



FORMULATION AND EVALUATION OF HERBAL GEL CONTAINING ROSEMARY OFFICINALIS

Khan Sheherbanu*, Khan Vahid¹, Dave Piyush¹, Dr. Madhuri Hinge²

¹ROFEL Shri G.M Bilakhia College of Pharmacy, Vapi, Gujarat, 396191, India.

¹ROFEL Shri G.M Bilakhia College of Pharmacy, Vapi, Gujarat, 396191, India.

¹ROFEL Shri G.M Bilakhia College of Pharmacy, Vapi, Gujarat, 396191, India.

²Faculty of Pharmacy, ROFEL Shri G.M Bilakhia College of Pharmacy, Vapi, Gujarat, 396191, India.



*Corresponding Author: Khan Sheherbanu

ROFEL Shri G.M Bilakhia College of Pharmacy, Vapi, Gujarat, 396191, India.

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ABSTRACT

Herbs are the traditional type of Indian medicine that was established by ancient sages where dried leaves of aromatic plants used to impart flavor, odor, or specific medicinal properties. It is the reason why India is known for the Traditional Medicine. Herbal cosmetics are concoctions used to improve one's look. The Goal of this study was to formulate and evaluate Rosemary Officinalis for Antioxidant and Antibacterial property. Rosemary leaves are high in Antioxidant and Antibacterial property and have specific aroma, which nourish and promote hair growth. On gram positive bacteria, Rosemary have Antibacterial properties. The selected formulation from different trials was evaluated for various physicochemical parameter for confirming the active profile of it. The pH of the gel was around 6.25. The hair gel was estimated with UV- spectrometry. Based on UV spectrometry, it is to be found that in 50 gm gel it contains 596 ug/ml of Carnosic acid which having wide role in alopecia. The presence of Carnosic acid indicate that it might be helpful in reducing hair loss and improve hair growth. The gel contains Alkaloids, Saponins, Flavonoids, Tannins, Cardiac glycoside, Alkaloids and Phenols. The product passed the evaluation test and appears stable.

KEYWORDS: Rosemary officinalis, Carnosic acid, Hair gel, Antioxidant, Anti-Bacterial.

1. INTRODUCTION

1.1. Introduction to the disease

Hair loss (alopecia) can affect just your scalp or your entire body, and it can be temporary or permanent. It can be the result of heredity, hormonal changes, medical conditions, or a normal part of aging. Anyone can lose hair on their head, but it is more common in men. Alopecia is a wide issue, having told both genders of all races to colorful degrees for whatever length of time that humankind has was. It has been recommended that alopecia could negatively affect physiological life and confidence between both sexual exposures. The primary symptom of alopecia areata is patchy hair loss on the scalp, face, or other areas of the body. In some cases, the hair loss can be widespread and result in total baldness, a condition known as alopecia totalis.^[1]

The exact cause of alopecia areata is unknown, but it is believed to be an autoimmune disorder in which the body's immune system mistakenly attacks hair follicles. Certain genetic and environmental factors may also play a role in the development of the condition. In rare cases, the hair loss can extend to the entire body, a condition known as alopecia

universalis. The hair loss is usually not accompanied by other physical symptoms, but some people may experience itching or burning in the affected areas.^[2]



Figure-1: Alopecia Disease.

Even though the symptom related to this drug has constrained its pharmacological advantages latterly the drug of factory origin is the stylish volition to the medicine of synthetic one India is storage of remedial shops. Sauces are also employed for the beautification of the body and the development of different cosmetics. In the traditional system of drug, a variety of natural origin

cures shown exertion for hair growth, but lower exploration over it makes low scientific backing and hence little or no information regarding its use.

After a detailed literature check carried out on crude medicines reveals essential information regarding the selection of medicines for the expression of an ornamental expression for this creation of hair growth exertion.

