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Development and Evaluation of Polyherbal Formulations for Hair Growth Potential

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ABSTRACT

The present study is an effort to formulate and evaluate hair growth promoting activity of three polyherbal formulations. Polyherbal formulations were prepared using extract of Cicer arietinum Linn., Ocimum sanctum Linn. and Cyperus rotundus Linn. in various ratios to obtained the best formulation The extract incorporated into cream were applied topically on shaved skin of rats and primary skin irritation test, hair growth initiation time, completion time, hair length and diameter were recorded. The ratio of Cicer arietinum Linn., Ocimum sanctum Linn. and Cyperus rotundus Linn. in 1:2:3 showed excellent hair growth activity comparable to standard.

Keywords: Alopecia, Polyherbal, Hair growth, Herbal formulation.

INTRODUCTION

Alopecia is a universal problem, having affected both sexes of all races to different extents for as long as mankind has existed. It has been suggested that alopecia could have an adverse effect on physiological life and self esteem between both the genders (1). Alopecia effects approximately 50% of men over 40 years of age and may also affect just as many as women. The majority of men and women (90%) or more want to reverse, halt hair loss. Alopecia is a synonym of baldness, involves absence or loss of hair, especially of the head. Androgens are well known to cause regression and balding on the scalp in genetically disposed individuals. Alopecia has also been observed as major side effect of anticancer drugs, immunosuppressant and many other drug treatments. Minoxidil, a drug of scientific origin was scientifically proved for the treatment of alopecia (2). Though the side effect associated with this drug has limited its pharmacological benefits hence the drug of plant origin is necessary to replace the synthetic one. India is a repository of medicinal plants (3–4). Besides healthcare, herbs are also used for beautification of the body and for preparation of various cosmetics (5). In traditional system of medicine, many plants and herbal formulations are reported for hair growth promotion (6–10) but lack of sound scientific backing and information limits their use.

The present study is an effort to formulate and evaluate hair growth promoting activity of polyherbal formulation, which include various concentrations of Cicer arietinum Linn., Ocimum sanctum Linn. and Cyperus rotundus Linn. The herbs Cicer arietinum Linn and Cyperus rotundus Linn. were selected on the basis of their traditional use (11–12) and Ocimum sanctum Linn. was selected based on its anti-androgenic property (13).

MATERIALS AND METHODS

Plant material

The leaves of Cicer arietinum Linn., whole plant of Ocimum sanctum Linn. and roots of Cyperus rotundus Linn. were collected in the month of October locally from Bhopal. The plants were authenticated at Department of Pharmacy, Barkatullah University, Bhopal. The plants were dried under shade.

Extraction

Dried powered drug were taken and maceration was done by keeping them in 95% alcohol for 7 days with occasional stirring. After filtration, double maceration was done for next three days with 95% alcohol. The solvent was removed under reduced pressure and the extract obtained was air dried.

Formulation

Herbal hair creams were prepared by fusion method using o/w type base (14). The formula of base contains glyceryl mono stearate 9% w/w, liquid paraffin (light) 20% w/w, cetyl alcohol 15% w/w, beeswax 15% w/w, propyl and methyl paraben 0.15% w/w, glycerol 4.5% w/w and water 59% w/w. The 5% extract mixture of Cicer arietinum Linn., Ocimum sanctum Linn. and Cyperus rotundus Linn. in various ratio as shown in Table 1 were incorporated in the base to obtain 5% herbal cream F_1, F_2, and F_3 respectively.

Animals

Albino rats, weighing 120- 150 g were used for hair growth activity. The study was approved by Institutional Animal Ethical Committee, Barkatullaha University, Bhopal. Animals were placed in cages and kept in standard environmental conditions, fed with standard diet ad libitum and allowed free access to drinking water. The prepared formulations were assessed for hair growth studies.

Primary skin irritation test

The rats were divided into five groups of six rats each. A 4cm^2 area of dorsal portion of all the rats were shaved and wiped with surgical spirit. Measured quantity of formulation of F_1, F_2, and F_3 were applied over the site. The test sites were observed for erythema and edema for 48 h after application (15).

