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FORMULATION AND EVALUATION OF HERBAL ANTIDANDRUFF GEL

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ABSTRACT

The present research has been undertaken with the aim to formulate and evaluate the herbal gel containing Alovera juice, Garlic extract, Amla extract. Ginger extract. The gel formulation was designed by using aqueous, ethanolic extracts in varied concentrations along with different polymer. The physiochemical parameters of formulations (washability, viscosity, spreadability etc.) were determined. The results showed that formulation containing 1 gm of ethanolic extract of Alovera juice, Emblica officinalis, Allium sativum Linn, Zingiber officinale (ginger) have promising effect than other formulations.

INTRODUCTION AND BACKGROUND

Many countries have their own traditional or indigenous forms of healing which are firmly rooted in their culture and history. Traditional Medicine (TM) is the sum total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether applicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness.

Some forms of TM such as Ayurveda, traditional Chinese medicine and Unani medicine are popular nationally, as well as being used worldwide. At the same time, the terms "complementary medicine" (CM) or "alternative medicine" refer to a broad set of health care practices that are not part of that country"s own tradition or conventional medicine and are not fully integrated into the dominant health-care system. They are used interchangeably with traditional medicine in some countries, some forms of CM such as anthroposophic medicine, chiropractic, homeopathy, naturopathy and osteopathy are also in extensive use.

Introduction to Hair

Hair is a unique character found on all mammals but not on other animals. In humans it is a special and cherished feature, especially in females, but its main functions are in protection of the skin from mechanical insults and to facilitate homeothermy for example, eyebrows and eyelashes stop things entering the eyes, while scalp hair prevents sunlight, cold, and physical damage to the head and neck. It also has a sensory function, increasing the perception of the skin surface for tactile stimuli and sub serves important roles in sexual and social communication, considering the psychological impact on quality of life seen in hair disorders, such as hirsutism, hair loss, etc.

Anatomy and Physiology of Hair

Hair is composed of cylindrical structures or shafts made up of tightly compacted cells that grow from small sac-like organs called follicles shown in Fig. 1. In man, the diameter of individual hair shafts may range from 15 to 120 mm depending upon the type of hair and the region of the body the follicle is located. Hair contains a family of sulphur -rich proteins called keratin (from the Greek word, keras, meaning horn). In the hair shaft, keratin forms long fibers which become bound together very tightly through the replacement of SH groups with S-S bonds and through chemical cross linking with other proteins. The result is a very tough, highly stable structure. The hair follicle serves as a reservoir for epithelial and melanocytestem cells and it is capable of being one of the few immune privileged sites of human body. Hair follicle development is related to the interactions between epithelial and mesenchymal cells.

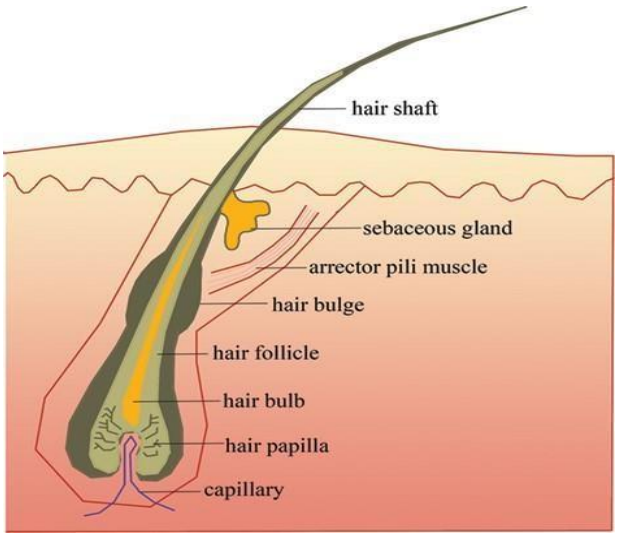


Fig. 1: Anatomy of Hair Follicle.

Dandruff

Dandruff is a very common non-contagious hair problem, nearly affecting person irrespective of age. Medically it is defined as pityriasis simplex capitis – shedding of dead skin from the scalp. It may be – dry or grease. Dry dandruff appears silvery and white while greasy flakes appear pale yellowish and may have an unpleasant smell. Historically there have been multiple other descriptive names reflecting the fungal cause of this condition, such as pityriasis simplex and pityriasis capitis (referring to Pityrosporum) and furfuracea (referring to Malassezia furfur). It is a common disorder which effects 5% of the global population. Dandruff affects the aesthetic value and causes the itching and keratinocytes play major role in the expressions and the generation of immunological reaction during dandruff formation. The severity of dandruff may fluctuate with season as a often worsen in winter. Dandruff is common scalp condition that producing the irritating white flakes and itchy scalp. Excessive drying of skin and over- activity of oil gland known as seborrhea.