A topical delivery system is a method of delivering medication or other active ingredients directly to the skin. It involves the application of a product, such as a cream, ointment, or gel, to the surface of the skin, where it is absorbed and transported to the underlying tissues and bloodstream. Topical delivery systems have several advantages over other methods of drug delivery, such as oral or injection. One advantage is that they allow for targeted delivery of the medication or active ingredient to a specific area of the body, without affecting other parts of the body. This can be particularly beneficial for treating conditions that are localized to a specific area, such as skin infections, rashes, or acne. When applied to the skin, the medication or active ingredient is absorbed directly into the bloodstream, bypassing the digestive system and liver metabolism. This can lead to quicker and more effective results.

Topical delivery systems can also be less invasive than other methods of delivery, such as injections or surgeries. This can make them a more attractive option for patients who are afraid of needles or who prefer non-invasive treatments. The effectiveness of a topical delivery system depends on several factors, including the properties of the medication or active ingredient, the formulation of the product, and the condition of the skin. The skin's ability to absorb the medication or active ingredient can vary depending on factors such as skin type, age, and hydration levels. Topical delivery systems can be used to deliver a wide range of medications and active ingredients, including antibiotics, anti-inflammatory agents, pain relievers, and hormones. They can also be used to deliver cosmetic ingredients, such as moisturizers, sunscreen, and anti-aging agents. Topical delivery systems can be used to deliver a wide range of medications and cosmetic ingredients.^[3]

1.2. Introduction to the Gel

Gels are semisolid preparations that are intended for application on the skin or mucous membrane. This is a moderately-rigid structure in which the mobility of the dispersing medium in dispersed phase is restricted by an intertwining 3-D particle system. A large amount of watery or hydroalcoholic fluid is entangled in a system of colloidal solid particles made up of organic polymers of synthetic or natural origin, as well as inorganic components.^[4]

1.3. Introduction to Rosemary Officinalis

Rosemary (*Rosmarinus officinalis*) is a fragrant, evergreen herb native to the Mediterranean region,

particularly the hills and coastal areas of Greece, Spain, and Italy. The plant belongs to the mint family, and its leaves are used both as a culinary herb and a medicinal herb.



Figure-2: Rosemary Officinalis.

Rosemary has a long history of use in traditional medicine, and it was believed to have a variety of health benefits, including improving memory, reducing inflammation, and boosting the immune system. Today, it is still widely used in herbal medicine for a range of ailments, and its essential oil is also popular in aromatherapy. Rosemary officinalis commonly called as Rosemary officinalis is an aromatic evergreen herb with needle-like leaves, native to the Mediterranean region. It is a member of the mint family and is commonly used as a culinary herb to flavor meat, fish, and vegetable dishes.

The main constituents of the rosemary essential oil are camphor (5.0–21%), 1,8-cineole (15–55%), α -pinene (9.0–26%), borneol (1.5–5.0%), camphene (2.5–12%), β -pinene (2.0–9.0%) and limonene (1.5–5.0%) in proportions that vary according to the vegetative stage and bioclimatic conditions.^[5]

In addition to its culinary uses, rosemary has also been used for medicinal purposes for centuries. It is believed to have anti-inflammatory and antioxidant properties and has been used to improve memory and mood.

Table-1: Taxonomical Classification of Rosemary Officinalis.

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Lamiales
Family	Lamiaceae
Genus	<i>Rosmarinus</i> L.
Species	<i>Officinalis</i>

Rosemary essential oil is also popular in aromatherapy and is said to have a variety of benefits, including reducing stress and anxiety, improving circulation, and relieving pain.^[6]

1.3.1. Medicinal activity of Rosemary Officinalis^[6]

- Antioxidant effect
- Antibacterial effect

- Antifungal effect
- Anti-inflammatory

2. MATERIALS AND METHOD

Table 2: List of Ingredients.