Table 1. Various ratios of extract for formulations

Formulation	Cicer arietinum Linn	Ocimum sanctum Linn	Cyperus rotundus Linn
F1	1	2	3
F2	2	3	1
F3	3	1	2

Hair growth activity

The rats were divided into five groups of six rats each. A 4 cm^2 area of dorsal portion of all the rats were shaved and wiped with surgical spirit. Hair remover was also applied over the shaved area to assure the removal of trace of hairs from denuded area. Group1 was kept as control, where there was no drug treatment. Group2 was treated as standard, where 2% minoxidil lotion (Mintop) was applied over the shaved area, once a day. The animals of remaining groups were given application of 5% cream of formulation, F_1, F_2 and F_3 respectively. The treatment was continued for 30 days during which time, hair growth initiation (minimum time to initiate hair growth on denuded skin region) and completion time (time taken to completely cover the denuded skin region with new hair) were recorded for each group of animals (16). Hair was plucked randomly from the shaved area of selected rats, from each group on 10th, 20th and 30th day of the treatment and length and diameter of 24 hairs was measured (17). The average length and diameter were determined. The determination and evaluation of these parameters have been considered as vital for accomplishment of hair growth. It is considered that these parameters are accomplishing the concept of hair growth.

RESULTS AND DISCUSSION

Primary skin irritation test

This test was conducted to evaluate the irritancy of the prepared formulations on intact skin of rats. None of the prepared formulations showed any erthyema or edema, indicating that the prepared formulations were non-irritant on the skin of rats.

Hair growth activity

In control group animals, initiation of hair growth in denuded area was observed in second week. Hair growth initiation was noted in the first week in rats of minoxidil treated standard group. The formulation F_3 exhibited hair growth initiation on 7th day and F_2 on 9th day whereas with formulation F_1, hair growth initiation time was reduced to 4th day. Similarly the time taken for complete hair growth on shaved area was affected with minoxidil treatment as well as treatment with formulations. Complete hair growth with minoxidil and control group was observed in 20 and 24 days respectively. In formulation F_2

Table 2. Effect of various formulations on hair growth initiation and completion time of albino rats

Compound Name	Initiation Time (in days)	Completion Time (in days)
Control	10.67 ±1.37	24.83 ± 2.14
Standard	6.17 ± 1.47**	20.00 ± 2.61**
F_1	4.17 ± 1.17**	18.17 ± 1.47**
F_2	9.17 ± 1.47	22.83 ± 1.60
F_3	6.83 ± 1.47**	19.83 ± 1.72**

Value are mean ± S.D. ;

** P<0.01,*

**P<0.001, When compare to control value by student's t-test (n = 6 animals)

Table 3. Effect of various formulations on hair length of albino rats

Compound Name	Length of hair in mm		
	10 Days	20 Days	30 Days
Control	3.00 ± 0.72	6.17 ± 0.76	7.54 ± 0.83
Standard	3.46 ± 0.59 *	6.79 ± 0.98 *	8.5 ± 1.10 **
F_1	4.08 ± 0.72 ***	7.33 ± 1.2**	9.08 ± 1.14***
F_2	3.29 ± 0.69	6.46 ± 1.06	7.88 ± 1.15
F_3	3.67 ± 0.70**	6.96 ± 1.23*	8.38 ± 1.28 **

Value are mean ± S.D.

**P<0.05;*

***P<0.01;*

****P<0.001; When compare to control value by student's t-test (n = 24 hairs)*

Table 4. Effect of various formulations on hair length of albino rats

Compound Name	Diameter of hair in mm		
	10 Days	20 Days	30 Days
Control	0.0192±0.0065	0.0233±0.007	0.0279±0.0066
Standard	0.0246±0.0083*	0.0358±0.0102 ***	0.0458±0.0102***
F_1	0.0271±0.0127**	0.0383±0.0096***	0.0479±0.0093***
F_2	0.0208±0.0097	0.0254±0.0078	0.0304±0.0069
F_3	0.0254±0.0078**	0.0350± 0.006***	0.0408±0.0102 ***

Value are mean ± S.D.