Types of Dandruff

Dandruff can be classified as disorders of the sebaceous gland or skin scaling disorders. Dandruff can be of two types,

1. Oily dandruff
2. Dry dandruff

Oily dandruff (Pityriasis Steatoides)

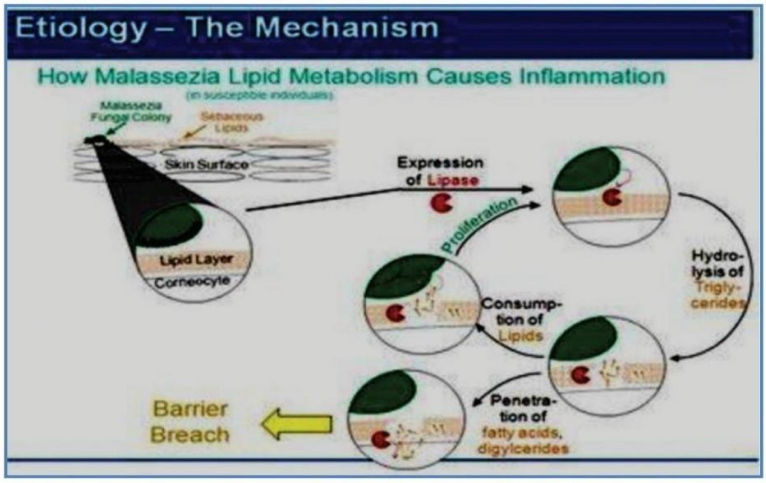
On the scalp, waxy, greasy, yellowish, thick scales crusts are present. Beneath the crusts, the scalp is red or pale but dry. The hair may be dull and flat without shine. There 12 may be slightitching. If irritated eczematization complicates the condition to produce seborrhoeic dermatitis. Patients with Pityriasis steatoides usually develop thing and later loss of hair.

Dry dandruff (Pityriasis sicca)

The scales are fine, thin, furfuraceous, white or grayish and dry or only slightly greasy. The hair is dry and lusterless. There is mild to moderate itching. The scales fall freely on the shoulders. This type of dandruff is more common in winter than in summer. It signifies exaggeration of normal exfoliation of the horny layer of the epidermis. It usually affects people with dry integument and scalp. In nutritional disorders, scaliness of the scalp is exaggerated.

Causes of dandruff

One explanation for dandruff is that the fungus Pityrosporumovale, which is naturally present on the scalp and other parts of the skin. Typically, this fungus causes no damage. However, with the weather changes, hormonal, and stress, the scalp will produce more oil, causing the fungus P. ovaleto proliferate. With the proliferation of the fungus, itchiness of the scalp skin cells and also the loss of hair follicles and so-called dandruff will come. The exact mechanism of dandruff formation is now believed to be the result of the formation of enzymes called lipases. The Malassezia fungus break down sebum to oleic acid by using these enzymes. The oleic acid then penetrates the top layer of skin and causes increased skin cell turnover in susceptible people. This, in turn, causes dandruff flakes and sometimes itching and redness.



Dandruff has been shown to be the result of 3 required factors.

1. Skin oil commonly referred to as sebum or sebaceous secretions.
2. The metabolic byproduct of skin micro-organisms (most specifically Malassezia yeast, a lipophillic fungus).
3. Individual susceptibility against presence of Malassezia species.

Signs and Symptoms of Dandruff

1. Presence of fragments
2. Itching of the scalp
3. Redness around the scalp.
4. Intense itching of the scalp where you will notice dead skin flaking off.

Herbs as Antidandruff

Dandruff is an overall scalp disorder/disease. The treatment of dandruff includes application of topical, antifungal or other products. Since recurrence occurs commonly prophylaxis using products for skin and hair to maintain good healthy skin of scalp and hairs. Herbs are compatible with both human skin and hair. Unlike chemical based products, herbs are completely safe, extremely effective and have almost no side effects due to their compatibility with human body. Herbal drugs or their formulations are viable alternative to synthetic drugs. During the past few decades, there has been a dramatic increase in the use of natural products in cosmetics. The awareness and need for cosmetics with herbs is on the rise, primarily because it is believed that these products are safe and free from side-effects.

GELS

The term gel represents a physical state with properties intermediate between those of solid and liquids. It is recommended that the term should be restricted to those systems that satisfy the following criteria, which are similar to suggested by Herman.

1. They are coherent colloidal system of at least two components (the gelling agent and a fluid component).
2. They exhibit mechanical properties characteristic of the solid state.
3. Each component is continuous throughout the system.

The term “gels” is broad, encompassing semisolid of a wide range of characteristics from fairly rigid gelatin slabs, to suspensions of colloidal clays, to certain greases. A gel can be looked upon as being composed of two interpenetrating phase (the gelling agent and a fluid component).

