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A REVIEW: POLYHERBAL ANTIDANDRUFF HAIR OIL

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ABSTRACT

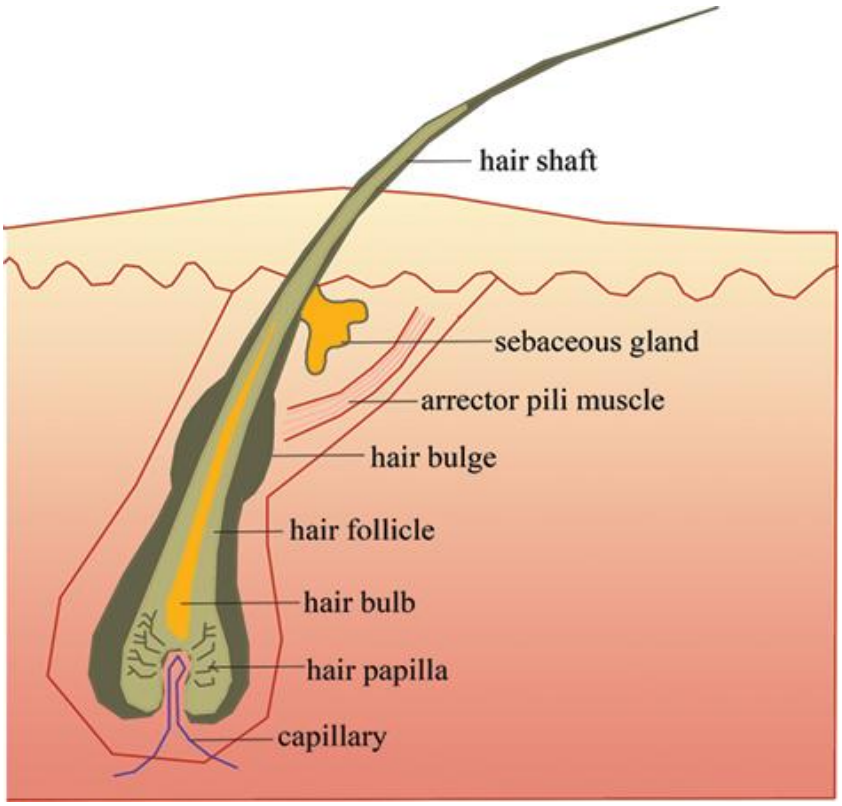
Herbal formulations are known for their use since ancient times with minimal side effects and enhanced activity due to their origin. These oils are used to treat hair problems like thinning of hair and dry or flaky scalp. Apart from their moisturizing purposes they are also used to promote hair growth, improve circulation of blood in the scalp, prevent dandruff and add volume to the hair shaft. The aim of present work is to formulate herbal hair oil from the leaves of Azadirachta indica, leaves and flowers of Hibiscus rosa-sinensis, leaves of Murraya koenigii, leaves of Bacopa monnieri, fruits of Phyllanthus emblica, and roots of Withania somnifera in coconut oil. The formulated hair oil was evaluated for different properties such as viscosity, refractive index, acid value, saponification value, and pH and reported.

KEYWORDS: Herbal hair oil, hair fall, anti-dandruff, formulation and evaluation.

INTRODUCTION

A. Hair

The hair follicle is one of the characteristic features of mammals serves as a unique miniorgan (Figure 1). In humans, hair has various functions such as protection against external factors, sebum, apocrine sweat and pheromones production an important roles for the individual's social and sexual interaction .d individual's social and sexual interaction, thermoregulation. The hair also plays important roles for the individual's social and sexual interaction.



1. HAIR ANATOMY

1.1. Classification of the hair

Nearly whole body surface is coated with the hairs except a few areas like palms, soles and mucosal regions of lips and external genitalia. Most of these are tiny, colorless vellus hairs. The ones located in several areas like scalp, eyebrows and eyelashes are thicker, longer and pigmented and are called terminal hairs. Humans have approximately 5 million hair follicles and 100,000 of them are located on the scalp.

