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## The Effect of Minoxidil 1% Shampoo On Androgenetic Alopecia: A Clinical Trial Study.

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### ABSTRACT

This double-blind clinical trial was conducted on 60 patients with hair loss referring to the clinic or private office in 2015 to investigate the therapeutic effects of Minoxidil 1% shampoo on hair loss in people with alopecia. Patients who had inclusion criteria were randomly divided in two intervention and control groups. In the intervention group minoxidil 1% shampoo was used on every other day for 4 months. In the control group, placebo-shampoo (quite "similar to the shampoo which was used in intervention group) was given. The average number of vellus hair before intervention was  $10.4 \pm 10.1$  that after three months of the intervention was increased to  $12.3 \pm 9.1$ , also it was increased in the control group from  $8.5 \pm 6.5$  to  $9.6 \pm 5.8$ , but there was no significant differences between two groups ( $p=0.19$ ). Also the number of terminal hair in the intervention group before using Minoxidil 1% shampoo was  $24.2 \pm 21.0$  that after the four months of intervention reached to  $26.9 \pm 21.9$ , it was increased in the control group from  $22.9 \pm 16.1$  to  $23.1 \pm 16.1$ , but there was no significant differences between two groups ( $p=0.27$ ). Although Minoxidil shampoo has positive effects in improving patients, but to draw conclusions about the efficacy of Minoxidil shampoo three months is a short time and long-term studies are necessary.

**Keywords:** Minoxidil, Alopecia Areata, Hair growth

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## INTRODUCTION

In public relations and psychological aspects, hair is a symbol of youth, health and fertility. Hair loss has unthinkable effect on self-confidence, interpersonal relations, and social status of an individual [1]. In the usual form, androgenic alopecia occurs in parietal and Fronto-vertical regions, but hairline remains in frontal region [2].

In addition to covering role of the hair, especially in women it has great importance role in human beauty, and sometimes its loss causes a variety of mental illness. Androgenetic alopecia is among the causes of hair loss and many of its topical treatments leads to severe side effects such as skin irritation. Therefore, selecting a safe treatment with a significant improvement has always been considered [3].

Male hair loss in men initially caused frontal thinning hair along with similar changes at the top of the head, but in severe cases can cause complete alopecia of the scalp. This disease can occur in women with less severity and total baldness is very rare [4].

Hair loss in men is often a characteristic related to age and occurs more frequently with increasing age, so that 30% of them in 30 years of age and 50% of them in 50 years or more of age are suffering from hair loss [5].

The relationship between androgens and hair loss in men is identified. The pathophysiology of hair loss in women is unknown and also the role of androgens in female hair loss is not as clear as in men. Hair loss pattern in men and women is different [6]. A study in Japan showed that hair follicle biology of Japanese women plays a role in androgenic alopecia and decreasing hair density is affected by increasing the number of single follicular hair [7]. In men usually there is no hormonal disorder and hair loss is a result of enzyme 5-alpha activity and down regulation of dihydrotestosterone [8].

Recommended treatment for androgenic alopecia includes Minoxidil, hormonal therapy such as topical and oral anti-androgens or products containing topical progesterone [9]. Minoxidil 1 to 5% is used as a treatment method but its disadvantage is long duration treatment (8). Finasteride is including medicines which are used orally or locally. The medicine inhibiting 5-alpha-reductase enzyme prevents the conversion of testosterone to dihydrotestosterone and reduces hair loss [10].

The frequency of hair loss in a study in Iran was 39.6%, and for Chinese men and women was 21.3% of 6% respectively [5, 11].

Since the use of shampoos minoxidil is easy for people with androgenic alopecia, in this study the therapeutic effects shampoo minoxidil on hair loss has been studied in patients with androgenetic alopecia.

## MATERIAL AND METHODS

This study was a double-blind clinical trial which was conducted on patients with androgenic hair loss referring to the clinic or private office in 2015. The sample size of this study with 95% confidence interval and 80% power determined as 35 patients in each group. Patients were selected using block randomized sampling and divided in two intervention and control groups.