Sr. No.	Ingridients	Medicinal Uses	Composition
1.	Rosemary officinalis	Antioxidant, Antibacterial, Antifungal, Anti-inflammatory	1, 8-cineol (38.5%), camphor (17.1%), α -pinene (12.3%), limonene (6.23%), camphene (6.00%) linalool (5.70%), Carnosol, Carnosic acid, ursolic acid, rosmarinic acid, caffeic acid.
2.	Carbopol	Gelling agent	-
3.	Glycerin	Moisturizer	-
4.	Methyl paraben	Preservative	-
5.	Polyethylene glycol	Solubilizer	-
6.	Water	Base and Qs	-

2.1 Method of extraction^[7,8]

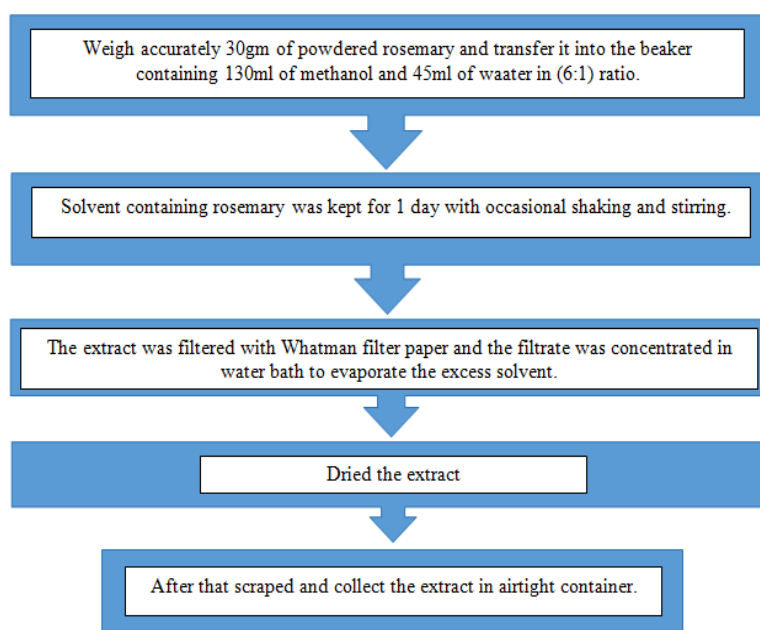


Figure-3: Filtration of Extract.



Figure-4: Evaporating of Excess solvent.



Figure-5: Dried Rosemary Extract.

2.2 Method of preparation of gel

STEP 1

Take Sample dried rosemary leaves and added to an ethanol and water mixture in ratio 1:6(w/v).

STEP 2

Do process of extraction.

STEP 3

Dissolve Quantity sufficient Carbopol 934 in water with proper stirring in water bath (gelbase).

STEP 4

Add measured quantity of methyl paraben, glycerin and were dissolve in it.

STEP 5

Now take required quantity of polyethylene glycol 200 and dissolve rosemary extract in it.

STEP 6

Mix the solution containing PEG 200 and extract in the gel base with continuous stirring until a homogenous gel is formed.

STEP 7

Add enough colorant for good appearance of gel.

STEP 8

Allow it to cool and freeze it to store for longer duration of time.

Table-3: Formulation of Rosemary Hair Gel.

NAME	F1	F2	F3	F4
Carbopol 934 (gm)	1	1.5	2	2.5
Extract (gm)	1	1	1	1
Methyl Paraben (mg)	75	75	75	75
Glycerin (ml)	3	3	3	3
PEG (ml)	6.25	6.25	6.25	6.25
Triethanolamine (ml)	0.5	0.5	0.5	0.5
Water (ml)	Qs	Qs	Qs	Qs



Figure-6: F1 & F2 Batch

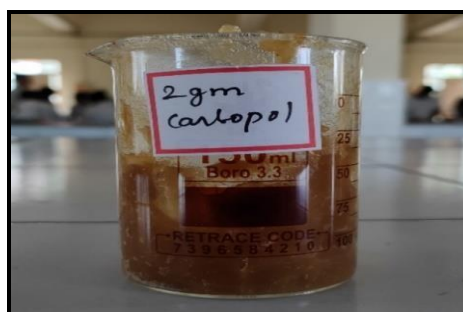


Figure-7: F3 Batch

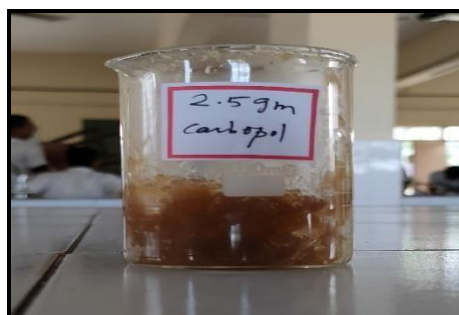


Figure-8: F4 Batch.



