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Formulation and Evaluation of Poly-Herbal Hair Gel

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Abstract: *Dandruff skin condition with symptoms includes flak in gland sometimes mild itchiness cause to the scalp. They are many bacteria fungus causing scalp infections which lead to further hair problem your skin issues. There is one of the common conditions which is typically caused on the skin or mucus membrane caused by candida. Herbal extract of gauva leaves, amla and aloe found to be effective in treating Cadidiasis. Guava leaves are rich in vitamin B & C that helps in nourishing hair and also aids hair growth. Guava leaves shows antibacterial and antifungal activity on gram positive and gram negative bacteria.*

Vitamin C present in Amla which is 20 times more than that of orange: which prevents premature praying of hairs, it also provides luster to hairs and strengthen follicles. Gauva leaves extract was evaluated by Cup and plate method against the fungus C.albicans and bacteria S.aureus. Herbal Gel was formulated and evaluated by using Carbopol 940, tri-ethanol amine etc. A poly herbal hair gel was found to be effective against candidias is a long with this is nourished the hair and prevent premature graying.

Keywords: Hairgel, gauva leave extract, hibiscus extract, amala extract

I. INTRODUCTION

Hair is a unique character found on all mammals but not on other animals. In humans it is a special and cherished feature, especially in females , but it main functions are in protection of the skin from mechanical insults and to facilitate homeo therapy eyebrows and eyelashes, for example, stop things entering the eyes, while scalp hair prevents sunlight, cold, and physical damage to the head and neck. It also has a sensory function, increasing the perception of the skin surface for tactile stimuli, and sub serves important roles in sexual and social communication , considering the psychological impact on quality of life seen in hair disorders, such as hirsutism, hair loss, etc. In particular, regarding this last point, a significantly higher prevalence of personality disorders in subjects with andro genetic alopecia regarding the prevalence of such diagnoses in the general population have been reported.

Mammalian skin produces hair almost all over the body surface except for a few areas of the body, i.e., sole of the foot, palm of the hand, buccal surface of the lip, and portions of external genitalia; in addition, considering the distribution of human hair in different areas of the body surface, it is possible to note that human hair growth is reduced with tiny and virtually colorless hair on most of the body surface, whereas hair is longer, thicker, and heavily pigmented in other areas, such as the scalp, eyelashes, and eyebrows. Differences are also related to the hair's form , which can best right, helical ,or wavy ,color depending on the balance of different types of melanin (brown to black, in dolic eumelanin, and yellow to reddish brown, sulfur containing pheomelanin) length, diameter and cross sectional shape.

STRUCTURE OF HAIR

Each hair is made up of two separate structures :

The hair shaft ,which comprises the visible part out side of the skin. The follicle which lies underneath the surface of the skin.

- Inner root sheath
- Outer root sheath

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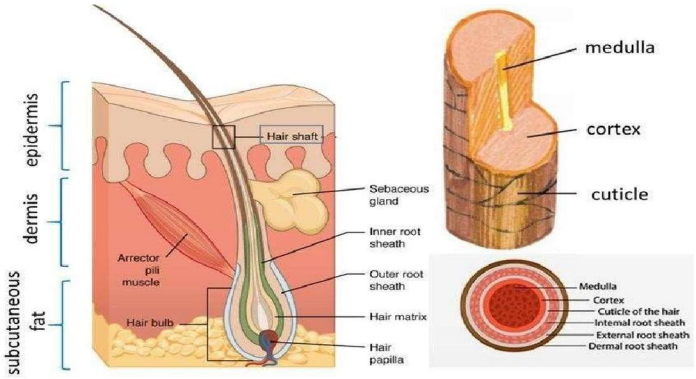
Hair is also made both of living and non-living components below and above the level of the epidermis. the base and forms the hair bulb.



FigNo.1:Structure of hair

The hair shaft is made up of a cortex, surrounding cuticle cells, and sometimes a central medulla which is found in thicker hair. The bulk of this hair fiber belongs to the cortical layer which plays an important role in determining the physical and mechanical properties of the hair, such as strength, texture, and color. It is composed predominantly of macro fibrils, which are rods of micro fibrils meshed together in a matrix.