1.2. Structure of the hair

Hair is consisted of two distinct structures: follicle—the living part located under the skin and hair shaft—fully keratinized nonliving part above the skin surface. The arrector pili muscle, takes place between the hair bulge area and dermoepidermal junction. Above the insertion of the arrector pili muscle, sebaceous glands and, in some certain regions, apocrine glands are opened into the follicle.

Hair shaft is consisted of three layers: cuticle, cortex and in certain cases medulla. Flat and square-shaped cuticle cells are adhered tightly to the cortex cells proximally. Peripheric movements of cuticle cells make the direction of the distal free edge upward and cause extensive overlapping. These imbrications are crucial. By interlocking with the cuticle cells

of inner root sheath, they contribute to the follicular anchorage of the growing hair. These imbricated surfaces also facilitate removal of dirt and desquamated cells from the scalp. Cuticle has also important protective properties and barrier functions against physical and chemical insults.

1.3. Molecular structure

Keratin proteins can be divided into two major families: the type I (acidic) keratins and the type II (basic-neutral) keratins. About 54 functional keratin genes (28 type I and 26 type II keratins) have been identified to date. There are 11 type I hair keratins, designated K31–K40, and 6 type II hair keratins, designated K81–K86, and the remainder are epithelial keratins.

The keratin-associated proteins (KAP), is a large group of proteins which constitutes the matrix of the keratin. The matrix proteins are separated to three major subgroups according to their amino acid compositions. Different hair and epithelial keratins are expressed in the various concentric layers of the hair follicle, with hair keratins found primarily in the cortex and hair cuticle.

1.4. Hair follicle innervation and vascularization

Nerves related to the hair follicle are identical to the dermal nerve network including sensory afferents and autonomic sympathetic nerves. Smaller nerve fibers form a circular layer around the bulge area of terminal follicles and the bulb area of vellus follicles. There are several types of nerve endings associated with the hair follicle: free nerve endings, lanceolate nerve endings, Merkel cells and pilo-Ruffini corpuscles. Each nerve ending responds to distinct stimulus. Free nerve endings transmit pain, lanceolate nerve endings detect acceleration, Merkel cells responsible of pressure sensation and pilo-Ruffini corpuscles detect tension. Perifollicular nerves related neuromediator and neuropeptides, that is, substance P, calcitonin gene-related peptide influence follicular keratinocytes and hair follicle cycling.

1.5. Immunology of hair follicle

The immunology of hair is very amazing and complicated. The hair follicle represents an immune privileged (IP) site, which is defined basically as a location in the body where foreign tissue grafts can survive for longer periods of time without immune rejection. This specialized immune environment of IP is required to prevent destructive immune reactions in critical regions. Other immune privileged sites include the anterior chamber of the eye, testis, brain and placenta. Hair follicle IP has a unique characteristic of recurring in a cyclic pattern.

Until recently, the IP of the hair follicle is considered to be restricted to the matrix region during the anagen phase. However, evidence has accumulated that the IP of the hair follicle extends to the bulge region and is present at this site during the entire hair cycle. Since the bulge represents the hair follicle stem cell niche, sustained IP in this region may be essential for the survival of the follic Hair follicle IP occurs during anagen. Thus hair follicle IP is limited to the proximal epithelium of anagen hair follicles. During anagen, melanogenesis is activated in the hair bulb and suggests that hair follicle melanocyte autoantigens play a key role as potential immune targets.

The hair follicle IP is maintained by several factors.