Figure-9: F-3 Confirm Batch

3. EVALUATION OF HERBAL GEL

3.1. Phytochemical Analysis^[9]

Test for Tannins

A known volume of the crude extracts were heated on the water bath and filtered. A few drops of 1% ferric chloride solution were added to the filtrate. Dark green solution indicates the presence of tannins.

Test for Flavonoids

Diluted NaOH and HCL were added to a known volume of crude extract. A yellow solution that turns colorless indicated the presence of flavonoids.

Test for Cardiac glycosides

A known volume of the crude extracts were shaken with 1ml of glacial acetic acid. A drop of ferric chloride and concentrated sulphuric acid were added. Green blue color

to the upper layer and reddish-brown color at the junction of two layers indicates the presence of cardiac glycosides.

Test for Saponins

A known volume of crude extract were shaken and heated to boil. Formation of a stable persistent froth and creamy mass of small bubbles indicates the presence of saponins.

Test for Alkaloids

A known volume of the crude extracts were heated with 2% sulphuric acid for two minutes. The mixture was filtered and few drops of dragendroff's reagent were added. Orange red precipitate shows the presence of alkaloids.

Test for Phenols

Distilled water 15ml was added to a known volume of the crude extracts. Then a few drops of neutral 5% ferric chloride solution was added. Formation of a dark green color indicates the presence of phenolic compounds.

Test for Terpenoids

A known volume of crude extracts were filtered and mixed with 2 ml of chloroform. Then 3ml of concentrated sulphuric acid was carefully added to form a layer. Formulation of reddish-brown coloration indicates the presence of terpenoids.

3.2. Physical appearance^[10]

The physical appearance was visually checked for the appearance, colour and the feel application of the prepared hair gel formulation.

3.3. Measurement of pH^[10]

A digital pH meter may be used to determine the pH for instance, 1g of gel mixed with 100 mL of purified water and kept for 2 hours. The pH is measured in triplicate and the average value is computed.

3.4. Spreadability^[11]

It depicts the coverage of the region to which the gel quickly spreads when applied to the affected section or skin. The curative efficacy is determined by the propagation of value. The time in seconds taken by two slides to fall off from the gel held between the slides towards the course of a certain lead is represented as Spreadability the less time taken, the better the Spreadability. It can be found using the formula as **Spreadability [s] = M x L/T** Here, M= Weight tied to upper slide. L= Length of glass slides. T= Time taken to detached the slides

3.5. Homogeneity and Grittiness^[12]

After the gel formulations were placed in the container, all generated gels were visually inspected for homogeneity. They were examined for the presence of lumps, flocculates, or aggregates.

3.6. Antibacterial activity^[13]

Qualitative or quantitative of any chemical compound from a single or even complex material with the use of microorganisms is termed as microbiological assay

3.7. Washability

Prepared gel was applied to the skin and then ease of washing and the degree of washing with water were checked manually

3.8. UV Analysis:^[14]

• Preparation of reference (standard) solution Carnosic acid stock solution (1000 µg/mL)

10 mg of Carnosic acid accurately weighed and transferred to a 10 mL volumetric flask, dissolved, and diluted with methanol to obtain a solution of 1000 µg/mL.

• Carnosic acid working solution (100 µg/mL)

1 ml of Carnosic acid standard stock solution was taken in 10 mL volumetric flask and diluted with methanol.