Inclusion criteria were included patients 15 to 40 years of age and written consent. Exclusion criteria were included hair loss due to underlying disease (Malnutrition, diabetes, hypertension, thyroid disease, Telogen effluvium), using drugs that cause hair loss in the past month, the treatment of hair loss in the last six months and lack of scarring hair loss. Patients who had inclusion criteria were randomly divided in two intervention and control groups. Patients and physician were not aware of grouping.

Both intervention and control groups received standard treatment for hair loss as well as minoxidil 1% shampoo in the intervention group (manufactured by Sheda Kish Company) was used on every other day for 4 months. In the control group, placebo-shampoo (packages of minoxidil shampoo and placebo shampoo were quite similar) was given. Patient and physician were not aware whether shampoo or placebo is used (double-blind).

Shampoo usage: Total surface of the head was washed and massaged with shampoo and after 3 to 5 minutes was rinsed.

Patients in both intervention and control groups were examined at baseline (first visit) and then on a monthly basis (5 times) also they were follow-up in order to check right performance of the shampoo and the improvement of hair loss treatment by dermatologist.

To determine the treatment response, templates which were designed with the dimensions of 10 cm were used that placed on the site. At least 3 squares were selected randomly . The site diameter, total hair, average number of terminal and Volos hair was counted ,mean was taken and recorded on the form [12].

Also complications caused by the drug, including erythema, desquamation, skin dryness burning or itching was evaluated .After 4 months, the process of treatment and recovery rate of hair loss in both groups was evaluated and recorded by dermatologist.

Data were analyzed using statistical software SPSS Ver. 18 and descriptive and analytical statistics (chi-square tests, t-test and analysis of variance for repeated measurements).

This study is approved by the Ethics Committee of Kurdistan University of Medical Sciences and is registered Iranian Clinical Trial Registry under IRCT2013031112563N3 code.

**RESULTS AND DISCUSSION**

The findings of the study showed that there were no significant differences between participants in both groups in terms of occupation, marital status, and use of hair dryers, hair gel, hair straightened and read of head washing.

Family history of hair loss in both groups was about 80%. Stress rate in the intervention group was 70% and in the control group was 80%. Alopecia severity was also similar in both groups (Table 1). The mean age of intervention group was 26.3 years and in the control group was 24.2 years (p=0.11). In terms of disease duration there was no significant difference (p=0.11).The extent of alopecia lesion in the intervention group was 7.3 cm and in patients of control group was 6.8 cm (p=0.63). The calculated stress score in the intervention group was 142.7 and 141.4 in the control group (p=0.96) (Table 2).

**Table1: Comparison of variables between study groups**

Variables		Intervention Group N(%)	Control Group N(%)	P
<b>Occupation</b>	Business	11(36.7)	9(30)	0.74
	Employee	6(20)	5(16.6)	
	Student	13(43.3)	16(53.4)	
<b>Marital status</b>	Single	20(66.7)	25(83.3)	0.14
	Married	10(33.3)	5(16.7)	
<b>Use of hair dryers</b>	Sometimes	6(20)	3(10)	0.58
	Repeatedly	6(20)	8(26.7)	
	No	18(60)	19(63.7)	
<b>Use of hair gel</b>	Sometimes	2(6.7)	7(23.3)	0.48
	Repeatedly	6(20)	1(3.3)	
	No	22(73.3)	22(73.3)	
<b>Use of hair straightener</b>	Sometimes	2(6.7)	2(6.7)	0.99
	Repeatedly	1(3.3)	1(3.3)	
	No	27(90)	27(90)	
<b>Use of hair Wax</b>	Sometimes	4(13.3)	3(10)	0.89
	Repeatedly	5(16.7)	6(20)	
	No	21(70)	21(70)	
<b>The read of head washing</b>	two times	3(10)	3(10)	0.43
	Three times	14(46.7)	18(60)	
	Four times & more	13(43.4)	9(30)	

<b>Family History</b>	Yes	24(80)	25(83.3)	0.74
	No	6(20)	5(16.7)	
<b>Stress</b>	Yes	21(70)	24(80)	0.37
	No	9(30)	6(20)	
<b>Severity of lesion classification BASP</b>	Tape M	18(60)	15(48.3)	0.72
	Tape C	10(33.4)	12(34.5)	
	Tape U	2(6.6)	3(17.2)	

