IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

FORMULATION AND EVALUATION OF SEMISOLID HERBAL HAIR GEL

Mr.Bodkhe V. D. , Dr. Kolhe S. D., Miss. Walunj Priyanka, Miss. Tarate Vaishnavi, Miss. Ajabe Snehal, Miss. Shirke Gayatri
Anand Charitable Sanstha's College of Pharmaceutical Science and Research Ashti TAL. – Ashti ,Dist.- Beed

ABSTRACT:

India is known for its traditional system of medicines like ayurveda, yoga, unani & siddha. Herbal plants and their cosmetics preparations are used to enhance the human appearance. Now a days these herbal plants and their preparations having higher demand in the world trade, because the usage of these herbal plants having higher efficacy, quality & safety. The aim of this project work was to formulate and evaluate the herbal hair gel of flaxseed that promotes hair growth and health while providing effective styling . The objective of existing research is to formulate and evaluate flaxseed hair gel to nourish our hair and prevent them from dandruff. Flaxseeds comprise omega3 fatty acids, which give energetic proteins and nutrients to hair follicles, boost circulation in the scalp, and inhibit hair follicle tenderness that inhibits hair fall. It contains vitamin E, which diminishes the influence of free radicals on the scalp and improves the hair growth and stronger hair follicles. Gel formulations containing Carbopol 934 and in exact concentrations of 0.5% were achieved and evaluated. The evaluation of the formulations was done on various parameters like physical appearance, pH, homogeneity, viscosity, spread ability, extrudability, and stability, In vitro evaluation study. Further there is lot of scope for carrying animal studies also.
The formulation results suggest the hair gel can be used as a natural alternative in the cosmetic industry.

Keywords: Aqueous extract, Carbopol, Flaxseed, Herbal Hair Gel.

INTRODUCTION

Flaxseed (also known as linseed) is emerging as an important functional food ingredient because of its rich contents of α-linolenic acid (ALA, omega-3 fatty acid), lignans, and fiber. Flaxseed oil, fibers and flax lignans have potential health benefits such as in reduction of cardiovascular disease, atherosclerosis, diabetes, cancer, arthritis, osteoporosis, autoimmune and neurological disorders.Apart from this, flaxseed is full of fatty-acids and anti-oxidants which help to remove toxins and dead cells from the scalp. Flax seed gel can be applied to scalp and hair as a moisturizer that can help to stimulate growth and improve the strength of existing hair.

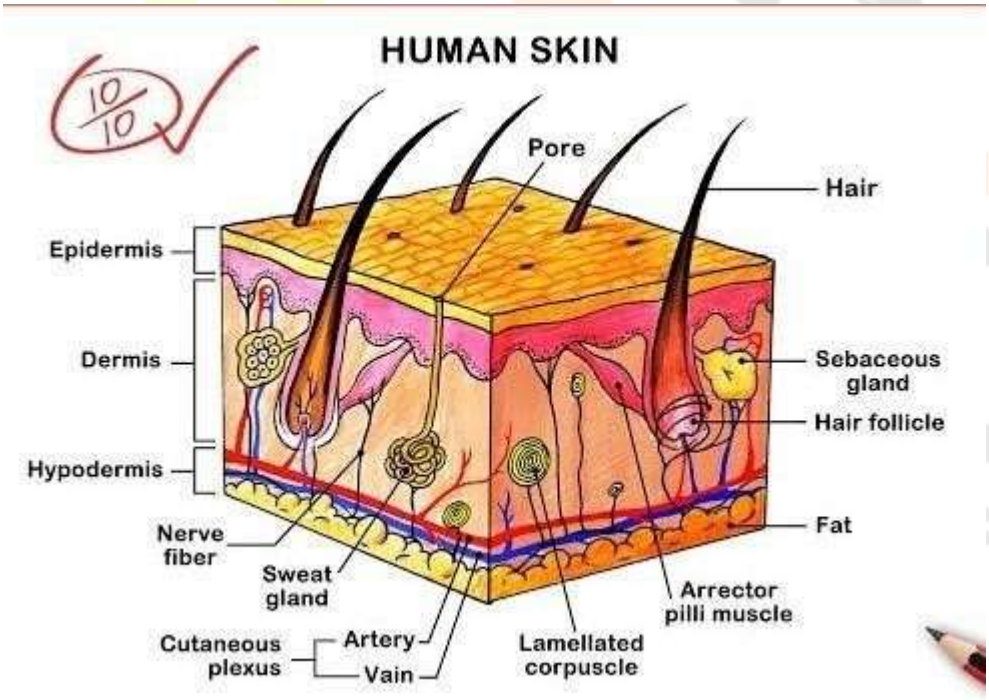
Topical formulations include oils, creams, ointments, pastes and gels out of which gels are getting more popular now a days because they are more stable and also can provide controlled release than other semisolid preparations. The gel formulations can provide better absorption characteristics and hence the bioavailability of drug. Gels are semisolid systems in which a liquid phase is constrained within a three dimensional polymeric matrix (consisting of natural or synthetic gums) in which a high degree of physical or chemical cross-linking has been introduced. Gels are relatively newer class of dosage forms created by entrapment of larger amount of aqueous hydro alcoholic liquids in a network of colloidal solid particles which may consist of inorganic substance such as aluminium salts or organic polymers of natural or synthetic origins.

