



upper layer of the scalp that is epidermal layer replaces itself by pushing itself toward the edge and in the end the cells die and the skin of scalp break away and flake off. For most of the people, this type of flakes are too small in size and also too small to viewable. However this precise condition cause the cells change to be uncommonly rapid, specifically in the scalp. It is speculated that the people having the dandruff skin cells can be mature and shed off within 2-7 days that is opposite to the around a month in individuals without dandruff. The outcome is that dead skin cells are shed in oil, large clumps, which appear like white and grey colored flakes on the scalp.

### 3.2. Symptoms

- White flakes on scalp
- Itchy scalp
- Scaly facial skin
- Recurrent ear eczema
- Chest rash with dry flaky and red spots



Fig: 2 Dandruff

### 3.3. Causes of Dandruff:

Causes can be classified into-  
Microbial and Non-microbial

#### a) Microbial factor:

1. Fungal :
  - Malassezia

It is the fungi which restore the enzyme that is known as lipase present on the hair scalp. This enzyme is

responsible for the oxidation of triglycerides of the sebum which give rise to the saturated fatty acids and unsaturated fatty acids that are consumed by the fungi called Malassezia. The unsaturated fatty acids involve the oleic acid and arachidonic acid. Oleic acid is very irritant to the human skin. That's why the reaction of degradation of the fatty acids are irritation of the hair scalp and growth of fungi.

#### 2) Bacterial:

- Imbalance in the proportion of the mainly two bacterial population found in the hair scalp. The causes of dandruff are propioni bacterium acnes and staphylococcus epidermidis.

#### b) Non-microbial factor:

1. Damage to scalp stratum corneum
2. Individually susceptibility to oleic acid.
3. Dry scalp
4. Oily or irritate skin.
5. Sensitivity to hair cosmetics.
6. The scalp condition like the eczema and psoriasis.

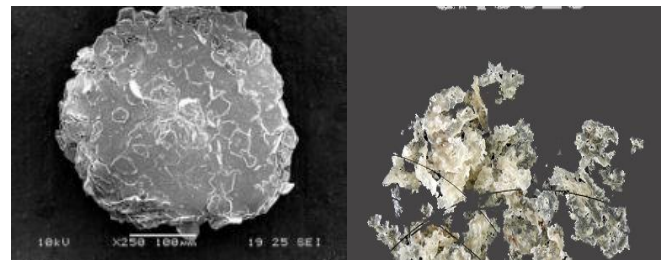


Fig.3 Structure of Dandruff

### 4. HAIR GEL:

Varieties of hairs are seen, some are dry some soft, rough and many different. It is difficult to make hairstyles for such hairs. But the Hair gel has made all the things easy. Hair gel is hairstyling cosmetic product which is used to harden the hairs into a specific hairstyle. This hairstyling product is applied to wet hairs to aid in the styling process. It is obtain in different forms, such as gel consistency, liquid consistently or in spray form. The holding power varies from light hold to strong hold and is most frequently preferred styling product for

styles that are allowed to air dry. This hair product is achieved from professional salons as well as at discount drug stores. Hair gel is not only used to aid in the styling process of different hairstyles but also most useful at providing a "wet look". Gel is also use for crunching, a term which refers branching up of hair to boost any natural or chemical curly ness or waves of the hair. It is also used for heat styling. Some of hair gels are used as Anti- dandruff and growth purpose.

#### 4.1. History of hair gel

In the ancient times the mummies styled their hairs using the gel that was based on fats. They applied the gel when alive and also when dead. Natalie was the archaeological scientist from the University Of Manchester, England and her co-workers studied the mummies hair samples which are taken from the 18 mummies. One of the oldest hair sample is 3,500 years old. In the year of 1914, the small pharmacy was located at the Buenos Aires, Argentina, a student named Josa Antonio Brancato made up the fixative for the hair which was named as gomina. For the formulation he mixed the gum arabic and Persian tragacanth and some of different types of perfumes. Later on the word gomina was synonyms to fixative. The purpose of fixative was to displace the soaps and the oils. The British Company Chemico Works created the Brylcreem in 1929 which became very popular and lead in the hair styling products both in the United Kingdom and United States. The modern type of hair gel was invented in the 1960s. The modern hair gel was named as the creator that is Luis Montoya. He gives the formulation unique and non-sticky or non-greasy finish by adding the Diethyl phthalate.

### 5. AIM AND OBJECTIVES

#### 5.1 AIM:

Formulation and Evaluation of anti-dandruff hair gel by using Apium graveolens(Celery seeds).

#### 5.2. OBJECTIVE:

The main objectives of the proposed topic are:

- To formulate a hair gel with celery seeds for anti-dandruff activity.

- To evaluate the stability parameter of prepared formulation.

### 6. LITURATURE SURVEY

**Barbara Buffoli et al (2014)**-The human hair: from anatomy and physiology, studied the hair is unique character of mammals and several functions from protection of skin to sexual and social communication. S.Ranganathan et al (2010)- The article discuss in about the prevalence, pathophysiology, clinical manifestations of dandruff including the etio-pathology. The article also discusses in detail about various treatment methods available for dandruff.