• Carnosic acid Final solution (10 µg/mL)

1 ml of Carnosic acid standard stock solution was taken in 10 mL volumetric flask and diluted with methanol.

❖ Preparation of Rosemary Extract solutions:

1. Rosemary Extract stock solution Preparation (1000 µg/mL)

1 ml of accurately Rosemary Extract weighed and dissolved and diluted with methanol in volumetric flask of 100 ml capacity to make solution of 1000 µg/mL.

2. Rosemary Extract working solution Preparation (100 µg/mL)

1 ml from Rosemary Extract stock solution was taken in a volumetric flask of 10 mL and diluted with methanol to get 100 µg/mL solution.

3. Rosemary Extract working solution Preparation (10 µg/mL)

1 ml from Rosemary Extract stock solution was taken in a volumetric flask of 10 mL and diluted with methanol to get 10 µg/mL solution.

❖ Preparation of Rosemary Gel solutions:

1. Rosemary Gel stock solution Preparation (1000 µg/mL)

100 mg of accurately Rosemary gel weighed and dissolved and diluted with methanol in volumetric flask of 100 mL capacity to make solution of 1000 µg/mL.

2. Rosemary gel working solution Preparation (100 µg/mL)

1 ml from Rosemary gel stock solution was taken in a volumetric flask of 10 mL and diluted with methanol to get 100 µg/mL solution.

3. Rosemary gel Final solution Preparation (10 µg/mL)

1 ml from Rosemary gel stock solution was taken in a volumetric flask of 10 mL and diluted with methanol to get 10 µg/mL solution.

4. RESULT AND DISCUSSION

4.1: Phytochemical analysis of herbal gel.

Sr. No.	Phytochemical	Result
1.	Tannis	+
2.	Saponins	+
3.	Flavonoids	+
4.	Cardiac glycosides	+
5.	Alkaloids	+
6.	Phenols	+

4.2 Physical appearance & Homogeneity

All prepared gels were visually inspected for the look and presence of any lumps, flocculates, or aggregates to ensure homogeneity. All formulations were determined to have satisfactory uniformity.

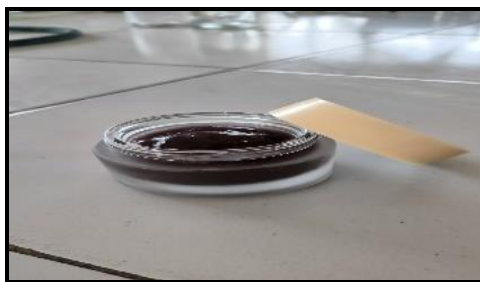


Figure-10: Herbal Gel containing Rosemary.

4.3 Measurement of pH

The pH of Herbal gel was 6.25 measures at 27°C. The pH of the formulations was in the range of 6.5 to 7.5 which lies in the normal pH range of the skin and would not produce any skin irritation. There is no standardized pH for any specific indication of hair shampoo, commercial/popular, antidandruff, or dermatological prescribed products. Still the standard pH requires to be attained through some modifications.



Figure-11: pH test.

4.4. Spreadability

The Spreadability was 7.2 gm cm/sec and considered good. The gel spreading helps in the uniform application of the gel to the skin, so the prepared gels must have a good Spreadability and satisfy the ideal quality topical application. Furthermore, this is considered an important factor in patient compliance with treatment.

4.5. Anti-Bacterial Activity

However, the formulations displayed a variable degree of anti-bacterial activity against the tested strains of *S. aureus* and *B. subtilis*. As shown in Figure, formulation F1 containing rosemary Extract (2gm) was found to be most effective against the selected microorganisms.



Figure-12: Zone of inhibition.