The follicle is the primary structure from which hair can grow .The histological arrangement of the follicle is divided into outer and inner root sheaths.

The outer root sheath (ORS) has been recognized as a ready supply of multi potent stem cells which differentiate into several cell types including melanocytes and keratinocytes. More specifically, these stem cells are thought to reside in a distinct bulge area located between the insertion of the arrector pili muscle and the ductal opening of the sebaceous gland.

AIM AND OBJECTIVES

AIM

• To prepare total herbal hair gel formulation.

OBJECTIVES

• To evaluate prepared herbal hair gel .
• Herbal hair gel preparation, which reduce side effects and improve hair texture than chemical marketed hair gel.
• To imparting gloss to hair and to maintain their manage ability and oiliness for hairs.

PLAN OF WORK

1) Literature review
2) Selection of drug and Excipients
3) Drug and Excipient profile
4) Formulation of Experimental work
5) Evaluation Tests
a. Organoleptic properties
b. PH
c. Spread ability
d. Viscosity.
e. Appearance and homogeneity
6) Result and discussion
7) Conclusion

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REVIEW OF LITERATURE

1] Formulation and Evaluation of Herbal Hair Gel ; by – Ramakrishna . S , Gopikrishna U .V. -2022.

Hair is an imperative part of human body. A variety of herbal plants are used to promote hair growth as well as prevent hair loss. The present work is done by formulating hair gel using Guar gum and Jatamansi. Guar gum hydrates the hair by sealing in the moisture, Jatamansi shown to have the hair growth promoting activity. The gel was formulated in two steps, firstly extraction of the powdered rhizome of Nardostachys-jatamansi was carried out by using alcohol by reflux condensation. Secondly Guar gum powder is triturated with water until gel consistency is obtained. The formulation was evaluated for varies physical parameters like pH, viscosity, spread ability, homogeneity, stability studies, skin irritation.

2] Preparation and Assessment of Poly- herbal Antidandruff Formulation

; by – Rashmi Pal ,.Nikita Saraswat , Pranay Wal , Ankita Wal , Yogendra Pal. -2020.

Dandruff is a major problem of hair, which can not be fully cured with the aid of chemicals An attempt has been made to prepare a poly-herbal anti-dandruff hair care formulation and it is standardized to ensure it stability and quality aspects. The herbal preparation was prepared in the laboratory, on the basis of decided proportion, with the help of all the herbal contents The pack was gauged for its various parameters.

3] Formulation and Evaluation of Herbal Antidandruff Gel ; by –BiradevS

. Karande. 1 -Jan-2019.

The present research has been undertaken with the aim to formulate and evaluate the herbal gel containing The gel formulation was designed by using aqueous, ethanolic extracts in varied concentrations along with different polymer. The physiochemical parameters of formulations (pH,viscosity,spread ability etc.) were determined. The results showed that formulation have promising effect than other formulations.

Preparation and Evaluation of Anti-dandruff Hair Gels ; by – Pingili Mamatha,VangaSridhar and Sriramula Harikishan Prasad.19-Dec-2017.

Dandruff is a shedding of dead skin cells from the scalp and is suffered by almost 50% of the population and causes sign if I cant discomfort. The severity can ranges from mild scaling to dry skin to sever scaling. Malassezia-furfuris considered to be the cause of dandruff. The anti- malassezial activity of Cloteimazole gel as an attempt was made for formulating gels containing Cloteimazole . Hair gel last long on the scalp.

4] Formulation and evaluation of Poly herbal hair gel formulation; by- Nilifar Khan , Prajwal Jadhav .etc. – 2022.

Dandruff is a skin condition with symptoms includes flaking and sometimes mild itchiness causes to the scalp. They are many bacteria, fungus causing scalp infection which leads to further hair problems or skin issues. There is one of the common condition candidiasis which is typically caused on the skin. Herbal extract of guava leaves, amla and aloe fond to be effectivein treating candidiasis . A poly-herbal hair gel was found to be effective against candidiasis along with its nourishment and prevent premature graying.

