

EVALUATING HAIR GROWTH POTENTIAL OF SOME TRADITIONAL HERBS

Jain PK^{1*}, Dass DJ²

¹Faculty of Pharmacy, Naraina Vidyapeeth Group of Institutions, Kanpur, Uttar Pradesh, India. ²School of Pharmaceutical Sciences, Siksha 'O' Anusandhan University, Bhubaneswar, Odisha, India. E-mail: jainpk1443@gmail.com

Received: 21 July 2015, Revised and Accepted: 07 September 2015

ABSTRACT

Objective: The present study was carried out in order to study the hair growth activity of some traditional herbal medicinal plants. Herbal traditional drugs are used frequently in therapeutics; more often their chief principles are employed in a more specific manner.

Method: *Centella asiatica*, *Cyperus rotundus* & *Emblica officinalis* alcoholic and aqueous extract were prepared and evaluated for the hair growth properties using albino rats. The hair growth formulation was formulated as hair oil and applied topically on shaved skin of rats. Primary skin irritation test, hair length, hair density test were performed. The hair growth-promoting efficacies were evaluated at 0 day, 10 days, 15 days, and 20 days after the application through the hair re-growth area significant hair growth was observed and the hair growth was compared with the standard drug used 2% solution of minoxidil.

Result: The result revealed that the hair growth activity of each drug was found proportional to the concentration range tested and compared with standard (2% minoxidil ethanolic solution) by an enlargement of follicular size and prolongation of the anagen phase. It holds the promise of potent herbal alternative for minoxidil.

Conclusion: Excellent results of hair growth were observed in formulations prepared by cloth pouch decoction method for preparation of hair oils.

Keywords: *Centella asiatica*, *Cyperus rotundus*, *Emblica officinalis*, hair oil, hair growth, hair length, % minoxidil.

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. 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.

Besides healthcare, herbs are also used for beautification of the body and for the preparation of various cosmetics. In the traditional system of medicine, many plants and herbal formulations are reported for hair growth promotion but the lack of sound scientific backing and information limits their use [1].

Hair suffers aggression; there can be some ailments to the normal health of hair and cause trouble. The main problems associated with hair such as pigmentation problems (Fading), dandruff and falling of hair (Shedding) [1].

Alopecia areata often starts suddenly and causes patchy hair loss in children and young adults. This condition may result in complete baldness (*Alopecia totalis*). However, in about 90% of people with the condition, the hair returns within a few years. *Alopecia universalis* causes all body hair to fall out, including the eyebrows, eyelashes, and pubic hair.

Trichotillomania, seen most frequent in children, is a psychological disorder in which a person pulls out one's own hair. *Telogen effluvium* is temporary hair thinning over the scalp that occurs because of changes in the growth cycle of hair. A large number of hairs enter the resting phase at the same time, causing hair shedding and subsequent thinning (Bhaleero and Salanki, 2002).

A synthetic drug, minoxidil is a potent vasodilator appears safe for long-term treatment. Approximately, 85% of all hairs are in the growing phase (Anagen) at any one time. The Anagen phase or growth phase

can vary from 2 to 6 years [2]. At the end of the Anagen phase, the hairs enter into a catagen phase which lasts about 1 or 2 weeks, during the catagen phase the hair follicle shrinks to about 1/6 of the normal length [3]. The resting phase (Telogen) follows the catagen phase and normally lasts about 5-6 weeks. During this time, the hair does not grow but stays attached to the follicle while the dermal papilla stays in a resting phase below.

The Synthetic drug, minoxidil is a potent vasodilator was scientifically proved for the treatment of alopecia (Parker *et al.*, 1982; Uno *et al.*, 1987). Though the use of drugs for its side effect is not advisable, the drug of plant origin is necessary to replace the synthetic one.

On the basis of a market survey carried out on crude drugs used presently for herbal hair, oils give us a clue for selection of drugs for the formulation of ointment for hair growth-promoting activity. Hence, the present study was aimed to evaluate the hair growth activity of herbal formulations, which includes oil extract of all mentioned drugs in various concentrations [2-7].

METHODS

Plant material

Plant material of *Emblica officinalis* (Fruits), *Centella asiatica* (Leaves), and *Cyperus rotundus* (L.) (Rhizomes) was collected in the month of January-February from the region of Kanpur (U.P.) identified by comparing with standard herbarium specimens available in NBRI, Lucknow. The various parts of plant drugs are crushed in mixer and passed through the sieve number 80. The various powder drugs were subjected to pharmacognostic studies for confirmation.