4.6. UV analysis

Standard Curve of Carnosic acid

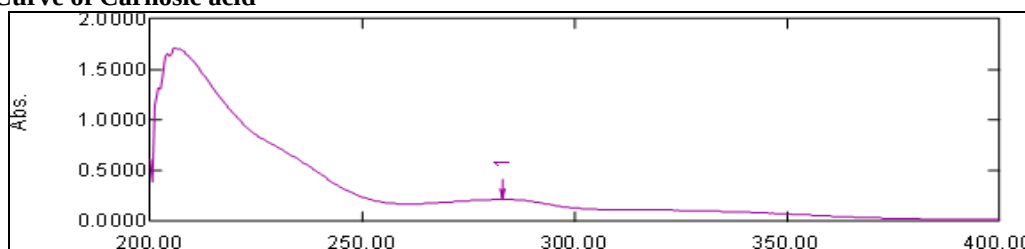


Figure-13: Standard Carnosic acid Spectrum.

Spectrum of Rosemary extract

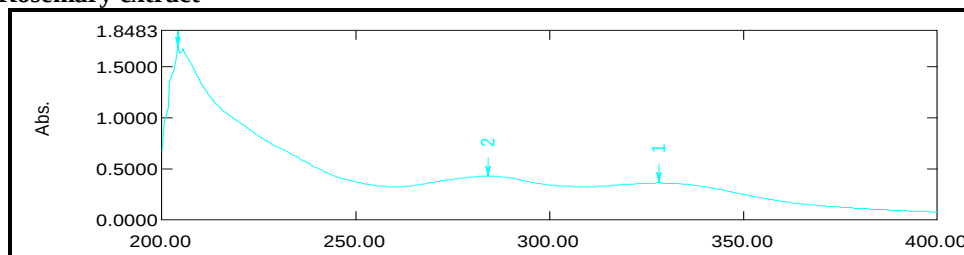


Figure-14: Rosemary Extract Spectrum.

Spectrum of Rosemary hair gel

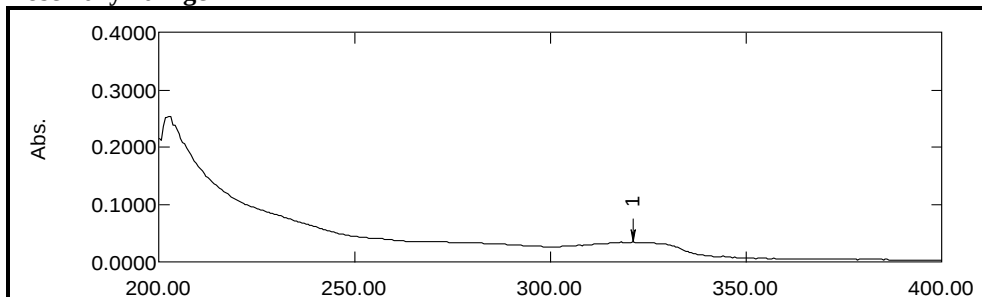


Figure-15: Spectrum of Rosemary hair gel.

Table-5: Linearity data of Carnosic acid at 239nm wavelength.

Sr. No.	Concentration of Carnosic Acid (ug/ml)	Absorbance
1.	10	0.1484
2.	20	0.2395
3.	30	0.3495
4.	40	0.4561
5.	50	0.5337

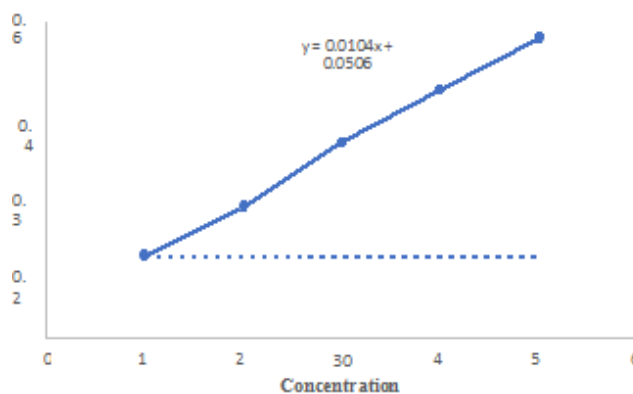


Figure-16: Spectrum of Linearity data of Carnosic acid.

