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Original article

The Use of Trichoscopy to Assess the Efficacy of Topical Minoxidil 2% Solution in Patients with Female Pattern Hair Loss

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ABSTRACT

Background: Female pattern hair loss is a common cause of alopecia in women that predominately affects postmenopausal women and is characterized by a decrease in hair density over the crown and frontal scalp. The aim of this study was a clinical and trichoscopic evaluation of topical minoxidil 2% solution in treatment of female pattern hair loss. **Methods:** A clinical trial was done with twenty patients with female pattern hair loss. The studied patients were treated with minoxidil 2% topical solution twice daily for six months. A clinical and trichoscopic examination were done before starting treatment and every two months with photo-documentation, and scoring of disease severity using Ludwig Scale. **Results:** Regarding hair growth, a significant difference was detected between baseline and both 4 and 6 months. 55% of studied patients reported side effects. **Conclusion:** Minoxidil stimulates hair growth after 4 months of treatment but with side effects as dermatitis and hypertrichosis.

Keywords: Minoxidil, FPHL, Alopecia, Trichoscopy

INTRODUCTION

Female pattern hair loss (FPHL) is a progressively popular problem in women **[1]**. FPHL is characterised by the production of finer and shorter hairs due to progressive miniaturisation of hair follicles, thus fine vellus hairs are produced instead of thicker terminal hairs **[2]**.

Minoxidil is a potassium channel agonist vasodilator that is used systemically as an anti-hypertensive drug. This vasodilatory action may illustrate the effect of topical minoxidil on stimulating hair growth **[3]**. Twice-daily application of 1 ml of topical minoxidil 2% solution is accepted by the Food and Drug Administration for female pattern hair loss (FPHL) **[4]**. It is recognized that minoxidil increases the anagen phase, prompts hair growth rate and decreases the telogen phase of the hair cycle through augmented proliferative, vasodilatory and anti-inflammatory actions **[5]**.

METHODS

Study design: A clinical Trial

The Institutional Review Board and ethical committees of Zagazig University Hospitals approved this study. All subjects gave a written informed consent before enrollment in this work.

This study was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

This study was carried out at Dermatology, Venereology & Andrology Department; Faculty of medicine, Zagazig University Hospitals. Twenty female pattern hair loss patients were included in this study. These patients were treated with topical application of minoxidil solution 2%. The patients applied 1 ml of the solution twice daily for six months. Scoring of disease severity using Ludwig Scale.

A detailed history, clinical examination and trichoscopic examination were done for every case before starting treatment & every two months with photo-documentation. Exclusion of pregnant or lactating as well as patients who had used any hair restoring treatment within the last 6 months was also done.

Trichoscopy with a polarized dermoscope (Dermlite, HÜD model) at 10-fold

magnification was performed at hair loss areas in the frontal area in all patients as well as at the occipital area.

Statistical analysis

The collected data were computerized and statistically analyzed using SPSS program (Statistical Package for Social Science) version **18.0**. Chi square test was used to calculate difference between qualitative variables. Quantitative data were expressed as mean ± SD (Standard deviation). The following tests were also used; Mcnemmar test and Mann whitney test. Mann whitney test was used to calculate difference between quantitative variables. Mcnemmar test was used to find difference between qualitative data in the same group at different time. P-value < 0.05 was considered statistically significant.

RESULTS

There were statistical significance difference between baseline and both 4 and 6 months after treatment with minoxidil. The majority of the studied patients were stage II (80%) and (20%) of patients were stage III. After 4 months of treatment, the majority of patients were stage I (80%) and (20%) of patients were stage II. After 6 months of treatment, the majority of patients were stage I (80%) and (20%) of patients were normal as shown in **(Table 1).**