Preparation of herbal extracts

The plant materials were dried under shade and made to a coarse powder. The 200 g of the powder was extracted in a systemic extraction method by help of a soxhlet extraction apparatus with continuous successive extraction. The ethanol extracts of the plants were also prepared.

Table 1: Effect of different hair formulation on hair length of albino rats in hair growth activity

S. No	Groups	Drug	Formulation	Hair length in mm (mean±SD)
1	Group 1	Vehicle	Coconut oil	2.10±0.087
2	Group 2	Minoxidil	2% solution	5.09±0.348
3	Group 3	Hydroalcoholic extract of <i>Emblica officinalis</i>	5% w/v in coconut oil	4.05±0.398
4	Group 4	Hydroalcoholic extract of <i>Centella asiatica</i>	5% w/v in coconut oil	3.88±0.155
5	Group 5	Hydroalcoholic extract of <i>Cyperus rotundus</i>	5% w/v in coconut oil	4.15±0.354
6	Group 6	Hydroalcoholic extract of <i>Emblica officinalis</i> , <i>Centella asiatica</i> , and <i>Cyperus rotundus</i>	5% w/v in coconut oil	3.98±0.357

SD: Standard deviation

Table 2: Effect of different hair formulation on hair density of albino rats in hair growth activity

S. No	Groups	Drug	Formulation	Hair density (mean±SD)
1	Group 1	Vehicle	Coconut oil	1195±37.25
2	Group 2	Minoxidil	2% solution	2529±35.69
3	Group 3	Hydroalcoholic extract of <i>Emblica officinalis</i>	5% w/v in coconut oil	1887±38.57
4	Group 4	Hydroalcoholic extract of <i>Centella asiatica</i>	5% w/v in coconut oil	1676±26.59
5	Group 5	Hydroalcoholic extract of <i>Cyperus rotundus</i>	5% w/v in coconut oil	2657±39.85
6	Group 6	Hydroalcoholic extract of <i>Emblica officinalis</i> , <i>Centella asiatica</i> , and <i>Cyperus rotundus</i>	5% w/v in coconut oil	1737±42.65

SD: Standard deviation

Table 3: Evaluation of herbal hair oil

S. No	Parameters	Observation
1	Color	Greenish brown
2	Odor	Characteristic
3	Specific gravity	0.9730
4	Viscosity	0.9121 poise
5	pH	6.5
6	Acid value	2.0
7	Saponification value	251
8	Irritation test	No irritation
9	Refractive index	1.510

Table 4: Qualitative observation of hair growth

S. No	Group	Time taken to initiate the growth (in days)	Time taken for complete growth (in days)
1	Control	8	24
2	Standard (2% minoxidil)	6	19
3	HF1	10	24
4	HF2	7	20
5	HF3	6	17

HF1: *Emblica officinalis*, HF2: *Centella asiatica*, HF3: *Cyperus rotundus***Table 5: Mean hair length mm**

S. No	Group	Mean hair length in mm
1	Control	2
2	Standard (2% minoxidil)	3.5
3	HF1	3
4	HF2	3.6
5	HF3	4.6

HF1: *Emblica officinalis*, HF2: *Centella asiatica*, HF3: *Cyperus rotundus***Preparation of hair formulation**

Herbal hair oil is more preferred and is used in many ailments of hair [4]. They promote hair growth, improve elegance of hair, and prevent hair fall [5]. Hair oil not only promotes hair growth they also provide necessary moisture to the scalp rendering in beautiful hair [6].

The present work was aimed to prepare and evaluate a polyherbal hair oil containing herbs, such as *E. officinalis* (Fruits), *C. asiatica* (Leaves), and *C. rotundus* (L.) (Rhizomes), using coconut oil as base. All these herbs have well-known traditional potential in the treatment of hair care.

Alcoholic and aqueous extracts of the above three plants were obtained and then formulation were prepared by mixing the above drugs in different combinations using coconut oil as a base.

The hair formulations of *E. officinalis*, *C. asiatica*, and *C. rotundus* of each drug were separately prepared by cloth pouch method and similarly were prepared. The method used for carrying out these formulations was holding the individual drug in a cloth pouch and boiling continuously with the stirring arrangement. These formulations were evaluated for their physical parameter which were described in Table 3.

Accordingly, four formulations were prepared out of which 3 were independent extract and 1 contains the fixed proportion of all the three extract.

Namely, HF-1 (*E. officinalis*), HF-2 (*C. asiatica*), HF-3 (*C. rotundus*), and HF-4 (combination of all three in equal proportion).