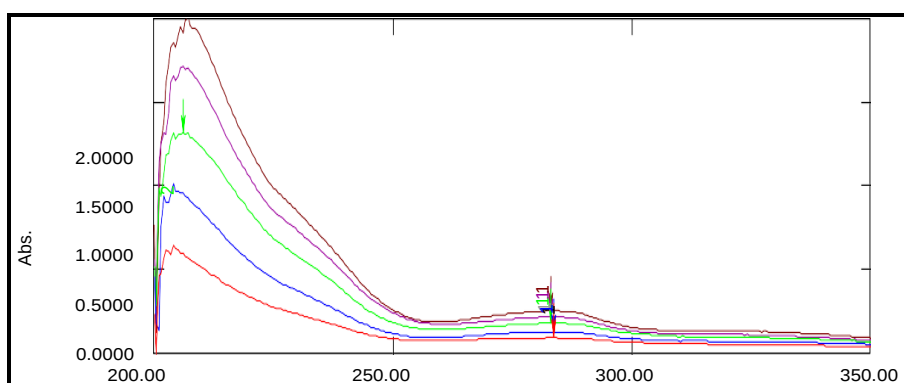


Figure-17: Calibration curve of Carnosic acid in methanol.

Concentration of Carnosic acid in herbal extract

$$Y = mx + c$$

Here,

$$Y = 0.063$$

$$c = 0.0506$$

$$m = 0.0104$$

$$x = y - c/m$$

$$x = 0.063 - 0.0506/0.0104$$

$$x = 1.1923 \text{ ug/ml}$$

Concentration of Carnosic acid in Gel

Since, 0.1 gm of Gel contains 1.1923 ug/ml of Carnosic acid. So, 50 gm of Gel contains 596 ug/ml of Carnosic acid.

4.7. Label of the product

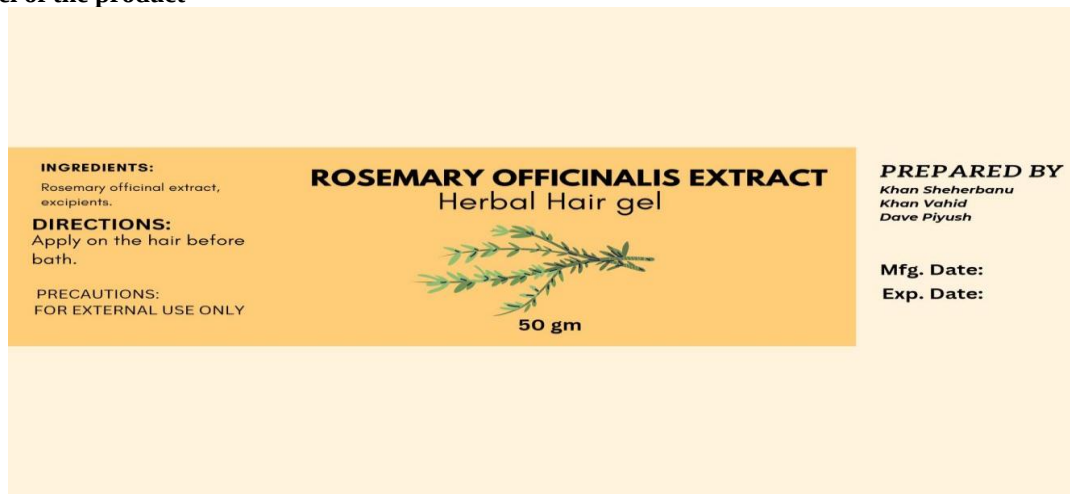


Figure-17: Label of the product.

5. CONCLUSION

From the finding it is concluded that the rosemary officinalis contains Carnosic acid which promote hair growth and give antioxidant and antibacterial activity. For further conformation clinical study is needed.

Hence, in the present investigation we prepared rosemary officinalis herbal hair gel by using its extract and other excipients and perform evaluation of physical parameters of the formulation.

The work justifies all the evaluation parameters and the results value lies within the standard limits.

6. ACKNOWLEDGEMENT

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