As regard trichoscopic findings, there were highly statistical significance difference between baseline and both 4 and 6 months. All of the studied patients had hair shaft thickness heterogeneity and brown peripilar sign, (75%) of patients had focal atrichia and (20%) of patients had yellow dots. After 4 months of treatment, all of patients had hair shaft thickness heterogeneity, (45%) of patients had brown peripilar sign and (10%) of patients had focal atrichia. After 6 months of treatment, a percentage of (80%) of patients had hair shaft thickness heterogeneity, (5%) of patients had brown peripilar sign and (20%) of patients were normal as shown in **(Table 2).**

Finally, there were increase in frequency of side effects among the studied patients as shown in **(Fig. 1).**

Table 1. Ludwig scale for studied patients at different times:

Variable	Minoxidil 2% (*n*=20)	
	No	**%**
Ludwig scale: (baseline)		
Stage I	0	0
Stage II	16	80
Stage III	4	20
Ludwig scale: (after 2 months)		
Stage I	0	0
Stage II	16	80
Stage III	4	20
Ludwig scale: (after 4 months)		
Stage I	16	80
Stage II	4	20
Stage III	0	0
Ludwig scale: (after 6 months)		
Normal	4	20
Stage I	16	80
Stage II	0	0
$P^{1\#}$	1 NS	
$P^{2\#}$	**<0.001****	
$P^{3\#}$	**<0.001****	

χ^2: Chi square test #: Mcnemmar test

P1: Baseline versus month 2 P2: Baseline versus month 4 P3: Baseline versus month 6

NS: Non significan0t (P>0.05) *: Significant (P<0.05) **: Highly significant (P<0.01)

Table 2. Trichoscopic findings for studied patients at different times:

Variable	Minoxidil 2% (*n*=20)	
	No	**%**
Trichoscopic: (baseline)		
Hair shaft thickness heterogeneity	20	100
Brown peripilar sign	20	100
Focal atrichia	15	75
Yellow dots	4	20
Trichoscopic: (after 2 months)		
Hair shaft thickness heterogeneity	20	100
Brown peripilar sign	16	80
Focal atrichia	7	35
Yellow dots	1	5
Trichoscopic: (after 4 months)		
Hair shaft thickness heterogeneity	20	100
Brown peripilar sign	9	45
Focal atrichia	2	10
Yellow dots	0	0
Trichoscopic: (after 6 months)		
Normal	4	20
Hair shaft thickness heterogeneity	16	80
Brown peripilar sign	1	5
Focal atrichia	0	0
Yellow dots	0	0
$P^{1\#}$	0.99 NS	
$P^{2\#}$	**0.008****	
$P^{3\#}$	**<0.001****	

χ^2: Chi square test #: Mcnemmar test NS: Non significan0t (P>0.05) **: Highly significant (P<0.01)

P1: Baseline versus month 2 P2: Baseline versus month 4 P3: Baseline versus month 6

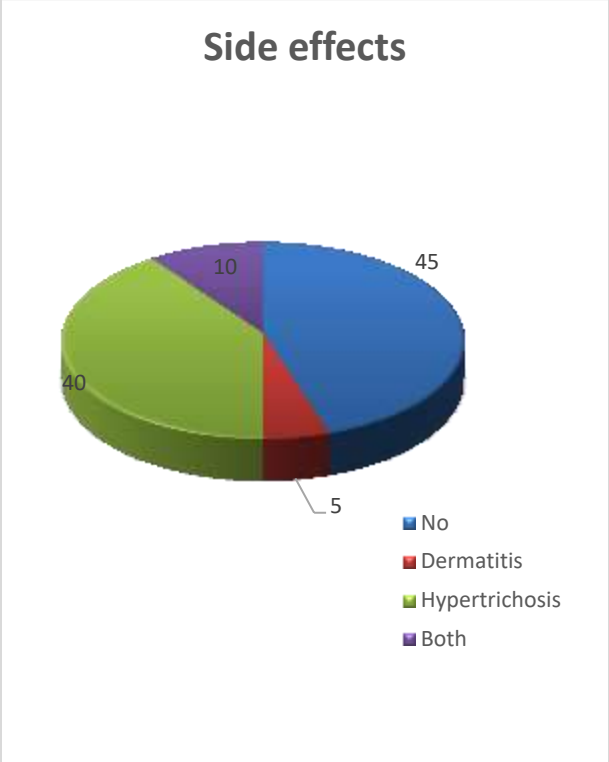

Figure 1. Frequency of different side effects among the studied patients.

