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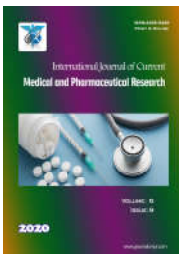

Research Article

FORMULATION ANDEVALUATION OFHERBAL HAIR GEL FOR HAIR REGROWTH AND STYLING

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ABSTRACT

In ancient Indian system of medicines like Ayurveda, siddhan and unani, herbal plants play an important role for the treatment of disease and disorders. Now a days these herbal plants having higher demand in the world trade, because the usage of these herbal plants having higher efficacy, quality and safety. The herbal medicament having grater patient compliance with lesser side effect. Hair gel is an important cosmetic item for enhancing personality and also important part of our appearance. In the present study we formulate and evaluate the herbal hair gel for preventing hair fall and also hair styling by using different herbal extract at various concentration. The gel base was prepared by using Carbapol 940, propylene glycol, methyl paraben, propyl paraben, polyvinyl propalin, triethanolamine and required amount of distilled water. The prepared gel was evaluated and stability study have been carried out as per the guideline for 3 months at various temperature and humidity. The result of this study shown better stability.

INTRODUCTION

Topical drug administration is localized drug delivery system anywhere within the body through ophthalmic, rectal, vaginal and skin as topical route. Skin is one among the foremost accessible organs of physical body for topical administration and main route of topical drug delivery system. Number of medicated products is applied to the skin or mucosa that either enhances or restores a fundamental function of skin or pharmacologically alters an action within the underlined tissues. Such products are referred as topical or dermatological products.[1]

External topical that are spread, sprayed, or otherwise dispersed on to cutaneous tissues to hide the affected area. Internal topical that are applied to the mucosa orally, vaginally or onanorectal tissues for local activity.

Advantages of Topical Drug Delivery System: [2]

•Avoidance of first pass metabolism.
•Convenient and straightforward to use .
•Avoidance of the risks and inconveniences of intravenous therapy and of the numerous conditions of absorption, like pH changes, presence of enzymes,
•Achievement of efficacy with lower total daily dosage of drug by continuous drug input.
•Avoids fluctuation in drug levels, inter- and interpatient variations.
•Ability to simply terminate the medications, when needed.
•A relatively large area of application as compared with buccal or cavity
•Ability to deliver drug more selectively to a selected site.
•Providing utilization of medicine with short biological half-life,
•Improving physiological and pharmacological response.
•Improve patient compliance.
•Provide suitability for self-medication.

Disadvantages of Topical Drug Delivery System:[2]

•Skin irritation of dermatitis may occur thanks to the drug and/or excipients.
•Poor permeability of some drugs through the skin.
•Possibility of allergenic reactions.
•Can be used just for drugs which require very small plasma concentration for action
•Enzyme in epidermis may denature the drugs
•Drugs of larger particle size tough to soak up through the skin
Recently, the amount of men and ladies who suffered from hair loss and/or hair thinning is increasing in worldwide. Hair loss may be a dermatological disorder, and therefore the surge for locating natural products with hair growth promoting potential is continuous [3,4]. Hair loss or alopecia may be a common patient complaint and a source of serious psychological and physical distress [5]. Many factors like metabolism, hormones, heredity and side effects of antineoplastic and immunosuppressant drugs, are negatively affecting the healthy growth of hair. consistent with one

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survey, androgenic alopecia on its own eventually affects approximately 50% of the world's adult population [5,6]. In androgenic alopecia it's assumed that the genetically predisposed follicles are the target for androgen - stimulated hair follicle miniaturization, resulting in gradual replacement of huge, pigmented hairs (terminal hairs) by barely visible, depigmented hairs (vellus hairs) in affected areas [7]. it's dihydrotestosterone medicated process, characterized by continuous miniaturization of androgen reactive hair follicles and amid per follicular fibrosis of follicular units in histological examination [8].

Androgenic alopecia leads to a decrease in follicle size amid a decrease within the duration of anagen; anagen is that the active phase of the hair during which hair lives and growing and a rise within the percentage hair follicles in telogen; telogen is that the resting phase and accounts for 10-15% of all hairs [9]. Androgens are considered to be one among the foremost important causes for alopecia aside from a spread of other factors [10]. Thus, it's vital to develop new therapeutic materials to prevent hair loss and to reinforce hair growth. medicine is one interesting area, which is getting more popular. Although it's not yet been incorporated into the mainstream of medical aid due to limited scientific evidences and lack of mechanistic understanding, medicine is becoming an increasingly attractive approach everywhere the planet [11]. Natural products within the sort of herbal formulations are available on the market and are used as hairdressing, hair growth promoter, hair conditioner hair-cleansing agent, antidandruff agents, also as for the treatment of alopecia and lice infection [12]. variety of herbal products are acclaimed with hair growth promoting activity. the normal system of drugs in India acclaims variety of herbal drugs for hair growth promotion but lack of sound scientific backing and knowledge limits their usage. within the present study, this herbal gel was prepared by using various herbs listed below (Table 1) was used for the preparation of herbal gel for hair growth and also for hair styling.