1. PHYSIOLOGY OF SKIN:

The skin is a largest organ of body with greatest surface area:15-20sq.ft. (1.5-2m2), it is in fact made of tissues that work together as a single structure to perform unique and critical functions. The skin and its accessory structures make up the integumentary system, which provides the body with overall protection. The skin is made of multiple layers of cells and tissues, which are held to underlying structures by connective tissue [Fig.1]. The deeper layer of skin is well vascularized (has numerous blood vessels). It also has numerous sensory, and autonomic and sympathetic nerve fibers ensuring communication to and from the brain.

Layers of Skin:

- Epidermis
- Dermis
- Hypodermis (subcutaneous tissue)



1. The Epidermis:

The epidermis is composed of keratinized, stratified squamous epithelium. It is made of four or five layers of epithelial cells, depending on its location in the body. It does not have any blood vessels within it Skin that has four layers of cells is referred to as "thin skin." From deep to superficial, these layers are the stratum Basale, stratum spinosum, stratum granulosum, and stratum corneum. Most of the skin can be classified as thin skin. "Thick skin" is found only on the palms of the hands and the soles of the feet. It has a fifth layer, called the stratum lucidum, located between the stratum corneum and the stratum granulosum. The cells in all of the layers except the stratum basale are called keratinocytes. A keratinocyte is a cell that manufactures and stores the protein keratin. Keratinis an intracellular fibrous protein that gives hair, nails, and skin their hardness and water-resistant properties.

The layers of Epidermis are:

a) Stratum Basale:

The stratum basale (also called the stratum germinativum) is the deepest epidermal layer and attaches the epidermis to the basal lamina, below which lie the layers of the dermis. The cells in the stratum basale bond to the dermis via intertwining collagen fibers, referred to as the basement membrane. A finger-like projection, or fold, known as the dermal papilla (plural = dermal papillae) is found in the superficial portion of the dermis. Dermal papillae increase the strength.

of the connection between the epidermis and dermis; the greater the folding, the stronger the connections made.

The stratum basale is a single layer of cells primarily made of basal cells. A basal cell is a cuboidal- shaped stem cell that is a precursor of the keratinocytes of the epidermis. All of the keratinocytes are produced from this single layer of cells, which are constantly going through mitosis to produce new cells. As new cells are formed, the existing cells are pushed superficially away from the stratum basale. Two other cell types are found dispersed among the basal cells in the stratum Basale. The first is a Merkel cell, which functions as a receptor and is responsible for stimulating sensory nerves that the brain perceives as touch. These cells are especially abundant on the surfaces of the hands and feet.

The second is a melanocyte, a cell that produces the pigment melanin. Melanin gives hair and skin its colour, and also helps protect the living cells of the epidermis from ultraviolet (UV) radiation damage. **b) Stratum Spinosum:**

As the name suggests, the stratum spinosum is spiny in appearance due to the protruding cell processes that join the cells via a structure called a desmosome. The desmosomes interlock with each other and strengthen the bond between the cells. It is interesting to note that the "spiny" nature of this layer is an artifact of the staining process. Unstained epidermis samples do not exhibit this characteristic appearance. The stratum spinous composed of eight to10 layers of keratinocytes, formed as a result of cell division in the stratum basale. Interspersed among the keratinocytes of this layer is a type of dendritic cell called the Langerhans cell, which functions as a

macrophage by engulfing bacteria, foreign particles, and damaged cells that occur in this layer. The keratinocytes in the stratum spinosum begin the synthesis of keratin and release a water- repelling glycolipid that helps prevent water loss from the body, making the skin relatively waterproof. As new keratinocytes are produced atop the stratum basale, the keratinocytes of the stratums pinosum are pushed into the stratum granulosum