- Downregulation of MHC class I expression in the proximal ORS and matrix cells.
- Local production of potent immunosuppressants like TGF-β1, IL-10 and α-MSH.
- Functional deterioration of antigen presenting cells.
- Absence of lymphatics.
- Establishment of extracellular matrix barriers to hinder immune cell trafficking.
- Expression of non-classical MHC class 1

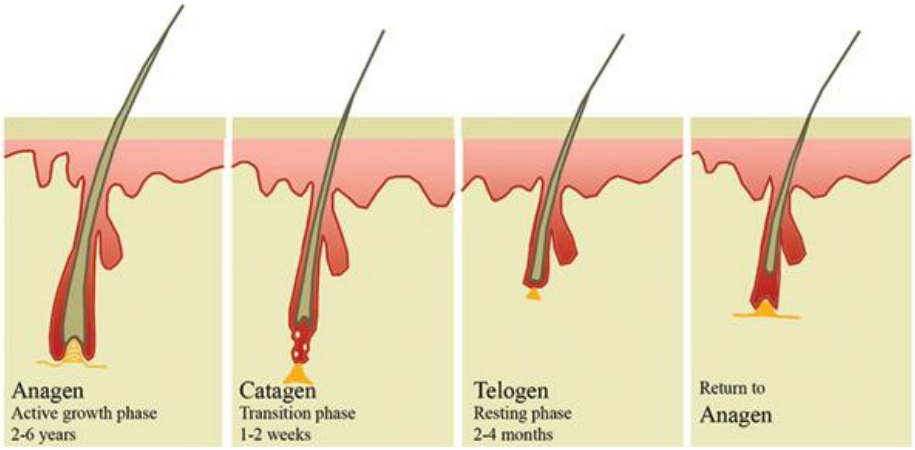
1.6. Pigmentation of hair follicle

Hair shaft pigmentation ensures multiple benefits including UV protection, thermoregulation and sexual perceptions. Furthermore, the hair pigment, melanin, is a potent free-radical scavenger. Melanin production inside the active anagen hair bulb may, therefore, help to buffer cell stress induced by reactive oxygen species. In contrast to the continuous melanogenesis observed in epidermal melanocytes, follicular melanogenesis is a cyclic phenomenon. It is ceased in early the anagen-catagen transition, restarted with the down-regulation of key enzymes of melanogenesis, followed by hair follicle melanocyte apoptosis.

2. PHYSIOLOGY OF THE HAIR

2.1. Hair growth cycle

Hair development is a continuous cyclic process and all mature follicles go through a growth cycle consisting of growth (anagen), regression (catagen), rest (telogen) and shedding (exogen) phases (Figure 3). The duration of the phases changes based on the location of the hair and also personal nutritional and hormonal status and age.



2.1.1. Anagen

The inception of anagen phase is presented by the onset of the mitotic activity in the secondary epithelial germ located between the club hair and dermal papilla in telogen hair follicle. The anagen is the active growth phase in which the follicle enlarges and takes the original shape and the hair fiber is produced. Almost 85–90% of all scalp hairs are in anagen. dermal papilla formation is realized and the new hair shaft appears from the skin. This phase can last up to 6–8 years in hair follicles.

2.1.2. Catagen

At the end of anagen, mitotic activity of the matrix cells is diminished and the follicle enters a highly controlled involutionary phase known as catagen. Catagen lasts approximately 2 weeks in humans regardless of the site and follicle type. During catagen the proximal of the hair shaft is keratinized and forms the club hair, whereas the distal part of the follicle is involuted by apoptosis.

2.1.3. Telogen

The telogen stage is defined as the duration between the completion of follicular regression and the onset of the next anagen phase. Telogen stage lasts for 2–3 months. Approximately 10–15% of all hair is in telogen stage. During the telogen stage, the hair shaft is transformed to club hair and finally shed. The follicle remains in this stage until the hair germ which is responsive to anagen initiating signals from the dermal papilla, starts to show enhanced proliferative and transcriptional activity in late telogen, leading to the initiation of anagen.

DIFFERENT TYPES OF DANDRUFF

dandruff types may only be common on the scalp, there are some that could form on different parts of the body. Below are the types. Just as theare di re fferent causes of dandruffs, there are different types of dandruff. Their classification is related to their causes. While some.