S.no	*Biological source*	*Family*	*Common name*	*Part used*	*Chem. Const.*	*Action*	*Ref.*
1.	Aloe barbadensis	Liliaceae	Aloe vera	Leaves	Minerals	Nutritional support	13
2.	Allium cepa Stimulates	L. Alliaceae	Onion	Cloves	Allicin, Vit. C, S-containing compds., minerals	Hair regrowth	14
3.	Allium sativum L.	Alliaceae	Garlic	Cloves	Allicin, Vit-C, S-containing compds, minerals	Anti-microbial & nerve stimulation	15
4.	Phyllanthus emblica	Euphorbiaceae	Amla	Fruit	Gallic acid, Vit. C, Quercetin	Nutritional support	16
5.	Cirus limon (L.) burm	Rutaceae	Lemon	Fruit	Voltl-oil, vit-B, C, hesperidin	Anti-microbial & Anti-oxidant	17
6.	Mintha piperita	Labiatae	peppermint	seed	Menthyl acetate, isovalerate, menthone, cineol	Hair regrowth	18

Apart from this, herbs are filled with fatty-acids and anti-oxidants which help to get rid of toxins and dead cells from the scalp. This formulated gel is often applied to scalp and hair as a moisturizer which will help to stimulate growth and improve the strength of existing hair. Topical formulations include oils, creams, ointments, pastes and gels out of which gels are becoming more popular now a days because they're more stable and can also provide controlled release than other semisolid preparations. The gel formulations can provide better absorption characteristics and hence the bioavailability of drug [19]. Gels are semisolid systems during which a liquid phase is constrained within a three-dimensional polymeric matrix (consisting of natural or synthetic gums) during which a high degree of physical or chemical cross-linking has been introduced [20]. Gels are relatively newer class of dosage forms created by entrapment of larger amount of aqueous hydro alcoholic liquids during a network of colloidal solid particles which can contains inorganic substance like aluminium salts or organic polymers of natural or synthetic origins. Most topical gels are prepared with organic polymers, like Carbopol 934, which impart an aesthetically pleasing, clear sparkling appearance to the products and are usually washed of skin with water.

MATERIALS AND METHODS

MATERIAL

All the chosen herbs (leaves of Aloe vera; Fruits of Amla; Cloves of Garlic, onion) were collected from an area market at Chennai city, India (Table.2). Plant materials were washed with water to remove earthy matters and processed (Garlic and onion was peeled, Amla and onion was chopped into small pieces, and burn plant leaves taken as such), and completely dried within the sunlight then homogenized to fine powder and stored in airtight container for further use.[21]'

Table 2 List of materials used

S.no	Material	source
1.	Aloe barbadensis (Aloe vera)	Local Market
2.	Allium cepa Stimulates (Onion)	Local Market
3.	Allium sativum L. (Garlic)	Local Market
4.	Phyllanthus emblica (Amla)	Local Market
5.	Cirus limon (L.) burm (Lemon)	Local Market
6.	Mintha piperita (peppermint)	Local Market
7.	Carbopol 934	Chemical store
8.	PVP	Chemical store
9.	propyl paraben	Chemical store
10.	liquid paraffin	Chemical store
11.	PEG	Chemical store
12.	Triethanolamine	Chemical store

Preparation of extracts

There are four extracts are utilized in the formulation. These extracts were prepared by decoction method. The prepared extracts involve following

- ✓ Amla
- ✓ Onion
- ✓ Garlic
- ✓ Aloe vera

Preparation of aqueous extracts

Aqueous extract was prepared by heating ten grams of every dried powder in water for 6 hours at slow heat. The it was cooled for about two hours, then it had been filtered by using muslin cloth and centrifuged at 5000 rpm for 15 min. The supernatant solution was collected and was concentrated to form syrupy mass then autoclaved at 121°C and 15 lbs pressure before storing at 4°C.