**Table2: The Comparison of the mean of quantitative variables in the two groups**

quantitative variables	Intervention Group Mean & SD	Control Group Mean & SD	t*	P
<b>Age (years)</b>	26.3 ± 5.1	24.2 ± 4.7	1.6	0.11
<b>Duration of disease (months)</b>	23.5 ± 18.2	31.7 ± 21.1	-1.6	0.11
<b>Extent of the lesion (Cm<sup>2</sup>)</b>	7.3 ± 3.4	6.8 ± 3.5	0.49	0.63
<b>Stress Score</b>	142.7± 89.7	141.4 ± 119.9	0.05	0.96

• \*T-test

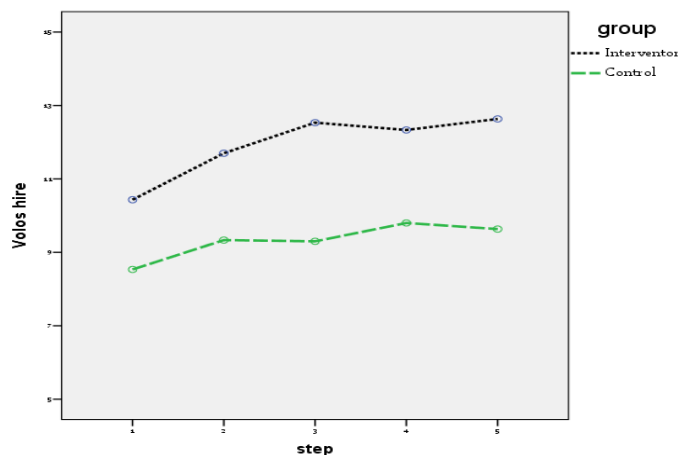
The average number of vellus hair before intervention was  $10.4 \pm 10.1$  that after 4 months of the intervention was increased to  $12.6 \pm 9.0$ , also it was increased in the control group from  $8.5 \pm 6.5$  to  $9.6 \pm 5.8$ , but there was no significant differences between two groups ( $p=0.19$ ).

The number of terminal hair in the intervention group before using Minoxidil 1% shampoo was  $24.2 \pm 21.0$  that after the three-month of intervention reached to  $26.9 \pm 21.9$ , also it was increased in the control group from  $22.9 \pm 16.1$  to  $22.8 \pm 15.7$ , but there was no significant differences between two groups ( $p=0.27$ ) (Table 3 & Chart 1 and 2). No complication was found in both groups.

**Table3: The Comparison of the average of hair Vellus and terminal hair during the Study in both groups**

Variables		Intervention Group Mean & SD	Control Group Mean & SD	F*	P
<b>Number of Vellus Hair</b>	Before Intervention	10.4 ± 10.1	8.5 ± 6.5	1.72	0.19
	One Month Later	11.7 ± 9.5	9.3 ± 7.0		
	Two Month Later	12.5 ± 9.9	9.3 ± 6.3		
	Three Month Later	12.3 ± 9.1	9.6 ± 6.0		
	four Month Later	12.6 ± 9.0	9.6 ± 5.8		
<b>Number of terminal Hair</b>	Before Intervention	24.2 ± 21.0	22.9 ± 16.1	0.61	0.27
	One Month Later	24.5 ± 20.8	23.1 ± 14.7		
	Two Month Later	25.5 ± 21.1	22.8 ± 15.5		
	Three Month Later	26.2 ± 20.9	23.1 ± 16.1		
	four Month Later	26.9 ± 21.9	22.8 ± 15.7		