Seborrheic dermatitis: This is one of the most severe dandruff types. It affects any part of the body especially places with folds such as behind the ears, on the armpits and on the nose too. It is also common on the back of the neck and the head but is not limited to these body parts. A person who has this kind of dandruff experiences a red and irritated skin and scalp and may also get sores.

Fungal dandruff: On everyone's scalp, there is a fungus known as malassezia. It is normally found in small harmless amounts as its growth is limited. However, at times it tends to reproduce in quicker than normal rates. This happens when there is an excessive oil production on the scalp which is what it feeds on. This facilitates their intensive growth.

When it gets to a level that is too high, there is a high concentration of oleic acid which is their metabolic by product. This tends to irritate the scalp. As a result, there is an excessive production of skin cells which increases the turnover of dead skin cells. When these combine with the scalp's oil, fungal dandruff flakes are formed.

Psoriasis dandruff: Psoriasis is a skin condition that causes an over production of skin cells within a very short time. This causes a faster than normal shedding of the skin. Dandruffs resulting from this condition are usually thick and tend to be silver in color. It also tends to affect any part of the body.

Sebum dandruff: While most people believe that the cause of dandruff is a dry skin, the opposite problem could cause dandruff too. Sebum related dandruff occurs when there is an accumulation of sebum oil which is secreted by the scalp. The accumulation may be as a result of an overproduction of oil or poor personal hygiene through irregular or improper hair shampooing. When the scalp is not clean enough, the skin oil combines with all the dirt and dead skin cells to form dandruff which may be accompanied by itching.

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- **Signs and symptoms**

The signs and symptoms of dandruff are an itchy scalp and flakiness.Red and greasy patches of skin and a tingly feeling on the skin are also symptoms.

Causes

The cause is unclear but believed to involve a number of genetic and environmental factors. The condition may worsen in the winter. It is not due to poor hygiene.

As the skin layers continually replaces itself, cells are pushed outward where they die and flake off. For most individuals, these flakes of skin are too small to be visible. However, certain conditions cause cell turnover to be unusually rapid, especially in the scalp. It is hypothesized that for people with dandruff, skin cells may mature and be shed in 2–7 days, as opposed to around a month in people without dandruff. The result is that dead skin cells are shed in large, oily clumps, which appear as white or grayish flakes on the scalp, skin and clothes.

The metabolic by-products of skin micro-organisms (most specifically Malasseziayeasts) Individual According to one study, dandruff has been shown to be possibly the result of three factors.

1. Skin oil commonly referred to as sebum or sebaceous secretions
2. susceptibility and allergy sensitivity.

a. Microorganisms

According to a 2016 study, bacteria (mainly Propionibacterium and Staphylococcus) are more important to dandruff formation than fungi. Bacterial presence was in turn influenced by water and sebum amount.

Older literature cites the fungusMalassezia furfur (previously known as Pityrosporum ovale) as the cause of dandruff. While this species does occur naturally on the skin surface of both healthy people and those with dandruff, in 2007 it was discovered that the responsible agent is a scalp specific fungus, Malassezia globosa, that metabolizestriglycerides present in sebum by the expression of lipase, resulting in a lipid byproduct oleic acid. During dandruff, the levels of Malassezia increase by 1.5 to 2 times its normal level. Oleic acid penetrates the top layer of the epidermis, the stratum corneum, and evokes an inflammatory response in

susceptible people which disturbs homeostasis and results in erratic cleavage of stratum corneum cells.

b. Seborrhoeic dermatitis

In seborrhoeic dermatitis, redness and itching frequently occur around the folds of the nose and eyebrow areas, not just the scalp. Dry, thick, well-defined lesions consisting of large, silvery scales may be traced to the less common condition of scalp psoriasis. Inflammation can be characterized by redness, heat, pain, swelling and can cause sensitivity.