C) Stratum Granulosum:

The stratum granulosum has a grainy appearance due to further changes to the keratinocytes as they are pushed from the stratum spinosum. The cells (three to five layers deep) become flatter, their cell membranes thicken, and they generate large amounts of the proteins keratin, which is fibrous, and keratohyalin, which accumulates as lamellar granules within the cells. These two proteins make up the bulk of the keratinocyte mass in the stratum granulosum and give the layer its grainy appearance. The nuclei and other cell organelles disintegrate as the cells die, leaving behind the keratin, keratohyalin, and cell membranes that will form the stratum lucidum, the stratum corneum, and the accessory structures of hair and nails.

D) Stratum Lucidum:

The stratum lucidum is a smooth, seemingly translucent layer of the epidermis located just above the stratum granulosum and below the stratum corneum. This thin layer of cells is found only in the thick skin of the palms, soles, and digits. The keratinocytes that compose the stratum lucidum are dead. These cells are densely packed with Leiden, a clear protein rich in lipids, derived from keratohyalin, which gives these cells their transparent (i.e., lucid) appearance and provides barriers water. **E) Stratum Corneum:**

The stratum corneum is the most superficial layer of the epidermis and is the layer exposed to the outside environment. The increased keratinization (also called cornification) of the cells in this layer gives it its name. There are usually 15 to 30 layers of cells in the stratum corneum. This dry, dead layer helps prevent the penetration of microbes and the dehydration of underlying tissues, and provide same chemical protection against abrasion for the more delicate, underlying layers. Cells in this layer are shed periodically and are replaced by cells pushed up from the stratum granulosum (or stratum lucidum in the case of the palms and soles of feet).

2) Dermis:

The dermis might be considered the “core ” of the integumentary system (derma= “skin”), as distinct from the epidermis (epi-= “upon” or “over”) and hypodermis (hypo = “below”).It contains blood and lymph vessels,nerves, and other structures, such as hair follicles and sweat glands. The dermis is made of two layers of connective tissue that compose an interconnected mesh of elastin and collagenous fibers, produced by fibroblasts. .

Papillary Layer:

The papillary layer is made of loose, areolar connective tissue, which means the collagen and elastin fibers of this layer form a loose mesh. This superficial layer of the dermis projects into the stratum basale of the epidermis to form finger-like dermal papillae. Within the papillary layer are fibroblasts, a small number of fat cells (adipocytes), and an abundance of small blood vessels. In addition, the papillary layer contains phagocytes, defensive cells that help fight bacteria or other infections that have breached the skin. This layer also contains lymphatic capillaries, nerve fibers, and touch receptors called the Meissner corpuscles.

a) Reticular Layer:

Underlying the papillary layer is the much thicker reticular layer, composed of dense, irregular connective tissue. This layer is well vascularized and has a rich sensory and sympathetic nerve supply. The reticular layer appears

reticulated (net like) due to a tight mesh work of fibers. Elastin fibers provide some elasticity to the skin, enabling movement. Collagen fibers provide structure

and tensile strength, with strands of collage next ending into both the papillary layer the hypodermis. In addition, collagen binds water to keep the skin hydrated. Collagen injections and Retin-A creams help restore skin turgor by either introducing collagen externally or stimulating blood flow and repair of the dermis, respectively.

3) Hypodermis:

The hypodermis (also called the subcutaneous layer or superficial fascia) is a layer directly below the dermis and serves to connect the skin to the underlying fascia (fibrous tissue) of the bones and muscles. It is not strictly a part of the skin, although the border between the hypodermis and dermis can be difficult to distinguish. The hypodermis consists of well vascularized, loose, are connective tissue and adipose tissue, which functions as a mode of fat storage and provides insulation and cushioning for the integument

HERBAL GEL:

A gel solid or semisolid system of at least two constituents consisting of a condensed mass enclosing and interpenetrated by liquid. The rigidity of a gel arises from the presence of a network formed by the interlinking of particles gelling agent. The nature of the particles and the type of force that is responsible for the linkages, which determines the structure of the network and the properties of gel. The individual particles of hydrophilic colloid may consist of either spherical or anisometric aggregates of small molecules, or single macromolecules. Possible arrangements of such particles in a gel network are shown in. In linear macromolecules the network is comprised of entangled molecules, the point of contact between which may either be relatively small or consist of several molecules aligned in acrystalline order. The force of attraction responsible for the linkage between gelling agent particles may range from strong primary valencies, as in silicic acid gels, to weaker hydrogen bonds and under waals forces. The weaker nature of these latter forces is indicated by the fact that a slight increase in temperature often causes liquefaction of gel.