• Analysis of variance for repeated measurements



**Figure 1: Flow diagram of the progress through the phases of a two-group parallel randomized trial**

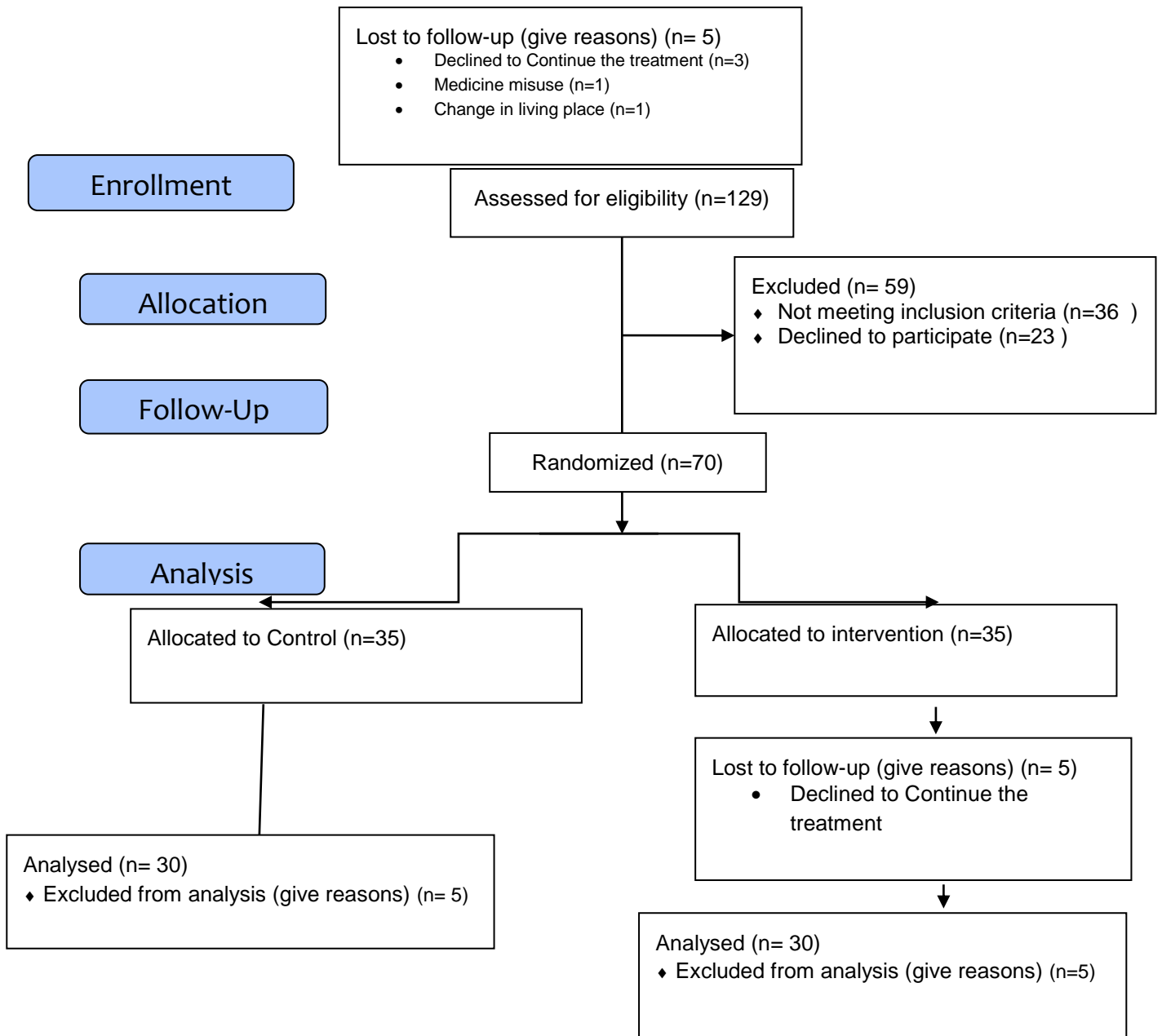


Chart 1: Average number of vellus hairs in both groups during the study

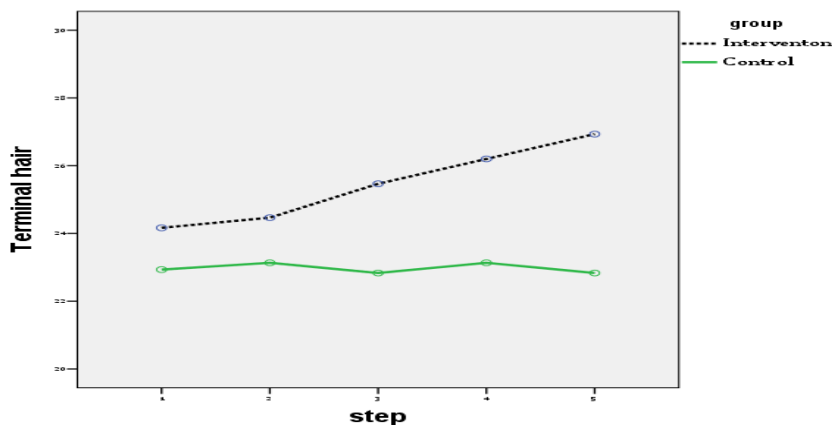


Chart 2: Average number of terminal hairs in both groups during the study

The results of this study showed that there were not statistically significant differences between participants in the two groups in terms of demographic characteristics, hair care, family history, stress, disease duration and severity.