5] Formulation and evaluation of Antimicrobial Hair gel from AbrusPrecatorius ; by – Arunadevi Birajdar , Ragini Rajmane , Sulbha Bhoyte. 1- Nov-2021.

Herbal cosmetics are the preparations used to enhance the human appearance. The aim of the present research was to formulate safe medicinal formulations from herb A brusprecatorius for the purpose of treatment of alopecia and antimicrobial activity. The current investigation was carried out to evaluate the hair growth enhancing potentiality of aqueous extract of A brusprecatorius leaf. It is potent hair growth promotor and suggested to be an effective to synthesis hair growth promotor.

6] The human hair:from anatomy to physiology ;by–BarbaraBuffoli PhD Fabio RinaldiMD1-Mar-2014.

Hair is a unique character of mammals and has several functions, from protection of the skin to sexual and social communication .In literature ,there are various studies about hair that take into consideration different aspects within many fields of science, including biology, dermatology, cosmetics, forensic sciences, and medicine. This review could be the basis for improvement and progression in the field of hair research.

7] Physiology of hair growth ;by–Ezra Hoover, Karthik Krishnamurthy.-2021.

Hair is a component to the integumentary system and extends downward into the dermal layer where its in the hair follicle .The presence of hair is a primary differentiator of mammals a unique class of organisms. In humans, it is

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cherished and highly visible indicator of health, youth, and even class. A microscopic level, the variety in length ,color, diameter
,and cross- sectional shape of each hair creates the characteristic profiles seen across ethnic groups and among individuals. This article will discuss the physiology of hair, cellular components, mechanisms of growth and differentiation, and its clinical significance.

8] Formulation and evaluation of herbal hair gel for hair growth potential
; by –T.Ragupathi,K.Chitra.22 -Feb-2017.

Ethyl acetate soluble fraction of ethanol of ecliptic alba and lippanodiflora was evaluated for potential on hair growth by in vivo method.The length of hair an the different cyclic phase of hair follicle like anagen and elogen phases were determined at different time period.

9] A Review on the extraction methods used in medicinal plants, Principle, Strength and limitation ; by Azwanlda NN . 6- Jul-2015.

Medicinal plants are gaining much interest recently because their use in ethno medic interesting common diseases uchascold,fever and other medicinal claim are now supported with sound scientific evidences. The study on medicinal plants started with extraction procedures that play a critical role to the extraction outcomes. Hence, this review aim to describe and compare the most commonly used methods based on their principle, strength and limitation to help evaluating the suitability and economic feasibility of the method.

DRUG PROFILE

1. Alovera:-

FigNo.2:Aloeveragel

Synonyms:-Aloe barbadensis , Aloe barbadensisval , Aloe ChineseisBaker ,Aloe elongate murray

Biological source:-Aloes is the dried juice of the leaves of Aloe barbadensis, Miller, known as Curcao aloes.

Family:-Asphodelaceae.

Geographical source:- Eastern and southern Africa and grown in capecolony Zanzibar.

Macroscopic characters:- Color:- Greenish brown.

Odour:-Stinky odour. Taste:- Bitter.

Chemical constituents:-all the varieties of aloe are the major sources of antra Quinone glycoside. The principle active composition of aloe is showing ,which is mixture of glucosides ,among which barbalo in is chief constituents .

Uses:-

Aloe vera gel is used commercially as an ingredients of yoghurts, beverages and some desserts.

Aloevera gel typically is used to make topical medication of skin condition such as burns, wounds, froast bite , rasheh, psoriasis , cold sorea or dry skin.

2. Guava leaves:-

FigNo.3:Guava leaves

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Synonyms:-Guajavapyrifera(L.) botanically classified as Psidiumguajava, are members of the Myrtaceae, or myrtle family along.

Biological source:-The common guava Psidiumguajava (lemon guava, apple guava) is a small tree in the myrtle family (Myrtaceae), native to Mexico, Central America, the Caribbean and northern South America.

