and placebo (0.01±0.05) (–0.03±0.08) in terms of change from baseline in total vertex and frontal hair mean count respectively. Five percent of topical MS was moderately superior to 10%

topical MS and placebo in increasing hair regrowth opposite to the expected, the irritation was marked for 10% topical MS. Psychosocial stress after 10% usage were worsen by the shedding, irritation compared to their high expectation in comparison to 5% usage [10].

Conclusion

Androgenetic alopecia is the most common type of progressive, noncicatricial alopecia, resulting from miniaturization of terminal hair into vellus hair in individuals with genetic predisposition, Minoxidil is the only topical drug approved by FDA, Minoxidil and dermapen injector are effective in treating of AGA, there is mild significant adverse effects were noted of the treated patients but all patients tolerated the procedure well, We strongly recommend the routine use of Dermoscopy in the early diagnosis of AGA, evaluation of treatment success and to follow up patients to detect the degree of improvement.

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