Inflammation and extension of scaling outside the scalp exclude the diagnosis of dandruff from seborrhoeic dermatitis. However, many reports suggest a clear link between the two clinical entities - the mildest form of the clinical presentation of seborrhoeic dermatitis as dandruff, where the inflammation is minimal and remain subclinical.

Seasonal changes, stress, and immunosuppression seem to affect seborrheic dermatitis.

Mechanism

Dandruff scale is a cluster of corneocytes, which have retained a large degree of cohesion with one another and detach as such from the surface of the stratum corneum. A corneocyte is a protein complex that is made of tiny threads of keratin in an organised matrix. The size and abundance of scales are heterogeneous from one site to another and over time. Parakeratotic cells often make up part of dandruff. Their numbers are related to the severity of the clinical manifestations, which may also be influenced by seborrhea.

Epidemiology

Dandruff affects around half of all adults.

Etymology

According to the Oxford English Dictionary, the word dandruff is first attested in 1545, but is still of unknown etymology.

C.HAIR OIL

Hair oils are composed of oils of vegetable origin as a base blended with small quantities of perfumes. Vegetable oils commonly used are coconut oil, castor oil and sesame oil. Hair oils are also coloured with a view to characterizing different brands and also rendering appeal. Being an item of mass consumption and in view of essentially simple nature of operations, a

hair oil unit is an attractive project proposition for budding entrepreneurs. Ayurvedic hair oil consists of herbal extracts in hair oil base, like bringaraj, amala brahmi hair oil etc.

Perfume hair oil

The production of perfumed Hair Oil establishing a small scale unit. Hair enhances the appearance & personality and thus needs proper care. Hair oil is essentially used to protect hair from early falling and/or premature discolouring to gray. Moreover, application of proper oil helps to add lusterto the hair, retaining them soft and flowing, prevent premature hair falling, keep the brain cool etc. The oil should be non-sticky, addition of perfume improves the fragranceand freshness and enhances the popularity.

Types of hair oil

1. Coconut oil

Coconut oil is pretty much the holy grail of hair oil. It acts as a heat protectant, repairs damaged hair and breakage, helps to prevent hair loss, as well as aids in hair growth. Because of its moisture retaining properties, coconut oil stays inside the hair instead of evaporating, making it one of the most effective hair treatments there is. Since coconut oil is loaded with fatty acids, it penetrates the hair more deeply than regular conditioners, leading to beautiful soft, silky, shiny hair, and who doesn't want that? For maximum benefits, we recommend using organic coconut oil whenever possible.

2. Argon oil

So, if coconut oil is made from coconuts, then argan oil is made from argans, right? Actually, yes! Argan is a type of tree found in Morrocco, which bears fruits with nuts, and that little nut is where argan oil is extracted from. If that doesn't impress you, maybe the fact that goats climb Argan trees will.

3. Castor oil

Castor oil comes from castor beans and is great for hair growth, because it has all the vital qualities such as vitamin E, minerals, and proteins. Castor oil also contains antioxidants, which support the keratin in hair, making it stronger, smoother, and healthier. If you get this oil, we recommend getting the cold-pressed variety (meaning there was no heat involved during the extraction process). 100% pure virgin castor oil offers many other great benefits such as controlling hair loss, fighting scalp infections and dandruff (due to its anti-fungal properties), conditioning and moisturizing the hair, as well as preventing split ends.

Phytochemistry of Ingredients

Amla

Synonyms: Emblica, Indian goose berry, Amlica

Biological source: This consist of dried, as well as Fresh fruits of the plant Emblica officinalis Gaerth phyllanthus emblica Linn.

Family: Euphorbiaceae.

Chemical constituents: Amla fruits is a rich natural source of vitamine C (Ascorbic acid) and contains 600-750 mg per 100 g of the fresh pulp. Fruits also contain about 0.5 per cent fat, phyllemblin and 5 per cent tannin. Amla fruits are also rich in mineral matters like phosphorus, iron and calcium. It contain appreciable amount of pectin.

