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# FORMULATION AND EVALUATION OF POLYHERBAL HAIR GEL

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**ARTICLE**

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**ABSTRACT**

Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. Herbal formulations have growing demand in the world market. Herbal gel containing Hibiscus sabdariffal and Murraya Koenigii extract was found to be stable. The Hibiscus sabdariffal and Murraya koenigii extract herbal gel was pale yellowish in color, translucent in appearance, and smooth in application. pH mean value of female hair 6.784±0.16, and that of male hair 5.604±0.93. Murraya koenigii revealed the fact that it is a common remedy among the various ethnic groups, ayurvedic practitioners for treatment of diversity of ailments. However, very little efforts have been put by the scientific community to discover the beneficial potential of this plant. It is thought provoking to know that crude organic extracts of leaves of Murraya koenigii have been evaluated for hair growth. The values of spreadability and washability indicate that the gel is easily spreadable and washable by small amount of shear. pH also maintained throughout the study which was found 5.604±0.93. The viscocity of hair gel was found to be 26200cp. The herbal hair gel using curry leaves were prepared by using carbopol as gelling agent. The result obtained was satisfactory with all formulations.

## INTRODUCTION

Globally, the proportion of men and women experiencing hair loss or thinning hair has been rising recently. Alopecia, or hair loss, is a common patient complaint that causes severe emotional and physical suffering [1]. Both men and women can develop androgenetic alopecia, which is characterized by a trend of increasing hair loss from the scalp. About 70% of men and 30% of women in modern civilizations suffer from alopecia, which has significant negative effects on the economy and psychology. [2]. One of the primary causes of hair loss is dandruff. However, dandruff is a relatively common hair issue that affects people of all ages and is not contagious. Pityriasis simplex capitis is the medical term for the shedding of dead scalp skin. It could be oily or dry [3]. The Indian traditional medicine system recommends several herbal remedies for promoting hair growth. Herbs are priceless gifts from nature, and lately, there has been an explosion of herbal cosmetics on the global market [4]. Gels are semisolid systems in which a high degree of physical or chemical cross linking has been added to a three-dimensional polymeric matrix made of natural or synthetic gum, therefore confining the liquid phase. Gels are a relatively new sort of dosage form made by trapping larger

amounts of aqueous hydroalcoholic liquids in a network of colloidal solid particles. These particles can be organic polymers derived from natural sources [5]. Murraya koenigii and Hibiscus sabdariffal has a high molecular weight polysaccharide obtained from natural source. Murraya koenigii and Hibiscus sabdariffal forms a good gel [6]. As from the years usage of synthetic chemical (Carbopol) for gel preparation was considered as the only source, Hence in the present study the focus has been laid down on the natural Murraya koenigii and Hibiscus sabdariffal for preparation of Gel. The Curry leaf tree, or Murrya koenigii, demonstrates a variety of biological processes. The Ayurvedic medical system has been using murrya koenigii for ages. Rutaceae is the family to which Murraya koenigii, often known as curry plant, belongs. Native to India, Sri Lanka, and other South Asian nations, the plant has medicinal properties [7]. It is typically grown in China, Australia, Nigeria, and other tropical and subtropical regions. The leaves of the plant are highly prized because they provide flavor and spice to cuisine. Curry leaves are thought to have a variety of health benefits, including hepatoprotective, anti-inflammatory, anti-diabetic, antioxidant, and antibacterial qualities. Curry leaves are the best source of carbazole alkaloids, which have been shown to have anti-oxidant and anti-cancer effects. These alkaloids include mahanimbine and koenigine. Murraya koenigii has many useful therapeutic properties that are advantageous to humans. The sector of soap and cosmetic aromatherapy also uses essential oils. Curry leaves make a great hair tonic for maintaining natural hair tone and promoting hair development when they are simmered with coconut oil until they are reduced to blanked residue. Traditionally, it has been used whole or in portions for bodily aches, kidney pain, vomiting, antiemetics, antidiarrheal, febrifuge, blood purifier, antifungal, and depressive purposes [8].