Family:-Myrtaceae.

Geographical source-:Guavas originated from , Central America or northern South America throughout the Caribbean region.

Macroscopic characters:-

Color:-deep green.

Odour:-fruity,floral,earthy,herbaceous,and sweet flavor. Taste:-Bitter.

Chemical constituents:-The guava fruit contains vitaminA,C,iron,phosphorusand calcium. It has more vitamin . The fruit contains saponin,oleanolicacid, lyxopyranoside, arabopyranoside, guaijavarin, quercetin and flavonoids.

Uses:-

Among many other medicinal benefits on the hair, the anti oxidants in guava leaves can fight free radicals, thereby preventing hair damage. The analgesic, antimicrobial, anti- inflammatory .

3. AMLA:

Synonyms:Embilica,indiangoose berry.

Biological source:

This consist of dried, as well Embilica officinalis.

Family:Euphorbiaceae. FigNo.4:Amlafruits

Partused:fruits .

Macroscopical characteristics:

1. Color-green color changes to light yellow or bricked maturity.
2. Odour-Odourless.
3. Taste-the test of malaisspread astringent.
4. Size-the average size of an Amla is between1.5and2.5cmindiameter.
5. Extra feature-fruits are fleshy obscurely4lobed with 6trygonusseed.They are very hard and smooth in appearance.

Uses:

1. Used as an acrid,diuretics,refrigerant, laxative.
2. Used in preparation of hair oils, shampoos.
3. Popular in gradients of triphla churn and chyawanprash.
4. Rich source of vitaminc.

4. Hibiscus:

Synonyms: Hibiscus rosa-sinensis

Biological source: this consists of dried as well as fresh flower of the plant .

Family: malvaceae Part used : flower

Chemical constituent:

a. flavonoids

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b. organic acid
c. tannins
d. gallic acid
e. Vitamin C

Uses:

1. Stimulates hair growth
2. Control dandraff
3. Used as antioxidant.
4. Used as natural conditioner
5. Add shine and smoothness to hair

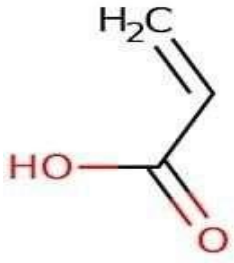
Fig No.5: Hibiscus

Excipient profile

1) Carbopol 940:

FigNo.6:Carbopol940

- Othernames:Polyacrylicacid,Acrypol940,Carboxyvinylpolymer, Carbomer 940.
- IUPACName:Poly(1-carboxyethylene),Poly(acrylicacid)
- Molecular formula :(C3H4O2)n.
- Molecularweight:72.063g/mol.
- Structure:



FigNo.9:Carbopol940

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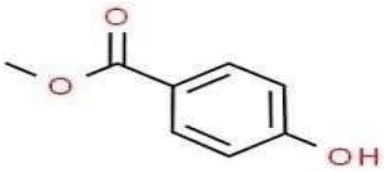
- Color:Crystalor fine particles.
- Odour:Acrid odourand fumes.
- Appearance:Colourlessliquid
- Solubility :Soluble inthewater
- Meltingpoint:12.5°c
- Boilingpoint:55°F

Use: Emulsifying agent, Act as gelling agent.

2) Methyl Paraben :

FigNo.7:MethylParaben

- Othernames:4-(carbomethoxy)phenol,4-hydroxybenzoicacid
- IUPACName:Methyl-4-hydroxybenzoate
- Molecular formula :C8H8O3
- Molecularweight:152.14g/mol
- Structure:



FigNo.8:MethylParaben

- Color: Colorless.
- Odour:Odourless or has faint characteristic odour.
- Appearance :White needle crystals.
- Solubility :Slight soluble in water and easily soluble in alcohol and other org. solvent.
- Meltingpoint:125-128°c
- Boilingpoint:265.5°c
- Use: Antifungal agent,

Act as preservative in cosmetic. (It shows the carcinogenicity)