EVALUATION METHOD OF HAIR FORMULATION PREPARED**Skin irritation test**

The institute has been cleared for the said biological evaluation by Animal Ethics Committee (Letter No.1122/ac/07/CPCSEA). Preliminary skin irritation test on albino rats, the skin from the back of six rats was shaved on both sides of the back using hair clipper and an electric shaver to exposed test areas. On cleaned test sites, the prepared formulations were applied and visual observations were made for the appearance of any irritation or erythema for a total period of 72 hr. after the application of test preparations [9].

Quantitative hair growth study

The method reported by Uno [11] was followed for the quantitative evaluation of treatment. Two rats from each group were euthanized after 10 days, 20 days, and 30 days of treatment: Skin biopsies were taken from shaved area, and the specimen was preserved in 10% formalin. Tissues were embedded in paraffin wax and sectioned into the uniform thickness of 10 µm and stained with hematoxylin and eosin. Sections from all the groups were evaluate for the number of hair

follicles per mm area of skin and percentage ratio of hair follicles in different cyclic phases, such as anagen (growth phase), catagen, and telogen (resting phase), was determined microscopically (Roy *et al.*, 2006).

Hair length

Hair was plucked randomly from the depilated area with the help of electric clipper and measured the hair length with the help vernier caliper Or Scale and calculated the mean of hair length [10].

Hair density

A hole of 1 cm² was made on card board. Then the card board set on the desired depilated area (where hair fall patches observed) on the back of rat after 45 days of depilation. The hair was trimmed of desired depilated area, and the hair was cut with the seizure. The hair was count manually [11].

RESULTS AND DISCUSSION

Hair length

In hair growth activity, the hair length of all groups shown in Table 1, 4 and 5. In Group-1, Group-2, Group-3 and Group-4, Group-5, Group-6 and the hair length was found to be 2.24, 5.55, 3.93 mm and 3.89, 4.92, 4.33 mm, respectively. In this Table 1, the Group-4 shows a very significant hair growth lengthwise as compared to control [13].

Hair density

The hair density of all groups shown in Table 2. In Group-1, Group-2, Group-3 and Group-4, Group-5 and Group-6, hair density was found to be 1195, 2529, 1887, 1676, 2657, and 1737 per cm², respectively (Group-4 have significant hair density as compared to control.).

REFERENCES

1. Adhirajan N, Dixit VK, Chandrakasan G. Development and evaluation of herbal formulations for hair growth. *Indian Drugs* 2001;38(11):559-63.
2. Bhalearo SS, Salanki NH. Therapeutics approaches to the management of common baldness. *Indian Drugs* 2002;39(1):567-73.
3. Bone K. *Clinical Applications of Ayurvedic and Chinese Herbs: Monographs for the Western Herbal Practitioner*. Warwick, Queensland: Phytotherapy Press; 1996.
4. Cash TF. The psychology of hair loss and its implications for patient care. *Clin Dermatol* 2001;19(2):161-6.
5. Chakravarty AK, Garai S, Masuda K, Nakane T, Kawahara N. Bacopasides III-V: Three new triterpenoid glycosides from *Bacopa monniera*. *Chem Pharm Bull (Tokyo)* 2003;51(2):215-7.
6. Kapoor LD. *CRC Handbook of Ayurvedic Medicinal Plants*. Boca Raton, FL: CRC Press; 1990. p. 61.
7. Khare CP. *Indian Herbal Remedies: Rational Western Therapy, Ayurvedic, and Other Traditional Usage*. Berlin, Heidelberg: Botany Springer; 2003. p. 89.
8. Mahato SB, Garai S, Chakravarty AK. Bacopasaponins E and F: Two jujubogenin bisdesmosides from *Bacopa monniera*. *Phytochemistry* 2000;53(6):711-4.
9. Messenger AG. Medical management of male pattern hair loss. *Int J Dermatol* 2000;39:585-6.
10. Parker LN, Lifrak ET, Odell WD. Lack of a gonadal or adrenal androgenic mechanism for the hypertrichosis produced by diazoxide, phenytoin and minoxidil. *Biochem Pharmacol* 1982;31(10):1948-50.
11. Purwal L, Gupta SB, Pande MS. Development and evaluation of herbal formulations for hair growth. *Euro J Chem* 2008;5(1):34-8.
12. Rathi V, Rathi JC, Tamizharasia S, Pathakb AK. Plants used for hair growth promotion: A review. *Pharmacogn Rev* 2008;2(3):185-7.
13. Roy RK, Thakur M, Dixit VK. Hair growth promoting activity of *Eclipta alba* in male albino rats. *Arch Dermatol Res* 2008;300(7):357-64.