**Herbal Ingredients Used**

**1. Neem**

**Synonym:** Nim, Nimba, Limba, Indian Lilac

**Family: -** Meliacae

**Biological Source:**

It consists of leaves and other aerial parts of *Azadirachta indica*

**Fig 1: Neem Leaf**

**2: Hibiscus**

**Synonym:** Roselle, Red roselle, Jamaica Sorrel, Florida Cranberry

**Biological source**: Hibiscus sabdariffaL. (H.sabdariffa,Roselle) is anannual dicotyledonous, herbaceous shrub belonging to the family Malvaceae.

**Family:** Malvaceae [9,10]

**Fig 2: Hibiscus Flower**

**Materials:** Carbopol 934, Polyethylene glycol, Methylparaben, Propylparaben, Glycerin, Potassium hydroxide, Distilled water and Ethanol, Murraya koenigii extract, Azadirechta indica extract, Hibiscus tiliaceus

**Methodology:**

**Product formulation and development**

One of the project's practical components is experimentation. Because having the right formulation is crucial to the manufacturing of any product, Prior to incorporating the active into the base, it is also crucial to choose an

adequately stable basis. The compatibility of the active ingredient with the base formulation determines its effectiveness and stability. To achieve a stable hair gel formulation, the base was chosen so that the active could be added to it. As a result, the experiment is broken down into the steps shown below [11]. Preparation of base, Optimization of base, Incorporation of active, Selection of final product with active

**Preparation of hair gel base**: The hair gel's basic formulation was made. All ingredients are precisely weighed before being prepared for hair gel, and batch variations are made to evaluate the stability of the base composition. Next, the bases are examined based on factors like viscosity, stability, and clarity. Next, the most stable base is chosen so that the active can be added to it [12].

**Procedure:** Wash all the apparatus before use, Weigh all ingredients properly, Carbopol 934 two gram add required quantity of water, Add methyl paraben and propyl paraben, Add PEG10 ml with continues stirring. Mixed by stirring continuously in magnetic stirrer at 800 rpm for 30 minor manually. Add ethanol and 3ml of glycerin with continuous stirring in above mixture. The mixture was neutralized by drop wise addition of potassium hydroxide. Mixing was continued until a transparent gel was formed. Then add perfume to it and store it in proper container.

**Optimization of hair gel base:** The following factors are taken into account during the optimization process to determine the base formulation for hair gel, indicating the qualities of the perfect gel. The optimization factors for choosing the base formulation are listed in the table below [13, 14]. On the basis of the parameters of optimization of the base batch, batch 2(B2) is selected as the best batch for the incorporation of active in it.

Collection of plant material: Murraya koenigii and Azadiracta indica plant leaves were gathered from the near garden For extraction, fresh leaves are utilized. Additionally, the hibiscus tiliaceus bloom was taken from the Garden, For extraction, fresh petals are utilized. Preparation of leaves extract of Murraya koenigii and Azadirachta indica: Fresh Murraya koenigii and Azadirachta indica leaves were gathered, cleaned with water, and then dried in the shade. Plant leaves were dried, then ground into a coarse powder and stored in an airtight container. 50 ml of solvent were used to soak 5 gm of coarsely powdered leaf from each plant. 25 ml of ethanol and 25 ml of water were boiled for an hour, and the mixture was then filtered [15]. Preparation of petels extract of Hibiscus tiliaceus. The freshly picked leaves of Azadirachta indica and Murraya koenigii were cleaned with water and allowed to dry in the shade. Plant leaves were coarsely powdered and stored in a tightly sealed container after drying. Each plant's coarsely powdered leaf weighed 5 gm, and 50 ml of solvent were added. Filtered after one hour of boiling with 25 ml of water and 25 ml of ethanol [15]. Wash all the apparatus before use, Weigh all ingredients properly, Carbopol 934 two gram and measured quantity of extract was add in 45ml of water, Add methyl paraben and propyl paraben, Add PEG10 ml with continues stirring. Mixed by stirring continuously in magnetic stirrer at 800 rpm for 30 minutes manually. Add 45ml of ethanol and 3ml of glycerin with continuous stirring in above mixture. The mixture was neutralized by drop wise addition of potassium hydroxide. Mixing was continued until a transparent gel was formed. Then add perfume to it and store it in proper container.