Uses

1. Amla fruits are largely used in Indian medicines.
2. It is used as acrid, diuretic, refrigerant, and laxative.
3. Dried fruits are given in diarrhea and dysentery.

4 Fruits are also used in prepation of inks, hair oil and shampoo.

5. They are also administered in jaundice ,dyspepsia and anaemia along with iron compound.

Neem

Synonyms: Margosa

Biological Source: It consists of all aerial parts of plant known as Azadirachta indica.

Family: Mealiaceae

Chemical constituents: The neem oil contains 2% of bitters, which are sulphur contantaing compounds nimbin, nimbidin, nimbinin and nimbidol.Azadirachtin-k, new tetraterpenoid has been isolated from seed kernels of neem alongwith other compounds such has nimbolide, olichinolide B, nimbin,6-deacetyl-nimbin salanin and azadiradione.

Uses

1. Recently, it has been scientifically and reported that it contanins different chemicals which have insect repellant, insecticide, antifeedant, nematicide and antimicrobial properties
2. The seed oil has spermicidal activity.

Ashwagandha

Synonyms: Withania root, Asgandha, Winter cherry

Biological source: It consists of drided roots and stem bases of Withanian Somnifera (Linn).

Family: Solanaceae

Chemical constituents: The main of ashwagandha are alkaloids and steroidal lactones. Among the various alkaloids, withanine is the main constituent. The other alkaloids are somniferine, somnine, somniferinine, withananine, pseudo-withanine, tropine, pseudo tropine, 3- α-gloyloxytropane, cholin, cuscohygrine, isopelletierine, anaferine, and anahydrine.

Uses

1.Ashwagandha has sedative and hypnotic effect.

2. It has hypotensive, respiratory, stimulant action alongwith bradycardia.

3. It is an immuno-modulatory agent.

4. Traditionally, it has been used in the treatment of rheumatoid, gout, hypotension, nervine and skin-disease.

Bramhi

Synonyms: Bacopa

Biological source: It consist of the fresh leaves and the steam of the plant known as Bacopa moniera Linn.

Family: Scrophulariacea

Chemical constituent: Brahmi is found to contain the alkaloid brahmine, herpestine and mixture of 3 other alkaloid. It contain saponins, namely becoside Aand B. dditionally it also contain betulic acid, stigmasterol, monnierin and hersaponin. Bacosides Aand B on acid hydrolysis yield tritepenoid aglycone bacogenins A and B respectively.

Uses

1. It is used as nervine tonic, in the treatment of asthma, epilepsy and insanity.
2. It is aperients and also diuretic.
3. The alcoholic extract of the entire plant is found to have anti-concer activity.

Tulsi

Synonyms: Kali- tulsi, Veranda

Biological source: Tulsi is dried leaves of Ocimum sanctum.

Family: Lamiaceae

Chemical constituent: Leaves contains 0.7%of volatile oil.

It also contain: Eugenol (71%) methyl eugenol(20%) Caryophyllene (2-32%)

Uses

1. Help to fight against various infection.
2. Help to enhance the immune power.
3. Act as tonic for lungs.
4. Helps to promote clear comfortable breathing.
5. Help to maintain normal body temperature.

AIM: To Prepare and Submit Polyherbal Antidandruff hair Oil.

OBJECTIVE

1. To eliminate the microbial infection from scalp.
2. To reduce hair loss.
3. To remove dirt and dust from hair
4. Hair protection.

MATERIAL AND METHOD

Collection of plant part

For the preparation of herbal hair oil various plant material were collected viz., Amla, Brahmi, curry leaves, Ashwagandha, and Tulsi from the local market, botnical garden, peth vadgon, leaves of Azadirachta indica and hibiscus were collected from botanical garden.