In our study, the average number of vellus hairs before intervention in intervention group was  $10.4 \pm 10.1$  and after the end of the 4 month period increased to  $12.6 \pm 9.0$ , also in the control group it was increased from  $8.5 \pm 6.5$  to  $9.6 \pm 5.8$ , but there were not statistically significant differences between two groups ( $p=0.19$ ). Also the number of terminal hair in the intervention group before using minoxidil 1% shampoo was  $24.2 \pm 21.0$  that after the three months of intervention reached to  $26.9 \pm 21.9$ , it was increased in the control group from  $22.9 \pm 16.1$  to  $22.8 \pm 15.7$ , but there was no significant differences between two groups ( $p=0.27$ ). Although the difference was not significant, but average number of Vellus and terminal hairs in patients who used Minoxidil 1% shampoo during three months of intervention was an upward trend. While in control group upward trend was not observed especially in terminal hair. In this study the intervention duration was 3 months, if the duration of treatment would increased the impact of intervention may be better assessed.

In Hu et al study 59% of the patients who used Minoxidil 5% were improved [13]. In Lucky et al study after 48 weeks of treatment, number of hair and hair growth in Minoxidil 2% group was more effective than the placebo group. Also Minoxidil 5% was significantly more effective on hair growth than Minoxidil 2% [14].

In Bouzari et al study after 4 months of treatment the improvement in hair loss, hair growth and number of hairs in the treated with Minoxidil 2% group were 81.6%, 56% and 156 respectively [15]. In Babaii Negad et al study who used Minoxidil 2% for the treatment of grade one hair loss in women, during one year 85.7% of patients had a significant reduction of hair loss and 14.3% had relative pause in hair loss [16]. In a double blind study the effect of Minoxidil topical solution 1% in the treatment of alopecia areata was significantly better than placebo [11]. Also in Price Study, Minoxidil has been effective in 40% of the patients [17].

Arca showed that finasteride in 80% and topical Minoxidil 5% in 52% were effective in the treatment of mild to severe androgenic alopecia [18]. Shin et al demonstrated the efficacy and safety of the combination of Minoxidil 5% and tretinoin 0.01% once-daily for treatment of AGA is better than Minoxidil 5% twice daily [19]. In Berger et al study results showed that increase in the number of visible hair for shampoo pyrithione zinc 1%, and minoxidil 5% topical solution in the combination group compared to the placebo shampoo group after 9 weeks of treatment was significant. No advantage was found using a combination of topical Minoxidil 5% and pyrithione zinc 1%. Overall assessment and observing patients was in favor of Minoxidil 5%. Hair counting results with daily use of shampoo pyrithione zinc 1% over a 26 week period of treatment showed Moderate and sustained improvement in hair growth [20].

In van Zuuren et al review study a wide range of interventions, in eleven studies with different concentrations of Minoxidil were evaluated. Information obtained from 4 studies showed that participants treated with Minoxidil had more moderate increase in hair regrowth compared to placebo. Also in seven studies, increased hair 13.28 per square centimeter was observed in the Minoxidil group compared to placebo [21].

During our study no complications were observed in the two groups. In Lucky Study itching, local irritation, and hypertrichosis in topical minoxidil 5% was more than topical minoxidil 2% compared with the placebo group [17]. In Van Zuuren review study there were no significant differences in terms of complications in minoxidil twice a day, except the extra hair growth in other areas of the scalp with minoxidil 5% [21].

## CONCLUSION

Although Minoxidil shampoo has positive effects in improving patients, but to draw conclusions about the efficacy of Minoxidil shampoo four months is a short time and long-term studies are necessary.

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