Hair Scalp Infection:

Dandruff is skin condition with Symptoms includes flaking and sometimes mild itchiness cause to the scalp. The are many bacteria, Fungus causing scalp infections which leads to further hair problems or skin issues. There is one of the common conditions candidiasis which is typically caused on the skin or mucus membrane caused by candida. As skin is the protective layers of body against infection but this yeast leads to skin conditions and if is multiplies it can become pathogenic. This fungus thrives mostly in moist, warm and sweaty conditions, there been some subdivisions in case of Candidiasis based on the areas of body and also consist of approx 150 species among these Candida albicans is most prevalent, This yeast is supposed to be present in healthy people. The symptom varies on basis of body location, focusing on the scalp problem the symptoms such as rash and white flaky substance over affected area is formed. There are many allopathic formulation treatments for this infection. Malassezia most commonly present in patients with higher levels of sebaceous secretion because of malassezia feed off of lipids.[9]

Folliculitis is a skin syndrome which is commonly found in population and cause inflammation to the skin. Several microbial agents act as causative Flaxseed has long history of use in India and flaxseed preparations are particularly considered for its nutrients and therapeutic property . In Southern India, flaxseed is partly being consumed by at lower levels as flaxseed chutney. Linum Usitatissimum L, the linseed producing plant belongs to the family Linoceae.Flax seed gel has several benefits on 4C hair. The gel is rich in omega-3 fatty acids, vitamins, minerals and Lignin which nourish the hair and promote growth. The omega-3 fatty acids in flaxseed gel is

responsible for moisturizing the hair. The presence of vitamin E in flaxseed provides nutrition to the scalp and reduces free radical damage.Flaxseed is rich in omega-3 fatty acids It can also reduce inflammation"It nourish dry, damaged hair, and fatty acids have been touted for their ability to provide moisture."Flaxseed gel helps hair grow faster and longer by providing nourishment to the hair follicles.

Flax seed gel can be applied to scalp and hair as amoisturizer that can help to stimulate growth and improve the strength of existing hair. "Flaxseed gel helps hair grow faster and longer by providing nourishment to the hair follicles," explains Celeste Arnold, senior stylist and owner of Celeste Arnold Hair and Makeup. "The presence of vitamin E in flaxseed provides nutrition to the scalp and reduces free radical damage." Flaxseeds extracts with unique composition of different phenyl propanoid compounds. Due to the elevated level of secoisolariciresinol diglucoside (SDG), ferulic acid, p – coumaric acid, their glucosides and also their multi directional mode of action the Flax seeds (Extract) were effective in inhibiting bacterial growth and fungal growth

FLAXSEED BENEFITS FOR HAIR:

The following ingredients can offer specific benefits for your hair:

Omega-3 fatty acids: omega 3 fatty acid provides vitamins, proteins and nutrients to hair and scalp. Omega 3 fatty acid inhibit hair follicle inflammation and help in reducing hair loss. It promotes circulation in the scalp that may effective in hair growth.