**P<0.05;*

***P<0.01;*

****P<0.001; When compare to control value by student's t-test (n = 24 hairs)*

complete hair growth occurred after 22 days, in F_3 after 19 days, and in F_1 it was reduced to 18 days (Table 2). In comparison to control for formulation F_1 the whole denuded area was covered with hair during the 4th week (Fig. 1). The experiment thus clearly demonstrates hair growth promoting activity in the developed formulations. The length of the hair began to increase until the end of the treatment course (Table 3). The formulation F_1 produced a greater effect on the length of hair when compare to other group being 9.08 mm at the end of the course, compare to 7.88 mm in the F_2, 8.38 mm in F_3 and 8.5 mm in standard. This may be due to the premature

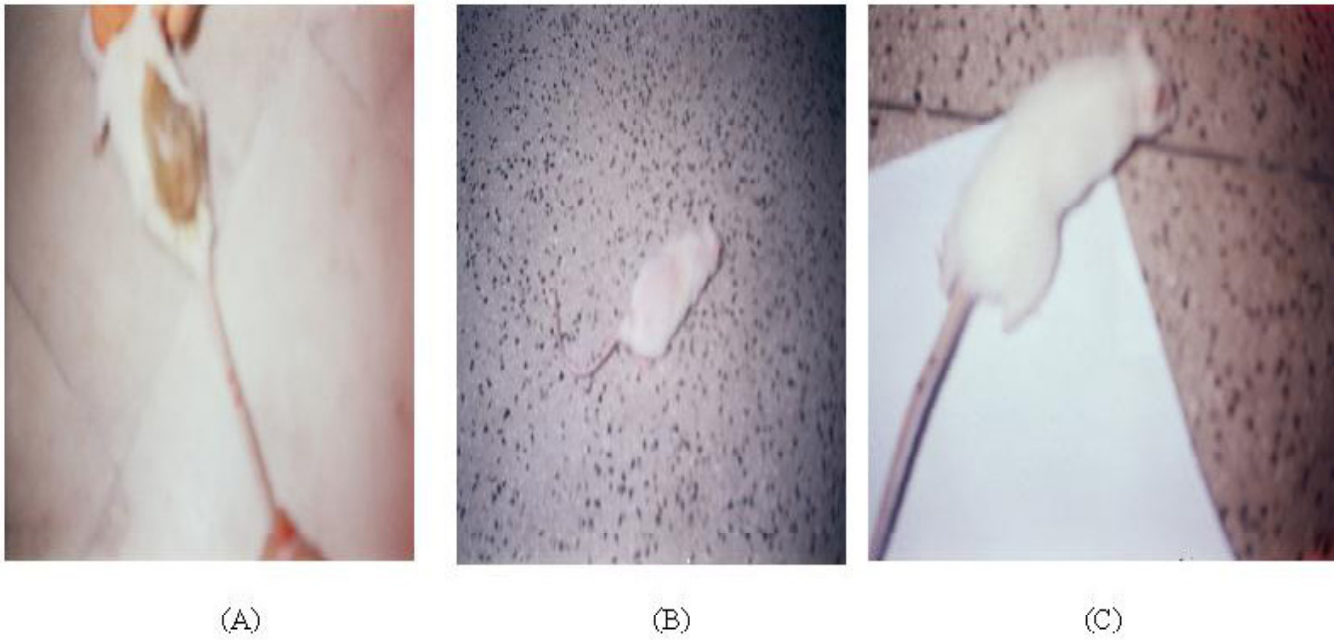

Figure 1: (A) Initially shaved albino rat (B) Control group after 30 days (C) Albino rat treated with formulation F1 for 30 days showing complete hair growth.

switching of follicles from the telogen to anagen phase of hair growth cycle (18). On 30th day, in control animal diameter of hair was found 0.0279 mm, in standard it was 0.0458 mm, in formulation F_2 and F_3 it was 0.0304 mm and 0.0408 mm respectively, but in formulation F_1, it was highest around 0.0479 mm (Table 4).

CONCLUSION

Among the various formulations, the formulation F_1, showed better growth initiation and hair growth completion time at the same time formulation F_1, showed remarkable improvement in hair length and diameter compare to control, standard and other formulations. Hence it can be concluded that the extract combination F_1 proved excellent growth activity and the formulation F_1, might be hold a promise of potential herbal alternative for synthetic drugs used for alopecia.

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