Fig. 1. *shows also that* there were increase in frequency of side effects among the studied patients.

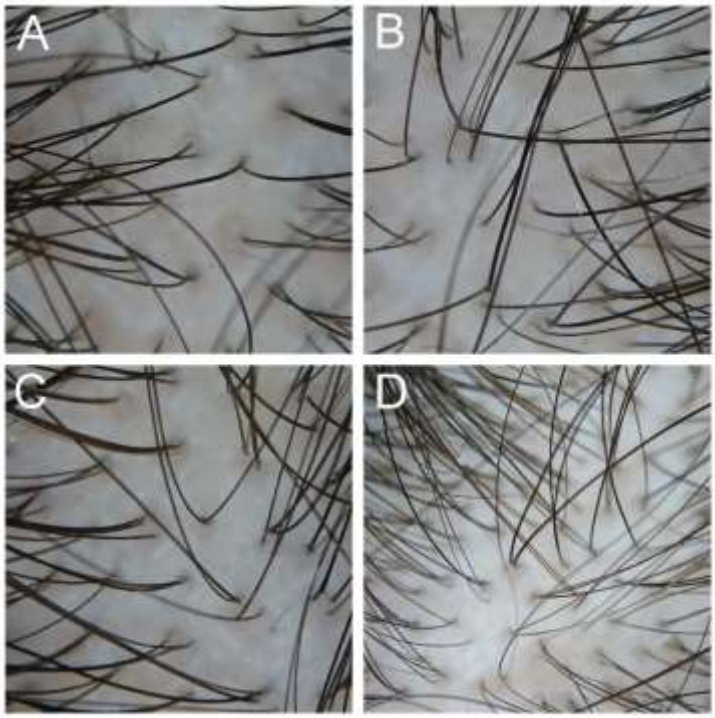

Fig. 2. Clinical findings (black alphabet letters) and trichoscopic findings (white alphabet letters) of patient 1 treated with minoxidil. (A) Baseline. (B) Month 2. (C) Month 4. (D) Month 6.