Formulation of herbal hair oil

Herbs of all crude are collected and dried under shade. Drying under shade will retain the active constituent. Hence shade drying is preferred over artificial drying. The dried crude drugs were made into coarse powder by using mixer. Later on all these coarsely powdered drug are passed through mesh number 80.Thus obtained powders are blended together to get a uniform mixture. Now coconut oil is added and mixed well. Now the contents were boiled for 15 min and were filtered through muslin cloth. To the filtrate coconut oil was added to make up the volume. Finally small amount of flavoring agent was added to the oil and it was placed in amber coloured or transperant bottle.

Table 2: List of ingredient used for herbal hair oil preparation.

Sr. No	Ingredients	Quantity
1	Coconut oil	q.s
2	Hibiscus	6gms
3	Amla	6gms
4	Ashwagandha	6gms
5	Tulsi	6gms
6	Curry leaves	6gms
7	Bramhi	6gms
8	Neem	6gms
9	Orange oil	q.s

EVALUATION OF HERBAL HAIR OIL

Organoleptic property: Different or ganoleptic properties like colour, physical state, odour and solubility was determined manually.

Primary skin irritation test: The prepared formulations were assessed for primary skin irritation test. Healthy human volunteers were selected for the study. The hair of each voltunteer of 1cm ^{2} was shaved which could accommodate three test sites. It was cleaned with surgical spirit. The quantities of formulations were applied over the respective test sites were observed for erythema and edema for 48hrs after application.

PH: The pH of herbal hair oil was determined using pH meter.

Viscosity: It is an index of resistance of a liquid to flow, the higher the viscosity of liquid, the greater is the resistance to flow. The viscosity was determined using Ostwald's viscometer.

Refractive index: It was determined using Abbe's refractometer.

Saponification value: Accurately measured and transferred 1 mL of oil into 250 mL of conical flask and 10 mL of ethanol: ether mixture (2:1) was added. Kept the flask aside for 30min and was cooled. The cooled solution was titrated against 0.1 N HCL using phenolphthalein indicator. Similarly the blank titration was performed without taking oil (sample). Amount of KOH in mg consumed was calculated as below.

Saponification value=28.05×(Y-X)/W

Where, Y=ml of KOH required for blank,

X=ml of KOH required to neutralize the substance,

W=weight of sample taken for the test (gm.)

Saponification value=28.05×(Y-X)/W

=28.05×(92.5-85.6)/1

=28.05×(6.9)/1

=193.54

Specific gravity: Tack the specific gravity bottle, rinsed it with distilled water, dry it on oven for 15minutes, cool, closed it with cap and weight it (W_1). Now fill the same specific gravity bottle with the sample and closed it with cap and again weight (W_2).

Determine the weight of sample per millimeter by formula (W_2-W_1).

Specific Gravity= (w_2-w_1)

= (28.11-27.3)

=0.81

RESULTS AND EVOLUTION

1. Organoleptic property

The prepared was checked for their physical properties and their result are as below:

Color: Greenish color

Physical state: Liquid with greasy in nature

Odour: pleasant

Solubility: Soluble in non-polar solvent

2. Primary skin irritation test

This test was performed to evaluate the irritation of the formulated oil on the skin of human volunteers. The prepared formulation did not show any erythema /edema on the intact skin of human. This shows that the formulated oil was safe for use on human beings.

Table 3: Evaluation of polyhedral antidandruff hair oil.

Sr. No.	Tests	Observation
1.	Viscosity	28.30
2.	pH	7
3.	Specific gravity	0.81
4.	Saponification value	193.54
5.	Refractive index	1.42

CONCLUSION

India has a wide variety of medicinal herbs with various cosmetic and healing properties. The herbs constituent chosen for formulation of hair oil were reported to have antidandruff, hair thickening and hair fall control properties, which when used together elicited a synergistic effect in promoting heathy and shiny hair gowth. The formulation was proven to be safe for human use.

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