**Naglaa H.M. Hassanen et al (2015)**- studied the Antioxidant and Antimicrobial activity of celery and coriander herb and seeds essential oil. The aim of the present study was to investigate the essential oils constituents and to study the antioxidant and antimicrobial activity of the celery. The chemical composition of the essential oils obtained from the hydro distillation process.

**Papamichail et al (2000)**-described the Supercritical fluid extraction of celery seeds oil. The supercritical fluid extraction of celery seeds using the CO<sub>2</sub> as a solvent described in this study.

**Riska Surya Ningrum et al (2017)**- studied the use Essential oil from the Apium graveolens(Celery seeds) and isolated ,identified and tested its activity against the fungi pytorosporum ovale, fungi that causes the dandruff.

**Ayesha Khalil et al (2015)**-Described the value added products, chemical constituents and medicinal use of Celery seeds (Apium gaveolens).They described the different parts of this plant is used for the medicinal formulations due to their anti-inflammatory, anti-fungal, anti-microbial, anti-oxidant potentials.

**M.P.Jain.et al (2003)**-studied an improved method for the recovered of the essential oil from the Celery seeds.

**Sharma M. et al (2013)**- Formulation and standardization of hair gel for the Treatment of Chronic Inflammatory disorder seborrheic dermatitis. In thus article they described about the dandruff and the formulation of the hair gel along with its evaluation parameters.

**Syed Sufiyan Fazal et al (2012)** –described the review on the Pharmacognostical and Pharmacological Characterization of Apium graveolens Linn. They studied

the pharmacological properties of the medicinal plants and various natural products plant origin lie in the chemical constituents they contain.

**M.Narshana et al (2018)** - studied the overview of Dandruff and novel formulations as treatment strategy. This review gives an insight of scalp condition dandruff. This article aims at investigating others causes of dandruff.

## 7. ACTIVE PROFILE

Active Name: Apium graveolens

### 7.1. BIOLOGICAL SOURCE:

Celery seeds are a marshland plant which is obtained from the plant Apium graveolens belonging to family Apiaceae.

### 7.2. SCIENTIFIC CLASSIFICATION:

Kingdom: Plantae

Family: Apiaceae

Genus: Apium

Species: A.graveolens

### 7.3. GEOGRAPHICAL SOURCE:

Celery seeds found in the Europe and in the Asia West of the Himalayas. The Ancient Greeks and Egyptians already cultivated celery. It was probably first grown as a medicinal plant, and for the flavoring.

### 7.4. DESCRIPTION:

The seeds are broad ovoid to globose, 1.5-2mm long and wide

### 7.5. CHEMICAL CONSTITUENTS:

Celery seeds contains the volatile oils, proteins, crude fibers, moisture, starch, ash, carbohydrates an fixed oils. The fatty acids in oil contains the oleic acid, palmitic acid, linolenic acid stearic acid. The essential oil of celery seeds contains salience, sesquiterpens, limonene, 3-isobutylidenphthalide and characteristic aroma.

### 7.6. BENEFITS OF CELERY SEEDS:

- Rich in Vitamin A, C and E along with the minerals like Calcium, Selenium and Magnesium.
- It provides hair nutrients to nourish hair follicles
- It soothes the itchy scalp.
- Extract of celery seeds showed inhibitory activity against the fungi causing dandruff.
- It moisturizes and decreases the sebum production.
- It shows the anti-fungal, anti-bacterial activity against the bacteria and fungi.



Fig .4 Celery seeds

## 8. MATERIALS AND METHODOLOGY

### 8.1. MATERIALS:

| Sr. No. | Material            | Name of supplier    | Role of material |
|---------|---------------------|---------------------|------------------|
| 1       | Carbopol            | Vishal Chem,Mum bai | Gelling agent    |
| 2       | Polyethylene glycol | Vishal Chem,Mum bai | Emollient        |
| 3       | Sodium benzoate     | Loba Chemie         | Preservative     |

|    |                      |               |                       |
|----|----------------------|---------------|-----------------------|
| 4  | Triethanolamine      | Rankem        | Buffering agent       |
| 5  | Glycerin             | Rankem        | Humectants            |
| 6  | Ethanol              | RFCL, Limited | Drying agent          |
| 7  | Distilled water      | –             | Solvent               |
| 10 | Celery seeds extract | –             | Active ingredient     |
| 11 | Perfume              | –             | Fragrance             |
| 12 | Color                | –             | Attractive appearance |

## 8.2. METHODOLOGY

- Measure quantity of sodium benzoate, glycerine and weigh quantity of polyethylene glycol
- The above mixture is dissolved in about 35ml of water in beaker and stirs it.