3. Propylene Glycol :

FigNo.9:Propylene Glycol

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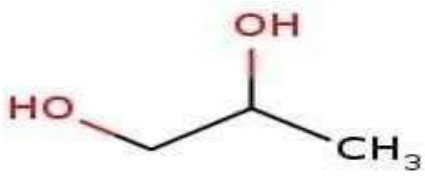
- Othernames:1,2-Propanediol.
- IUPACName:Propane-1,2-diol.
- CASNo.:57-55-6
- Molecular formula :C3H8O2.
- Molecularweight:76.09g/mol.
- Structure:



FigNo.10:Propylene Glycol

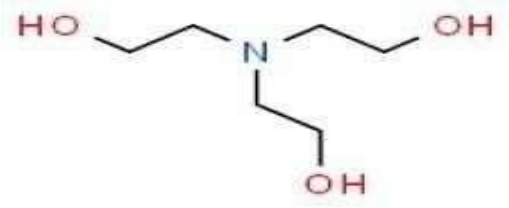
- Color:Colorless liquid.
- Odour :Odourless.
- Appearance:Clearviscous liquid.
- Solubility:Watersoluble.
- Meltingpoint:60°c
- Boilingpoint:187°c

Use: Solubility enhancer,Emulsifying agent,(It shows the carcinogenicity)

4. Triethanolamine:

FigNo.11: Triethanolamine

- Othernames:2,2,2"-Nitrilotriethanol,Alkanoamine- 2,4,4
- IUPACName:2,2,2"- Nitrolitei(Ethan 1-ol)
- CASNo.:102-71-6
- Molecularformula :C6H15NO3
- Molecularweight:149.19g/mol
- Structure:



FigNo.12: Triethanolamine

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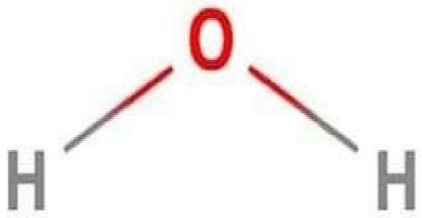
- Color:Clear,Colorless.
- Odour:Mild ammoniacal.
- Appearance :Colorless to light yellow,Viscous liquid.
- Solubility: water soluble.
- Meltingpoint:21°c
- Boilingpoint:360°c

Use: act as PH adjuster,(It shows the carcinogenicity)

5. Water :

FigNo.13:Distilledwater

- Other names :Dihydrogenmonoxide,Dihydrogenoxide,Diprotiumoxide.
- IUPAC Name :Oxidane.
- CASNo.:7732-18-5
- Molecular formula :H2O
- Molecularweight:18.015g/mol
- Structure:



FigNo.14:Distilledwater

- Color:White to off white.
- Odour : Odourless.
- Appearance:Colorless liquid.
- Meltingpoint:0°c
- Boilingpoint:100°c

Table No1.Herbs used in the preparation of herbal hair gel

Sr No.	Constituents	Biological source	Family	Uses
1	Alovera	Dried leaves of aloe barbadensis miller	Asphodelaceae	Conditioner and moisturizing effect
2	Amla	Dried ripe fruits of Embelicaofficinalis	Euphorbiaceae	Darkening of hair and hair growth parameter
3	Guava leaves	Dried leaves of Psidium guajava	Myrtaceae	For hair growth and in antidandruff
4	hibiscus	Dried as well as fresh flower	Malvaceae	Hibiscus helps in

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		of plant		making Shine and smoothness to hairs

EXPERIMENTAL WORK AND METHODOLOGY

1. Collection of herbs:

We collected guava leaves from collected from local area of Beed ,and kept for sundry for 3 days. After sun drying grind it to coarse powder for further extraction process.