Preparation of lemon extract

Fresh fruits obtained from an area market at Chennai city, India. The fresh fruits were washed in water to remove earthy matters, surface sterilized with 70% alcohol, rinsed with sterile

water and cut into two equal halfs with a sterile knife and therefore the juice pressed out into a sterilecontainer separately then filtered using Millipore 0.45 filter paper to remove the seeds and other tissues. To enhance the steadiness of the gel, it had been heated to 40°C then a mix of stabilizing agent consisting of vitamin C (0.5% w/w) and benzoate of soda (0.5% w/w) was added and mixed uniformly. The Extracts of peels was then cooled to room temperature and were stored at 4 °C until use.[22]

Extraction of oil

These oils were prepared by using Clevenger apparatus i.e. The required amount of drug to be extracted were placed into the necked round extraction flask and soaked with water. Water and medicines were mixed gently and allowed to boil. Water and extracted oil evaporate. The vapour mixture condensed using condenser. From condenser distillate water and oil flow into gradated tube. Because the oil is immiscible in water and it is easily separated. Finally, the oil was collected and stored.[23]

METHODOLOGY

Preparation of herbal gel Herbal gel was prepared for F1 to F6 batches by using different quantities of herbal extract mentioned within the Table 3. keeping the entire volume (50ml) of the gel constant altogether the formulations. These six different herbal gel formulations were prepared by simple gel preparation method with Carbopol gel base. Measured quantity of methyl paraben, glycerine and weighed quantity of polyethylene glycol were dissolved during a bout 35 ml water in a beaker. Then the mixture was stirred at high speed using magnetic stirrer. 2g Carbopol 934 (optimized) [24] and PVP were added slowly to the beaker containing above liquid while stirring. Then triethanolamine was added slowly with continuous stirring to get gel structure. Finally, varying concentrations of herbal aqueous extract was incorporated into Carbopol gel base and stirred for about 1 hour so on obtain gel. The prepared herbal gel formulations were stored at temperature until further evaluation.

Table 3 Composition of Batches of Syrup

S.no	Ingredients	F1	F2	F3	F4	F5	F6
1.	Onion%	10	20	30	-	-	-
2.	Garlic%	10	20	30	-	-	-
3.	Aloe-vera%	20	20	20	-	-	-
4.	Amla%	-	-	-	20	20	20
5.	Lemon%	-	-	-	10	20	30
6.	Peppermint oil%	-	-	-	10	20	30
7.	Carbopol 934(g)	2	2	2	2	2	2
8.	PVP (mg)	5	5	5	5	5	5
9.	propyl paraben(mg)	75	75	75	75	75	75
10.	Glycerine (ml)	3	3	3	3	3	3
11.	PEG (ml)	6.25	6.25	6.25	6.25	6.25	6.25
12.	Triethanolamine(ml)	0.5	0.5	0.5	0.5	0.5	0.5
13.	Water(ml)	35	35	35	35	35	35

Evaluation of Formulatedherbal Gel

Physical appearance: The gel formulation was evaluated in terms of physical character like phase separation and alter in colour, odour and rheological parameters [25]. The results are tabulated in table 4.

pH: The pH of the gel formulation decided by using digital pH meter. One gram of gel was taken and dissolved in 100 mL water and stored for two hours then measurement of pH was done [26]. The results are tabulated in table 4.

Viscosity: Brookfield viscometer was used for the measurement of viscosity of the prepared gel. The Brookfield viscometer was rotated at 100 rpm, spindle no.6. Each reading was taken after equilibrium was attained by the sample at the top of two minutes. The study was repeated 3 times and average value is given in Table 4.

Homogeneity: Developed gel was tested for homogeneity by visual inspection after the gel was set within the container. It had been tested for appearance and presence of any aggregates [27]. The results are tabulated in table 4.

Spreadability: it had been determined by wooden block and glass slide apparatus. Weights of about 20 g was added to the pan and therefore the time was noted for upper slide (movable) to separate completely from the fixed slides. Spreadability was then calculated by using the formula,

$S=M*L/T$

Where,

S=Spreadability,

M=Weight tide to upper slide,

L=Length of glass slide,

T=Time taken to separate the slide completely from one another.

The therapeutic efficacy of a formulation also depends upon its value [28]. The results are tabulated in table 4.

Skin irritation test: Test for skin irritation was performed on human volunteers with their consent. Five volunteers were selected and 1.0 g of formulated gel was applied on a neighbourhood of two sq in to the rear of hand. The volunteers were observed for lesions or irritation [29]. The results are tabulated in table 5.

Stability Study: the steadiness study was performed as per ICH guidelines 6. The formulated gel was filled within the collapsible tubes and stored at temperature and 40o C at 75% RH. the steadiness study was conducted for the amount of three months. The parameters like appearance, pH, extrudability, colour was tested monthly [30]. The results are tabulated in table 6.