Gels are semisolid, being either suspensions of small inorganic particle or large organic molecule interpenetrated with liquid. In the first case, the inorganic particles, such as bentonite, form a three-dimensional “house of cards” structure throughout the gel. This is a true two-phase system, as the inorganic particles are not soluble but merely dispersed throughout the continuous phase. Large organic molecules tend to exist in solution as randomly coiled flexible chains. These molecules, either natural or synthetic polymers, tends to entangle with each other because of there random motion. It is interaction between the units of the colloidal phase, inorganic or organic, that sets up the “structural viscosity” immobilizing the liquid continuous phase. Thus gels exhibit characteristics intermediate to those of liquid and solids.

Gel forming compounds

A number of polymers are used to provide the structural network that is the essential for a gel system. These include,

1. Natural gums: Alginates, carragenan, tragacanth, pectin, xanthan, gum, etc.
2. Carbomers: Carbopol 934, carbopol 940 and carbopol941.
3. Cellulose derivatives: Methyl cellulose, sodium carboxy methyl cellulose, hydroxy ethyl cellulose, hydroxy propyl cellulose and hydroxy propyl methylcellulose.
4. Polyethylenes: PEG 200 to PEG8000.
5. Colloidally dispersed solids: Microcrystalline silica, colloidal cellulose.
6. Surfactants: Non-ionic surfactants.
7. Other gellants: Bees wax, carnauba wax, cetyl esters wax, PEGs, etc

Literature survey

1. J. P. Burianaet al., (2017)39 evaluated the antifungal potential of garlic with S. schenckii through minimum inhibitory concentration test and colony-forming units
2. Pratibha Rawal et al., (2016)42 determined the antimicrobial activity of dried ginger powder, using by using chloroform, ethanol, acetone.
3. Sankaran mirunaliniet al., reviewed the phytoconstituents of Amla and reported that it contain rich amount of vitamin C, polyphenols such as tannins, gallic acid.
4. Abdulaziz Bashir Kutawaet al., determined the antifungal activity of aqueous and ethanolic garlic extract on some selected fungi namely, Fusarium spp and Rhizopus spp.

Selection of herbs

1) Garlic

Biological source: Allium sativum Family: Liliaceae.

Fig – Garlic Chemical.

Constituents

allin, allicin, diallyl disulfide, diallyl sulfide Uses:

1. Promote hair growth,
2. Protect hair follicle from hair damage,
3. Fight against infection of fungi and suppress growth of fungi (Allicin)
4. helps reduce dandruff as it has high anti-bacterial properties also stimulated scalp and improves blood circulation

2) Aloe

Biological source: aloe barbadensis

Family - liliaceae

Fig- Aloe.

Chemical constituents:

Barbaloin, Beta barbaloin, Iso barbaloin Uses:

1. moisture hair
2. Promote hydration
3. Reduce dryness
4. Remove dead skin

3. Ginger

Biological source : Zingiber officinale Family : Zingiberaceae

Chemical constituents:

GINGEROL, SHAGOL, ZINGIBERINE, ZINGIBEROL, PHELLANDRENE

Fig. Ginger Uses.

1. It has anti-fungal and anti-inflammatory properties that reduces inflammation and irritation to the scalp and fights with scalp infections
2. It has antiseptic properties that can help in getting rid of dandruff

4. Amla

Biological source: Embilica officinalis

Family: Euphorbiaceae

Fig. Amla Chemical.

Constituents:

Ellagic acid, gallic acid, Emblicanin A and B, quercetin Uses:

1. It has anti-inflammatory properties that can calm down any skin irritation
2. stimulate hair follicle
3. Promote hair growth

METHODOLOGY

Procedure

Measured quantity of methyl paraben, glycerin and weighed quantity of polyethylene glycol were dissolved in about 75 ml of water in beaker. Then it was stirred at high speed using mechanical stirrer. Carbopol 940 added slowly to the beaker containing above liquid while

stirring. Triethanolamine (Neutralising agent) was added slowly while stirring till to attain gel structure. Required proportions of Aloevera juice, Emblica officinalis, Zingiber officinale, Allium sativum, extracts were added to the prepared gel and stirred continousely to form proper gel. The details are shown in table 1 continuously to form proper gel. The details are shown in table 2

Table 1: Composition Of Herbal Anti-Dandruff Gel1 (F1).