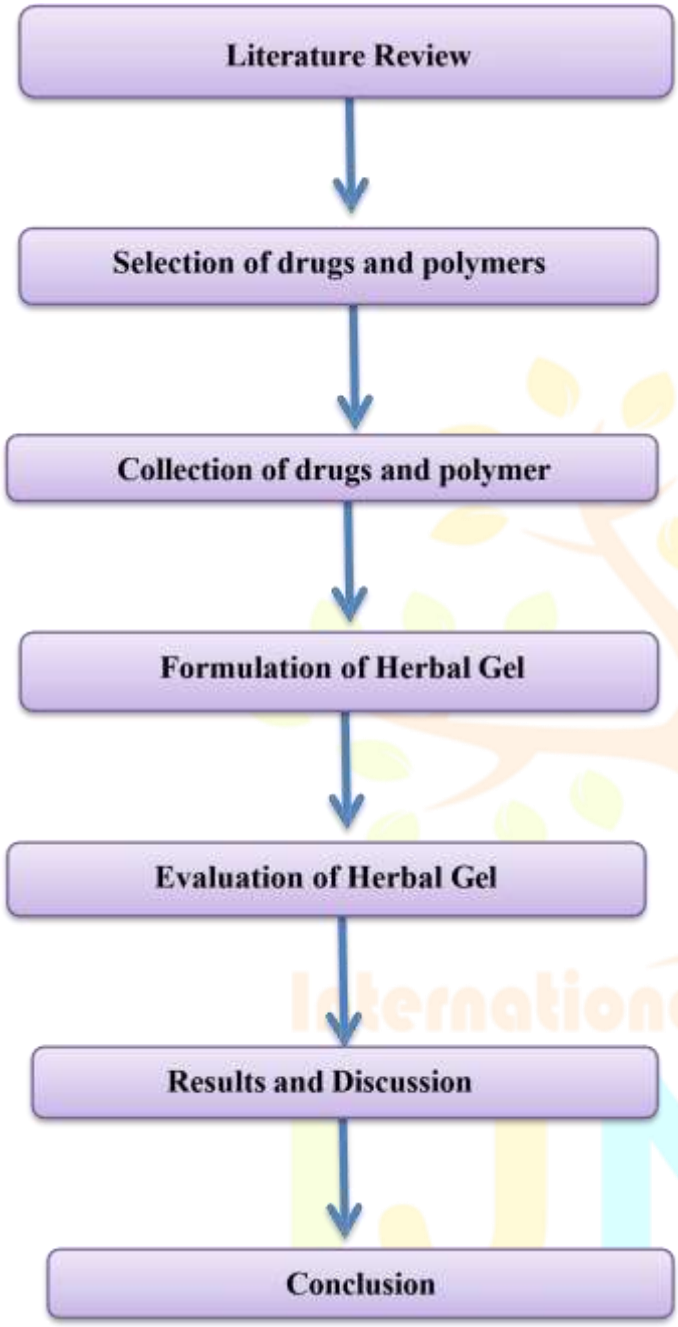
Antioxidant: Antioxidant produces by flaxseed is lignans. lignans may help to suppress or inhibit bacterial growth. Lignans may help in regeneration of hair and reduces hair loss.

Vitamin B: Flaxseed is a consistent source of vitamin B. Vitamin b is a group of nutrients that are recognized for making hair stronger and healthier at a more rapid rate**.**

Fiber: Fiber is the most significant for the hair health. Fiber is made from some protein it significantly known as keratin. Many hair products in the market are enhanced with added fiber for minimizing hair damage. Fibers are very effective in camouflaging hair loss.

Vitamin E: Vitamin E is antioxidant is readily available in flaxseed and is vital for hair growth. Vitamin E blocks erosion on scalp tissues and preventing hair loss. Vitamin E is best known vitamin for hair growth. Vitamin E stops hair fall and provides nourishment to hair. Vitamin E help to maintain a healthy hair.

PLAN OF WORK:



DRUG PROFILE:

DRUG USED IN FLAX SEED GEL FORMULATION:

1. Flax seed
2. carbopol932
3. Polyvinylpyrrolidone(pvp)
4. Triethanolamine
5. Polyethylene glycol200
6. Methyel paraben
7. Glycerin
8. Aloe vera

1) Name: Flax Seed

Common names: Flax seed, linseed, Alsi or teesi (Hindi, Gujarati, and Punjabi), Ali vidai in Tamil , Atasi and Jawas in Marathi, Tishi in Bengali, Pesi in Oriya, Agasi in Kannada, Aviseginzalu in Telugu, and Cheruchanavithu in Malayalam.

Biological Source: Linseed is the dried, ripe seed of Linum usitatissimum Linn. Linseed oil is obtained by expression of linseeds, belonging to family Linaceae.

Scientific name: Linum usitatissimum

Kingdom: Plantae

Order: Malpighiales

Family: Linaceae

Genus: Linum

Species: L. usitatissimum

MORPHOLOGY:

Studies have reported that Flax is a plant and has been a stable part of farming for hundreds of years and every part of it was usable. The seeds for food and the production of linseed oil (another name for Flax and is a good preserver of wood as well as good for our bodies) and the stems for example can be used to

produce linen fiber for clothes and other products. The oil industry (petroleum) removed some of the needs of Flax and so its production took a decline especially after the II World War commonly cultivated Flax plants are named Linumusitatissimum [15] Cultivated Flax plants grow to 1.2 m (3ft 11in) tall, with slender stems. The leaves are glaucous green, slender lanceolate, 20-40mm long and 3mm broad. The flowers are pure pale blue, 15–25mm diameter, with five petals. The fruit is a round, dry capsule 5-9mm diameter, containing several glossy brown seeds shaped like an apple ip, 4– 7mm long

flax (Linum usitatissimum) in a true flowering crop that produces small, flat seeds ranging in color from golden yellow to reddish brown. The seeds are commonly consumed in one of three ways whole seed, ground seed (powder or meal), or flaxseed oil. In the last decade, faxed has garnered attention due to its reported health benefits. The American Botanical Council reported a 177% increase in sales of flax products in 1999 alone. Most of the benefits reported from flaxseed consumption are believed to the following three importance components found in flexseeds, α-linolenic acid (ALA), lignans, and fiber

USES:

1. improve digestive health
2. nourishes the scalp and roots
3. stimulates the growth of hair
4. anti-bacterial activity
5. anti-inflammatory activity
6. rich of omega -3 fatty acids and vitamin E that prevent the breakage of hair and strengthen the hair.
7. boosts skin and hair growth.
8. protect against UV damage
9. lower blood sugar
10. weight loss or obesity
11. Rich in fatty acids and antioxidants, flaxseed aids in the removal of pollutants and dead skin cells from the scalp.
12. You can use flax seed gel as a moisturizer on your hair and scalp.
13. Aid in promoting new hair development and strengthening existing hair. Topical formulations come in the form of oils, creams, ointments, pastes, and gels; among these, gels are becoming more and more well-liked these days due to their increased stability and ability to offer controlled release in comparison to other semisolid preparations

14. The gel formulations can provide better absorption characteristics and hence the bioavailability of drug **2) name:** Aloe vera.

Biological Source: aloe is obtained from the dried juice of leaves of aloe barbadensis miller..

Scientific name: aloe barbadensis miller.

Kingdom: plantae **Order:**

Asparagales

Family: liliaceae

Genus: aloe

Aloe vera uses:

- Aloe vera is a natural remedy which help to reduce dandruff and nourishes the hair. It produced from the farm in batches.
- It locally available for various purpose because it contains many properties like vitamins, minerals and other ingredients which is essential for healthy hair growth and provide nourishment.
- Aloe vera is an herbal drug and containing efficacious properties and less side effect, so it has been widely used.
- Aloe vera is directly applied on scalp to relief from dandruff, so it is protective for hairs.
- Aloe vera is support in preventing the formation of dandruff and hair dryness. Aloe vera contain vitamin, enzymes, minerals, salicylic acid, amino acid, saponin, lignin, sugar due to this it efficacious for skin hydration.
- Aloe vera prevents the scalp from dandruff and protective for hair

MATERIALS AND METHODS: MATERIAL:

Sr.no	Materials used
1	Flax seeds
2	Carbopol934
3	Polyvinylpyrrolidone (PVP)
4	Triethanolamine
5	polyethylene glycol 200
6	Methyl paraben
7	glycerin,
8	distilled water
9	Aloe vera

METHOD:

Preparation of hair gel base:

Weighed the Polyethylene glycol 0.7 ml, methyl paraben 0.18mg and glycerin 30 ml were dissolved in 45 ml of water in a 250 ml beaker. Then above mixture was stirred by using mechanical stirrer at high speed up to 800 rpm. Appropriate quantity of 2gm Carbopol 934 and 2 gm polyvinylpyrrolidone (PVP) were added slowly in the beaker containing above mixture of solvent with continuous stirring. Then 0.5 ml triethanolamine (gelling agent) was added slowly with continuous stirring until gel was obtained. In this way prepared 3 different formulations of hair gel base in which the concentration of Carbopol 934 were changed. Prepared 3 different concentrations of containing Carbopol hair gel base Formulations like F1, F2, F3 and these different formulations concentrations mentioned in table 1. These above formulations stored at room temperature for 24 hrs. until further evaluations. After storing for 24 hrs. from this above 3 gels the F1 Carbopol gel base formulations containing 2 gm Carbopol 934 showed smooth and too thick gel to handling and it is perfect as compare to other concentration. So, among these 3 formulations the F1 formulations which contains 2 gm Carbopol is results good so it was carried out or further studies. The gel formation was better observed after 24 hours. The F1 gel preparation containing 2g of Carbopol 934 were formed unchanging and smooth gel, that did not liquify and the appearance is also unchanged even after 24 hrs.