**Physical Examination:** We looked at the color, smell, texture, homogeneity, and air bubble presence of the created gel compositions.

**pH:** A digital pH meter was used to measure the gel compositions' pH. One gram of non-medicated gel was dissolved in 100ml of purified water.

**Fig 3: Different Polyherbal hair gel formulation**

**Evaluation of Hair Gel [17]**

**Viscosity:** Viscosity (cp) of the gel formulations was measured at 25°–28°C using a Brookfield viscometer (Brookfield LVDV, spindle no. S64). Spindle no. S64 was used to rotate the gels at a speed of 100 rpm. The equivalent viscosity (in cps) at each speed.

**Spreadability:** Two glass slides were layered with an extra 2 grams of gel. To create a homogenous gel film between the slides and to release trapped air, a 1 kg weight was placed on top of one slide for five minutes. The excess gel was removed by scraping off the edges. With the aid of a line fastened to the hook, the top slide was then pulled 80 gms, and the amount of time (measured in seconds) needed for the top slide to travel 7.5 cm was recorded.

Spreading ability was calculated by using the formula:

$$S = M.L/T$$

Where, S-Spreading Coefficient, M=weight tied to upper slide, L=length of glass slides, T = time taken to separate the slides.

**Skin Irritation:** After applying the prepared herbal hair gel by hand, it was left in the sunlight for 4 to 5 minutes.

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

## RESULT AND DISCUSSION

**Physical Examination:** As any other cosmetic products, the beauty of hair gels for consumers tends to be judged visually, thus having good physical appearance is important.

**pH**: The pH balance of products is important as it affects the skins and surfaces as they are being used. The pH mean value of female hair 6.784±0.16, and that of male hair 5.604±0.93.

**Homogeneity:** The prepared hair gel was Smooth, Homogeneous and no agglomerates were found.

**Skin Irritation:** The prepared herbal hair gel was applied on skin of hand and exposed to sunlight for 4-5 min. It was found skin compatible and non-irritant.

**Stability Study**: The stability study was carried out for the prepared hair gel at standard room temperature of 25 –30$^{o}$C for 30 days. Several parameters such as physical appearance, odour, and color of the prepared gel were noticed. Significant changes in color and pH of hair gel was not observed in 30 days.

**Washability:** The prepared herbal hair gel was applied on hair then washed with water. After washing there is no trace of gel.

**Spreadability:** Spreadability plays an important role in consumer acceptability and help in uniform application. The spreadability of prepared gel was in range of 14-17 g-cm/sec.

**Table 1: Ingredients of Hair Gel Base**

| S.NO. | Ingredients | B1 | B2 |
|---|---|---|---|
| 1 | Carbopol934 | 2.0gm | 2.0gm |
| 2 | PEG | 10ml | 10ml |
| 3 | Methyl Paraben | 0.2gm | 0.2gm |
| 4 | Propyl Paraben | 0.1gm | 0.1gm |
| 5 | Glycerin | 1ml | 1ml |
| 6 | Potassium Hydroxide | q.s | q. s |
| 7 | Distilled Water | 85ml | 45ml |
| 8 | Ethanol | 0ml | 40ml |
| 9 | Perfume | q.s | q.s |

**Table 2: Optimization of gel base**

| Sr.no. | Parameter | B1 | B2 |
|---|---|---|---|
| **1** | Consistency | ++ | +++ |
| **2** | Color | ++ | ++ |
| **3** | Spreadibility | + | +++ |
| **4** | Appearance | + | + |

Abbreviations: (+) = poor (++) = good (+++) = satisfactory

**General formula for herbal hair gels**

**Table 3: General Formula for Herbal hair gel**

| Ingredients | Quantity |
|---|---|
| Carbopol 934 | 2.0gm |
| PEG | 10ml |
| Methyl Paraben | 0.2gm |
| Propyl Paraben | 0.1gm |
| Pottasium Hydroxide | q.s |
| Glycerin | 1ml |
| Ethanol | 40ml |
| Distilled Water | 45ml |

Various concentration of API were incorporated in carbopol base gel and prepared herbal hair gel base was shown in Table