Sr. No.	Ingredient	Quantity	Use
1	Emblica officinalis	1.0g	Stimulate hair growth
2	Zingiber officinale	1.0g	Anti-fungal, reduce irritation to the scalp
3	Allium sativum	1.0g	Antifungal, (suppress growth of fungi)
4	Aloevera	6ml	Promote hydration, reduce dryness,
5	Carbapol 934	1g	Gelling agent
6	Polyethylene glycol	10g	Humectant and cosolvent
7	Triethnolamine	1.3ml	Alkalizing agent
8	Methyl paraben	0.15g	Preservative
9	Glycerine	6ml	Humectant, solvent, antimicrobial preservative
10	Water	Up to 100ml	Supporting their integrity and solubility

Table 2: Mposition Of Herbal Anti-Drandruff Gel 2 (F2) Co.

Sr.no.	Ingredient	Quantity	Use
1	Emblica officinalis	1.0g	Stimulate hair growth
2	Zingiber officinale	1.0g	Anti-fungal, reduce irritation to the scalp
3	Allium sativum	0.5g	Antifungal, (suppress growth of fungi)
4	Aloevera	6ml	Promote hydration, reduce dryness,
5	Carbapol940	1g	Gelling agent
6	Poly ethyelene glycol	14g	Humectant and cosolvent
7	Triethnolamine	1.3ml	Alkalizing agent
8	Methyl paraben	0.15g	Preservative
9	Glycerine	6ml	Humectant, solvent, antimicrobial preservative
10	Water	Up to 100ml	Supporting their integrity and solubility

F1

F2

Procedure for extraction

The finely powdered material undergo the Soxhlet extraction method by using hydroalcoholic solvent (70% ethanol) until completely extracted at a temperature not exceeding more than 70◦C. The hydroalcoholic extract was collected, filtered and the filtrate was subjected to concentration. The concentrated product was finally used for further experimental studies.

The same procedure was followed for the crude drug, Emblica officinalic, Allium sativum Linn, Zingiber officinale was extracted by hot continuous extraction process.

Aloevera juice used directly.

EVALUATION METHODS OF FORMULATION

PHYSICAL EVALUATION

Physical parameters such as color, appearance and consistency were checked visually.

WASHABILITY

Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

SPREADABILITY

Spreadability of gels was measured with the glass slide apparatus, excess of gel was placed between two slides and 1 kg weight was placed on slide for 5 min to compress the sample to uniform thickness, time in seconds to separate two slides was taken as measure of spreadability.

HOMOGENICITY

The developed gels was tested for homogenicity by visual inspection, after the gel have been set in the container, spread on the glass slide for the appearance, tested for the presence of any lumps, flocculates or aggregates.

SKIN IRRITATION TEST

The skin irritation was carried out on human volunteers. For formulated gel, three human volunteers were selected and 1.0g of formulated gel was applied on an area of two square inch to the back of the hand. The volunteers were observed no irritation.

MICROBIAL ASSAY

The antifungal activities of different formulations was determined by modified agar well diffusion method.

METHOD

Add 0. 1 ml of the inoculum/10 ml of previously molten sabouraud dextrose agar media, shake well to disperse equally and immediately pour in sterile plates, allow to solidify taking care that the thickness of layer is uniform and incubated for 24 hours at 22-27°C.

For Fungi

After 72hr the plates were observed. The zone of inhibition was calculated by measuring the minimum dimension of the zone of no fungal growth around the patch. showm in below figure

Malassezia furfur

Total: 135.8 rs

DISCUSSION

Herbal hair gel are becoming increasingly popular due to their natural ingredients and the benefits they offer for hair health. These gels are often formulated with herbal extracts, essential oils, and other natural ingredients that are known for their nourishing and conditioning properties. The natural ingredients in these gels can help to improve the overall texture of the hair, making healthy hair. Additionally, herbal hair gel are often gentle on the scalp, reducing the risk of irritation or discomfort during the gelling process. In addition to their hair benefits, herbal hair gels often come in eco-friendly packaging, making them a more sustainable choice for environmentally conscious consumers. Furthermore, these gels are often scented with natural ingredients, providing a pleasant and non-irritating aroma during the gelling process. Overall, herbal hair gels offer a range of benefits, from improving hair health to providing a more natural and eco-friendly alternative to traditional hair gels.

CONCLUSION

Now the world market is moving towards the herbal medicines for health care and beauty care. An Indian traditional literature and ethanopharmacological study shows a number of plants have the medicinal use. In this study using Emblica officinalis, Alium sativum Linn, Zingiber officinale and Aloevera juice are already reported as antifungal and anti-inflammatory and antimicrobial activities. Present investigation was carried out to formulate herbal anti dandruff gel based on traditional knowledge and evaluate parameters. From this investigation it is clearly concluded that the prepared herbal formulation has shown good antifungal activity, clearly evident by observing results of the antifungal studies. Formulation F1 showed good antifungal activity compared to formulation F2 and the results of formulation F1 are very nearer compared to standard drug which clearly indicates that the prepared formulation is best suits for anti–dandruff activity as it is acting against Melassezia furfur.

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