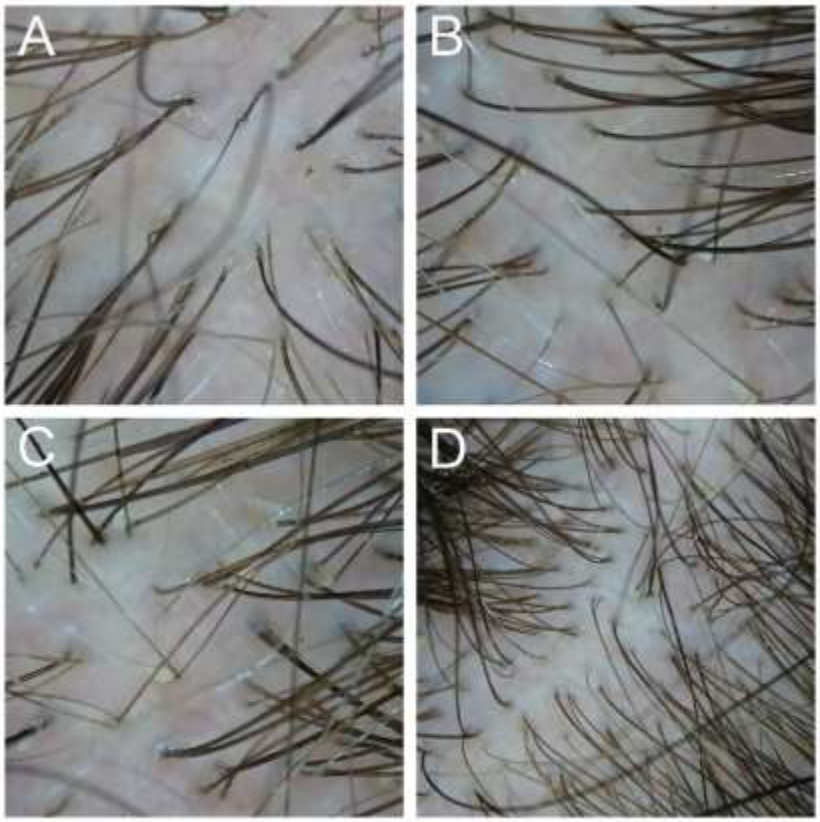

Fig. 3. Clinical findings (black alphabet letters) and trichoscopic findings (white alphabet letters) of patient 2 treated with minoxidil. (A) Baseline. (B) Month 2. (C) Month 4. (D) Month 6.

DISCUSSION

FPHL is the most common type of hair loss in women. Hormonal factors and genetic predisposition are involved in the cause of FPHL. In women with FPHL, the local conversion of testosterone into dihydrotestosterone in the hair follicles is supposed to initiate terminal to vellus transformation **[6]**.

The contribution of a genetic and metabolic androgen imbalance in FPHL may be locally exacerbated at the pilosebaceous unit level by cytokines and pro-inflammatory mediators. Some authors call the implication of various activators of inflammation in the etiology of androgenetic alopecia (AGA) as microinflammation. Perifollicular microinflammation may explain some cases of AGA, which do not respond to topical minoxidil **[7].**

Topical minoxidil solution is approved by the Food and Drug Administration (FDA) for FPHL but contact dermatitis and facial hypertrichosis are common side effects **[8]**.

The aim of this study is a clinical and trichoscopic evaluation of topical minoxidil 2% solution in treatment of female pattern hair loss.

In the current study, twenty female pattern hair loss patients were included. These patients were treated with topical application of minoxidil solution 2%. The patients applied 1 ml of the solution twice daily for six months.

A detailed history, clinical examination and trichoscopic examination were done for every case before starting treatment & every two months with photo-documentation. Exclusion of pregnant or lactating as well as patients who had used any hair restoring treatment within the last 6 months was also done.

Trichoscopic examination evaluated include percentage of hair shaft thickness heterogeneity, brown peripilar sign, focal atrichia and yellow dots.

In our work as regard trichoscopic findings, there were highly statistical significance

difference between baseline and both 4 and 6 months. The improvement in trichoscopic findings was significantly evident from month 4.

In the present work as regard Ludwig scale, there were highly statistical significance difference between baseline and both 4 and 6 months. We observed that there was a significant increase in hair growth in patients treated with topical minoxidil solution.

Earlier to the present study, **Jacobs et al. [9]** found that topical minoxidil solution was significantly more effective than placebo in the treatment of FPHL and no serious side effects were reported during the study.

Lucky et al. [10] found that topical minoxidil 5% was superior to topical minoxidil 2% and placebo in the treatment of FPHL but an increased occurrence of side effects was reported with topical minoxidil 5% versus topical minoxidil 2%.

However, we found that the frequency of side effects among the sudied patients are evident. A percentage of (55%) of them reported side effects as dermatitis and hypertrichosis

La Placa et al. [11] reported also that patients treated with topical minoxidil solution developed allergic contact dermatitis, psoriasiform scalp dermatitis and severe telogen effluvium.

In the present work, we have found that topical 2% minoxidil solution promotes hair growth but with side effects as dermatitis and hypertrichosis. This finding provides more evidence of how topical minoxidil solution is effective therapy in treatment of female pattern hair loss.

CONCLUSION

In this study regarding hair growth, a significant difference was detected between baseline and both 4 and 6 months. 55% of studied patients reported side effects.

The analysis of the above data suggests that topical minoxidil can induce a siginificant trichogenic effect in FPHL after 4 months of treatment but with frequent side effects.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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