**Development of herbal hair gel formulation**

**Table 4: Development of herbal hair gel formulation**

| Sr.no. | Ingredients | F1 | F2 | F3 |
|---|---|---|---|---|
| 1 | Murraya koenigii extract | 1.0ml | 1.5ml | 2.5ml |
| 2 | Azardichta indica extract | 1.0ml | 1.5ml | 2.5ml |
| 3 | Hibiscus tiliaceus | 1.0ml | 1.5ml | 2.5ml |
| 4 | Carbopol934 | 2.0gm | 2.0gm | 2.0gm |
| 5 | PEG | 10ml | 10ml | 10ml |
| 6 | Methyl Paraben | 0.2gm | 0.2gm | 0.2gm |
| 7 | Propyl Paraben | 0.1gm | 0.1gm | 0.1gm |
| 8 | Glycerin | 1ml | 1ml | 1ml |
| 9 | Potassium Hydroxide | q. s | q. s | q. s |
| 10 | Distilled Water | 45ml | 45ml | 45ml |
| 11 | Ethanol | 40ml | 40ml | 40ml |
| 12 | Perfume | q.s. | q. s | q. s |

**Table 5: Physical examination of hair gel**

| Sr.no | Parameter | F1 | F2 | F3 |
|---|---|---|---|---|
| **1.** | Color | Faintred | Red | Dark Red |
| **2.** | Odor | Pleasant | Pleasant | Pleasant |
| **3.** | Texture | Smooth | Smooth | Smooth |
| **4.** | State | Semisolid | Semisolid | Semisolid |

**Table 6: pH Determination**

| Sr. no | Formulation | pH |
|---|---|---|
| **1.** | F1 | 6.4 |
| **2.** | F2 | 6.03 |
| **3.** | F3 | 5.9 |

**Table 7: Washability Determination**

| Sr. no | Formulation | Washability |
|---|---|---|
| **1.** | F1 | Easily Washable |
| **2.** | F2 | Easily Washable |
| **3.** | F3 | Easily Washable |

**Table 8: Spreadability Determination**

| Sr. no | Formulation | Spread ability |
|---|---|---|
| **1.** | F1 | 14.65 |
| **2.** | F2 | 15.05 |
| **3.** | F3 | 16.12 |

**Table 9: Viscosity Determination**

| Sr. no | Formulation | Viscosity(cp) |
|---|---|---|
| **1.** | F1 | 26200 |
| **2.** | F2 | 31510 |
| **3.** | F3 | 30261 |

## SUMMARY AND CONCLUSION

The growing demand for natural and organic personal care products has led to a rise in popularity for herbal hair gel formulations in recent years. Formulations for herbal hair gel might be a fantastic natural substitute for store-bought hair style products. The natural substances used to make them, such as plant extracts and other natural additives, offer the hair and scalp a number of advantages. Herbal hair gels have the ability to strengthen hair, promote hair growth, lessen hair loss, and enhance scalp health. It has been discovered that neem extract possesses antifungal and antibacterial qualities against a range of fungi, including those responsible for dandruff and other disorders of the scalp. It has also been demonstrated that curry leaf extract exhibits antifungal action against specific fungi. Conversely, it has been discovered that hibiscus extract possesses antifungal properties against Candida albicans, a form of fungus that can infect humans. To find out how well a hair gel containing these extracts might nourish hair and have any medicinal benefit, more research would be necessary. It is crucial to remember that using herbal medicines in place of medical treatment requires the advice of a healthcare provider. Herbal substances are also frequently devoid of dangerous chemicals that can injure the scalp or hair. It is crucial to remember that the quality, quantity, and formulation technique of the substances utilized in a herbal hair gel formulation will all affect its efficacy. As a result, when creating and utilizing herbal hair gel formulations, it is crucial to adhere to the correct recommendations and safeguards.

All things considered, herbal hair gel formulations have promise as a secure and reliable substitute for conventional hair gels; however, further investigation and refinement are required to maximize their efficacy and guarantee their safety. For anyone searching for a healthy, efficient approach to style and take care of their hair, herbal hair gel formulas can be a fantastic choice. A premium herbal hair gel that offers several advantages for the hair and scalp can be made by carefully weighing the components and the formulation process.

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