RESULT AND DISCUSION

The herbal hair gel was formulated and subjected to evolution of different parameters. The prepared herbal hair gel was showed slightly brownish white in colour (F1, F2 & F3) and white in colour (F4, F5& F6) and the prepared gel had a cool and smooth when it was subjected to application on the skin. The PH of the gel was determined by using digital PH meter, it had been maintained constant throughout the stability study ranged between 5.8-6.9. The initial viscosities of prepared herbal hair gels were measured using Brookfield viscometer. Further stability test for 3 months has been administered and results revealed gel showed better stability for all the formulated gel ranged between 26061 cps and 27090 cps respectively and after stability study there were not much difference at different temperature and humidity. The spreadability was also measured and found to be less variation with the initially prepared gel after performs the stability study. The skin irritant test was performed on human volunteers the result shown there were non-irritant when application on the skin Table 5

Table 4 Evaluation of prepared herbal hair gel

Formulation	Physical appearance	PH	Homogeneity	Viscosity (cps)	Spreadability (GM.CM/SEC)
1.	Slight brown	6.8	Good	27090	19.04
2.	Slight brown	6.8	Good	26706	16.37
3.	Slight brown	6.9	Good	26061	14.62
4.	White color	6.5	Good	27045	18.72
5.	White color	6.3	Good	26756	16.07
6.	White color	5.8	Good	26109	15.21

Table 5 Skin irritant test

Formulation	F1	F2	F3	F4	F5	F6
Initial	*	*	*	*	*	*
1st month	*	*	*	*	*	*
2nd month	*	*	*	*	*	*
3rd month	*	*	*	*	**	**

(*- No irritant, **-slightly irritant, ***- strong irritant)

Table 6 400 C / 75% RH at 1st months

Formulation	F1	F2	F3	F4	F5	F6
colour	Sl-brown	Sl-brown	Sl-brown	white	white	white
PH	6.8	6.8	6.9	6.5	6.3	5.8
Homogeneity	good	good	good	good	good	good
Viscosity	27090	26706	26061	27045	26756	26109
spreadability	19.04	16.37	14.62	18.72	16.07	15.21

Table 7 400 C / 75% RH at 2nd months

Formulation	F1	F2	F3	F4	F5	F6
colour	Sl-brown	Sl-brown	Sl-brown	white	white	white
PH	6.6	6.8	6.5	6.3	6.3	5.8
Homogeneity	good	good	good	good	good	good
Viscosity	27085	26706	26069	27055	26736	26125
spreadability	18.84	16.25	14.82	18.78	16.87	15.22

Table 8 400 C / 75% RH at 3rd months

Formulation	F1	F2	F3	F4	F5	F6
colour	Sl-brown	Sl-brown	Sl-brown	white	white	white
PH	6.6	6.7	6.5	6.5	6.3	5.8
Homogeneity	good	good	good	good	good	good
Viscosity	27090	26706	26061	27045	26786	26199
spreadability	19.02	16.37	14.32	18.72	16.07	15.20

CONCLUSION

Natural remedies are more acceptable within the assumption that they're safer with fewer side effects than the synthetic and semi-synthetic ones. Herbal formulations have growing demand within the universal trade. It's an attempt made to work out the herbal gel containing various concentration of herbal extract. The formulated of herbal gel is employed to preventing the hair fall and hair styling. There's an extra scope for pharmacological studies in lower animals.