Preparation of aloe vera pulp:

The leaf was peeled and prepared natural aloe vera gel, by using a small spoon or scooped and a blender. Be careful about not to include any pieces of the aloe vera skin in aloe vera pulp. Aloe vera gel were blended until it's frothy and liquefied and stored the pulp in refrigerator.

Preparation of extract:

The flaxseed aqueous extract was prepared by boiling 15 gm flaxseed with sufficient quantity of 250 ml distilled water with continuous stirring until thick mucilage was obtained. Then the mucilage was filter by using suitable sieve and masculine cloth and stored at room temperature. The gel was stored in room temperature until further use for Stabilization purpose.

Table 1: Formulation of Herbal Hair gel base

Formulation code	F1	F2	F3
Carbopol934(g)	2	2.5	3
Pvp(mg)	2	2	2
Methyl paraben (mg)	0.18	0.18	0.18
Glycerin (ml)	30	30	30

PEG(ml)	0.7	0.7	0.7
Trimethanolamine(ml)	0.5	0.5	0.5
Water(ml)	45	45	45

Preparation of herbal hair gel:

Herbal hair gel formulations were prepared by simple gel preparation method with Carbopol gel base. Measured quantity of methyl paraben 0.18 gm, glycerin 30 ml and weighed quantity of polyethylene glycol 0.7 gm were dissolved in about 45 ml water in a beaker. Then the mixture was stirred at high- speed by using mechanical stirrer. 2g Carbopol 934 and 2 gm of Polyvinylpyrrolidone were added slowly in the beaker containing above mixture while stirring. Then triethanolamine was added slowly with continuous stirring to obtain gel structure. Then 30 ml aloe vera pulp & 1 to 2 drop of sandal wood oil added slowly by stirring continuously and stored the gel at room temperature. In this way prepared 3 different concentrations of hair gel formulations by varying in the concentration of aqueous flaxseed mucilage like 5%,10%,15% and it was introduced into Carbopol gel base Formulations and other ingredients also added in it and stirred up to 1 hr. So, obtain 3 different formulations like F1C1, F2C2, F3C3 .These 3 different formulations contents mentioned in table 2. These different gels were stored at room temperature for 24 hrs. until further evaluations. After 24 hrs. among these above formulations the F1C1 formulation shows the good stability, viscosity, physical appearance, homogeneity and other parameters.So according to evaluation results, among these 5 formulations F1C1 is shows perfect stabilities and resulted good in evaluations study so this formulation is carried out for further marketed evaluation and formulation purpose. The prepared herbal gel formulations were stored at room temperature Table 2: Formulation of Herbal Hair gel

Formulation code	**F1**	**F2**	**F3**
Aqueous extract of flaxseed%	5	10	20
Carbopol934(g)	2	2.5	3
PVP(mg)	2	2	2
Methyl paraben (mg)	0.18	0.18	0.18
Glycerin (ml)	30	30	30
PEG(ml)	0.7	0.7	0.7
Trimethanolamine(ml)	0.5	0.5	0.5
Water(ml)	45	45	45

EVALUATION OF HERBAL HAIR GEL FORMULATIONS:

Physical Appearance:

The color of the herbal gel formulations was found to be pale yellow with translucent appearance which was found to besmooth on application. This result is mentioned in table 3.

Homogeneity:

The gel was tested for homogeneity by pictorial inspection for the presence of any flocculates and lumps. The homogeneity was found to be excellent for the gel formulations. This result is mentioned in table 3. **pH determination:**

The pH of the herbal gel formulations was found to be in between 6.7 to 7.3, that suited for the hair The above Formulation indicating the compatibility with hair. This result is mentioned in table 3.

Extrudability:

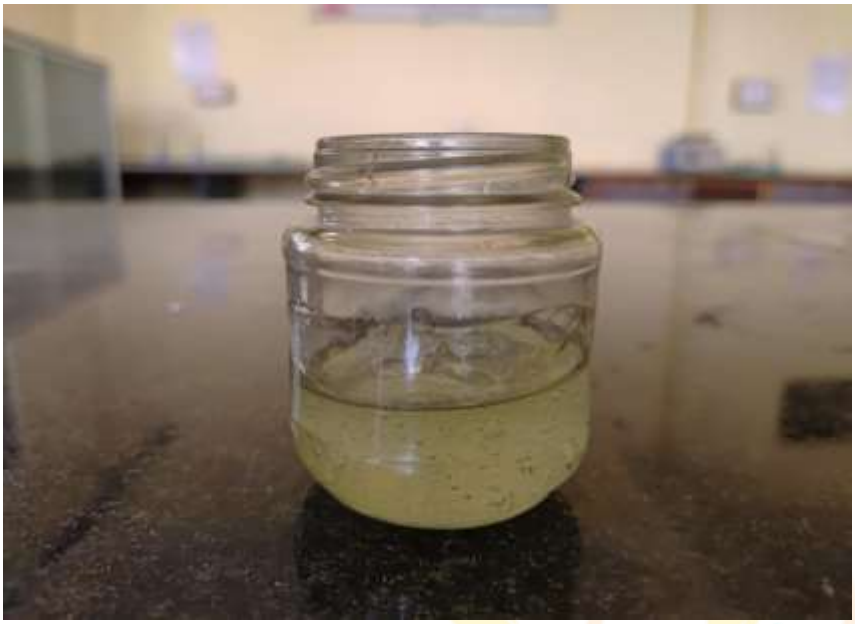
The flaxseed gel formulations were introduced into metal tubes this tube is collapsible. Then pressed the tubes and extrude the material and evaluate the extrudability of flaxseed hair gel. The resulted extrudability mentioned in table 3.

Viscosity determination:

The viscosity was determined by using Brookfield viscometer. Vane spindle were used for calculating the viscosity of this formulation. The formulation was filled in wide mouth container for better measurement of viscosity. The rpm of the spindle is adjusted to 25 rpm and viscosity was recorded. The viscosity of the preparations was found in the range. From the above results it is clear that as the concentration of flaxseed gel extract increased from 5% to 20% the viscosity of the preparations also enhanced. This result is mentioned in table 3 & 4. increased from 5% to 20% the viscosity of the preparations also enhanced. This result is mentioned in table 3.

Table 3: Evaluation of herbal hair gel

Formulation	Physical appearance	Homogeneity	pH	Extrudability	Viscosity(cps)
F1C1	Translucent, pale brown, smooth on application	Excellent	6.5	++	1,50,232
F2C2	Translucent, pale yellow, smooth on application	Good	6.8	++	1,50,692
F3C3	Translucent, pale yellow, smooth on application	Good	7.2	+++	1,51,658



RESULTS AND DISCUSSION:

Physical appearance:

The color of all the herbal gel formulation found to be pale brown with translucent appearance which was found to besmooth on application. This result is mentioned in table 3.

Homogeneity:

The developed gel was verified for homogeneity by pictorial inspection for appearance and presence of any flocculates and lumps. The homogeneity was found to be excellent for the gel formulation. This result is mentioned in table 3.

PH determination:

The pH of the herbal gel preparations ranged between 6.7 to 7.3, that suited the hair, indicating the compatibility of the herbal gel preparations with the hair. This result is mentioned in table 3.

Extrudability determination:

Formulations showed the good extrudability when the gel formulation extruded from metallic collapsible tube. The gel had excellent extrudability. The resulted extrudability mentioned in table 3 **Viscosity determination:**

The viscosity was determined by using Brookfield viscometer. Vane spindle was used for calculating the viscosity of this formulation. The formulation was filled in wide mouth container for better measurement of viscosity. The rpm of the spindle is adjusted to 25 rpm and viscosity was recorded. The viscosity of the formulations was found in the range of 1,50,232 to 1,52, 876 cps. From the results it is clear that as the concentration of flaxseed extract increased the viscosity of the formulations also increased. This result is mentioned in table3.

CONCLUSIONS:

The flaxseed hair gel formulations provide a tremendous result in treatment of the scalp and strengthens the hair thereby inhibiting the hair loss. Flaxseed hair gel also prevents the hair from dandruff. Flaxseed also acts as an Anti-dandruff agent and involved in to reduce the generation of dandruff flakes. Flaxseed hair gel is prepared by simple boiling procedure, so it is less in cost and easy to handle. In flaxseed hair gel the aloe vera gel is also incorporated so it results in elimination of dandruff from scalp and protective for hair and provides healthy growth. The evaluation of the formulations was done on various parameters like physical appearance, pH, homogeneity, viscosity, spread ability, extrudability, and stability, In vitro evaluation study. The evaluation results shows that the flaxseed hair gel is compatible for hair and it having less side effects and these parameters show results in standard range.

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