| Sr. No | Ingredients         | Quantity 100% |        |        |
|--------|---------------------|---------------|--------|--------|
|        |                     | B1            | B2     | B3     |
| 1      | Carbopol 940        | 0.32%         | 0.38%  | 0.45%  |
| 2      | Polyethylene Glycol | 12.90%        | 12.90% | 12.90% |
| 3      | Sodium benzoate     | 0.10%         | 0.10%  | 0.10%  |
| 4      | Triethanolamine     | 1.54%         | 1.54%  | 1.54%  |
| 5      | Glycerin            | 6.4%          | 6.4%   | 6.4%   |

|    |                      |                     |        |        |
|----|----------------------|---------------------|--------|--------|
| 6  | Ethanol              | 12.90%              | 12.90% | 12.90% |
| 7  | Distilled water (ml) | 64.51%              | 64.51% | 64.51% |
| 8  | Celery seeds extract | 1.29%               | 1.29%  | 1.29%  |
| 9  | Perfume              | Quantity sufficient | Q.s    | Q.s    |
| 10 | Color                | Quantity sufficient | Q.s    | Q.s    |

- Add carbopol slowly to the beaker containing above liquid with continue stirring.
- In another beaker Apium graveolens extract is dissolved in ethanol and add to the above solution and stir it.
- Neutralize the above solution by adding triethanolamine solution with constant stirring and form a gel.

## 9. EXPERIMENTAL WORK

### 9.1. Extraction of Celery seeds:

Hydro distillation:

The celery extract prepared by extracting the celery seeds with volatile solvent like alcohol and driving off alcohol in vacuum. On distillation it yields pale yellow essential oil with characteristic odor, the principle components of which are d-limonene and salience. The celery seeds were crushed to half size in grinder and hydro distilled with a known quantity of water, 3 to 5 times the weight of seeds using Clevenger and straight distillation. Time of distillation was varied from 3 to 5, at the 100 °C

### 9.2 Formulation table:

Table no.2 formulation table

## 10. EVALUATION PARAMETERS

1. Physical parameters:
  - Color
  - Odor
  - Consistency
2. pH test
3. Thermal stability
4. Viscosity
5. Spread ability

### 10.1. Physical parameters:

The physical parameters of hair gel includes color, odor and consistency

Table no.3 Physical parameters

| Parameter   | B1                 | B2                 | B3               |
|-------------|--------------------|--------------------|------------------|
| Color       | Transparent yellow | Transparent bluish | Transparent Pink |
| Odor        | Pleasant           | Pleasant           | Pleasant         |
| Consistency | Semisolid          | Semisolid          | Semisolid        |

**Conclusion:** B1 has shown the proper physical parameters suitable as a hair gel

### 10.2. pH test:

Acidity and basicity of an aqueous solution is determined by the term pH. The acidity or alkalinity of water solution is determined by the relative number of hydrogen ions (H<sup>+</sup>) or hydroxyl ions (OH<sup>-</sup>) present in a solution. Acidic solution has a higher relative number of hydrogen ions and also the solution has a higher relative number of hydroxyl ions. Acids are substances which either dissociated to release hydrogen ions or react with water to form hydrogen ions. Bases are substances that dissociate to release hydroxyl ions or react with water to form hydroxyl ions.

Table no.4 pH tests

| Formulations | pH  |
|--------------|-----|
| B1           | 6.9 |
| B2           | 7.1 |
| B3           | 7.3 |

**Conclusion:** The B1 Formulation has shown the proper pH suitable as hair gel.

### 10.3. Spreadability:

Table no.5 Spreadability

| Formulations | Week1             | Week2             | Week3             | Week4             |
|--------------|-------------------|-------------------|-------------------|-------------------|
| B1           | 13.61<br>g.cm/sec | 13.65<br>g.cm/sec | 13.67<br>g.cm/sec | 13.70<br>g.cm/sec |
| B2           | 13.11<br>g.cm/sec | 13.15<br>g.cm/sec | 13.17<br>g.cm/sec | 13.20<br>g.cm/sec |
| B3           | 12.65<br>g.cm/sec | 12.68<br>g.cm/sec | 12.69<br>g.cm/sec | 12.70<br>g.cm/sec |

**Conclusion:** B1 has shown proper spreadability as a hair gel.

### 10.4. Rheological studies:

Viscosity of the product was calculated by the Brookfield viscometer at 100 rpm, using spindle type model S64. The 5gm of gel was taken in beaker and spindle was dipped in it for about 5 minutes and readings were taken.

Table no.6 Viscosity tests

| Batches | Viscosity |
|---------|-----------|
| B1      | 3353cps   |
| B2      | 3563cps   |
| B3      | 3971cps   |

Conclusion: B1 has shown proper viscosity suitable as a hair gel.

## 11. RESULTS

Table no.7 Results

| Sr. No | Evaluation parameters | Result                |
|--------|-----------------------|-----------------------|
| 1      | pH                    | 6.9                   |
| 2      | Color                 | Transparent<br>Yellow |
| 3      | Application           | Easy to apply         |
| 4      | Viscosity             | 3353cps               |

## 12. CONCLUSION

The present study involves the formulation and evaluation of anti-dandruff hair gel. The extract of Celery seeds used for the anti-dandruff property. Stability parameters of the formulation showed that there was a significant variation during stability study, thus the present study concluded that it is possible to formulate and evaluate the anti-dandruff gel with Apium graveolens (Celery seeds) and can be used for more efficiency.

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