Reference

1. Dandre SG, Wagh KB; Formulation and Evaluation of Fluconazole Gel by using Synthetic Polymer; PharmaTutor; 2018; 6(4); 27-31.
2. Singh M.K., Khare G., Iyer S., Sharma G., Tripathi D.K. Clerodendrumserratum: A Clinical approach. JAPS. 2012: 2(2): 11-15.
3. Arakawa T, Emoto K, Utsunomiya S, Hagiwara Y, Shimizu T (1962) Effect of Swertinogen in hair growth with special reference to its activities on skin function. Tokushima J Exp Med 9: 37-59.
4. Adhirajan N, Ravikumar T, Shanmugasundaram N, Babu M (2003) In vivo and in vitro evaluation of hair growth potential of Hibiscus rosa sinensis Linn. J Ethanopharm 88(2-3): 235-239.
5. Han A, Mirmirani P (2006) Clinical approach to the patient with alopecia. Semin Cutan Med Surg 25(1): 11-23.
6. Paus R, Cotsarelis G (1999) The biology of hair follicles. N Engl J Med 341(7): 491-497.
7. Whiting DA (2001) Possible mechanisms of miniaturization during androgenetic alopecia or pattern hair loss. J Am Acad Dermatol 45(3): S81-S86.
8. Yoo HG, Kim JS, Lee SR, Pyo HK, Moon HI, *et al*. (2006) Perifollicular fibrosis pathogenetic role in Androgenetic alopecia. Biol Pharm Bull 29(6): 1246-1250.
9. Cotsarelis G, Millar SE (2001) Towards a molecular understanding of hair loss and its treatment. Trends Mol Med 7(7): 293-301.
10. Bagatell C, Bremner WJ (1996) Androgens in men - uses and abuses. New Engl J Med 334(11): 707-714.
11. Bhaumik S, Jyothi MD, Khar A (2002) Differential modulation of nitric oxide by curcumin in host macrophages and NK cells. FEBS Lett 483(1): 78-82.
12. Olsen EA (1993) Androgenetic alopecia. In: EA Olsen (Eds.), Disorders of Hair Growth: Diagnosis and Treatment, McGraw Hill Inc, USA, pp. 257-87.
13. M. Semalty, A. Semalty, Geeta P. Joshi and M.S.M. Rawat, 2010. In vivo Hair Growth Activity of Herbal Formulations. International Journal of Pharmacology, 6: 53-57.
14. Sharquie KE and Al-Obaidi HK: Onion juice (Allium cepa L.), a new topical treatment for alopecia areata. The Journal of dermatology 2002 Jun; 29(6):343-6.
15. Dr. Azar H. Maluki, Dr.Thikrha A. Treatment of Alopecia areata with topical garlic extract. Kufa Med. Journal 2009. vol.12 No.1
16. Jae Young Yu, Biki Gupta, HyoungGeun Park. Preclinical and Clinical Studies Demonstrate That the Proprietary Herbal Extract DA-5512 Effectively Stimulates Hair Growth and Promotes Hair Health. Evid Based Complement Alternat Med. 2017; 2017: 4395638.
17. Pushpendrakumarjain, Debajyoti Das. The wonder of herbs to treat-Alopecia. Innovare journal of medical sciences. Vol 4, Issue 5, 2016.
18. Ji Young Oh, Min Ah Park. Peppermint Oil Promotes Hair Growth without Toxic Signs. Toxicol Res. 2014 Dec; 30(4): 297–304
19. Preet Kaur and Tarun Kumar Guleri. Topical Gel. A recent approach for novel drug delivery. Asian J Biomed pharma Sci. 2013;3(17):1-5.
20. Shaik Arif Bhasha, Syed Abdul Khalid, Duraivel S, Debjit Bhowmik and Sampath Kumar KP. Recent trends in usage of polymers in the formulation of dermatological gels. Indian J Res Pharm Biotech. 2013;1(2):161-168.
21. Nair R, Chanda SV. Antibacterial Activities of Some Medicinal Plants of The Western Region Of India. Turkish Journal of Biology. 2007; 31:231–36.
22. Nada KhazalKadhim Hindi, Zainab Adil Ghani Chabuck. Antimicrobial Activity of Different Aqueous Lemon Extracts. Journal of Applied Pharmaceutical Science Vol. 3 (06), pp. 074-078, June, 2013.
23. Available at: http://web.ist.utl.pt/ist11061/fidel/flaves/sec5/sec52.html

24. D. Manjula, J. Josephine Leno Jenita. Formulation and evaluation of Flaxseed hair gel: A Natural hair tamer. IJRPC 2018, 8(3), 487-491.
25. Regupathi T, Chitra K, Ruckmani K, Lalitha KG and Mohan Kumar. Formulation and Evaluation of Herbal Hair Gel for Hair Growth Potential. J Pharmacol Clinical Res. 2017;2(2):1-8.
26. Preet Kaur, Rajeev Garg and Gupta GD. Development and evaluation of topical gel of minoxidil from different polymer bases in application of alopecia. Int J Pharmacy and Pharm Sci. 2010;2(3):43-47.
27. Ankita C and Biyani KR. Design, development and characterization of novel herbal hair styling preparation. Int J Pharma Chem Bio Sci. 2014;4(3):665-672.
28. Kumar L, Verma R, In vitro evaluation of topical gel prepared using natural polymer, Int. J Drug Delivery, 2010, 2, 58-63.
29. Prakash RP, Rao R. J.pharmaceutical and clinical research. 2010; 3: 126-129.
30. Chauhan K, Tyagi B, Singh B and Agarwal S. Accelerated stability studies of polyherbal preparation (Ezmov) capsule. 1999;18(3&4):210-217.

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