2. Preparation of extracts :

A. Preparation of Guava leaves extracts :

Simple Boiling Method:

Boil 5-6 guava leaves in 1 liter of water until the liquid reduces to about 1/3 its original volume. This method is suitable for preparing an extract for tea or other applications

FigNo.15:.Guavaleavesextract

B. Preparation of Amla extract:

Take a 50 gm of amla powder in a beaker, add 200 ml of alcohol in a beaker, keep this beaker minimum three days for maceration. After three days, filter the mixture, take filtrate in a china dish and keep this china dish on water bath for evaporation of alcoholic content and alcoholic extract of amla remains in china dish

FigNo.16:.Amlaextract

C. Prepration of Hibiscus extract

Boiling Water and Steeping:

Place the crushed flowers in a pot and cover them with boiling water. Bring the water to a simmer and let it steep for a few minutes (10-15 minutes is a good starting point).

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Fig No.17:. Hibiscus extract

D. Prepration of Aloe extract:

The fresh Aloe was collected and cut into small pieces. It was crushed by using some required amount of water with the help of motor and pestle and then this whole was filtered through a clean cotton cloth and the aloe gel obtained.

FigNo.18:.Aloeextract

Formulation Table

SrNo.	Ingredients	Quantity taken 5mg/ml	Quantity taken 2mg/ml
1	Guava leaves	2.5 gm	1gm
2	Hibiscus	2.5 gm	1gm
3	Amla	1 gm	1gm
4	Alovera	1 gm	1gm
5	Carbapol940	0.45 gm	0.45gm
7	Methylparaben	0.1 gm	0.1gm
8	Propyleneglycol	10.4 gm	10.4gm
9	Triethanolamine	1-2 drops	1-2drops
10	water	QS	QS

Table No.2

Formulation of Polyerbal hairgel

1. Weigh required quantity of carbopol 940 and dispersed in 25 ml of distilled water in beaker.
2. Keep beaker as for half an hour to swell Carbopol 940 and then start stirring at 1200 rpm by using mechanical stirrer for 30 min.
3. SolutionA: Take 1gor 2.5g of Guava extract and Hibiscus adding 5ml of Propylene glycol in one beaker and stirred properly.
4. Solution B: Add Aloe juice. Amla juice, methyl Paraben and propylene glycol in another beaker.
5. Disperse SolutionA and B in Carpool 940 with constant stirring.
6. Finally add remaining ml of distilled water to make up 50 ml of formulation and add Tri ethanol amine drop wise to the formulation until pH become neutral and gel get required consistency.

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FigNo.19:.Herbal hair gel

EVALUATION OF POLYHERBAL HAIR GEL

A. Physical evaluation:

Physical parameter such as color, appearance, and consistency were checked vidyalaya.

B. Washability:

Formulation were applied on the skin and then ease and extent of washing with water were checked manually.

C. pH:

The pH of the prepared polyherbal hair gel in distilled water (10% v/v) was evaluated by placing drop of solution on a piece of pH paper and compare the paper with the pH scale.

D. Spreadability:

Spreadability of gel was measured with glass slide apparatus, excess of gel was placed between two slides and1kg weight was place don slide for 5 min to compress the sample to uniform thickness, time in seconds to separate two slides was taken as measure of spreadability,

S=wl/t Where, S=spreadability(gcm/sec)

W-weighton upper slide (g) 1-length of slide (cm)

t-time taken in sec

E. HOMOGENEITY:

The developed gel sweetest for homogeneity by visual in section after the gel have been set in the container spread on glass slide, for the appearance, tested for the presence of any lumps, flocculates or aggregates.

F. SKIN IRRITATION:

The skin irritation was carried out on human volunteers. For formulated gel,five volunteers were selected and 1.0g of formulated gel was applied on an area of two square inch to the back of the hand the volunteers were observed for lesions or irritation.

G. MICROBIALASSAY:

The antifungal activity of different formulation was determined by modified agar well diffusion method.

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Method:

A] Preparation of inoculums:For evaluation of antifungal activity 24 hrs fresh culture was used by using Bacillus bacteria.

B) Determination of zone of inhibition:

Antifungal activity was checked by agar well diffusion method previously liquefied media was poured into sterile Petri dish Care was taken for uniform thickness of the layer of medium. After complete solidification, asmallino culums of hair geland Guava leaves was spread over the sabarods dextrose agar . Wells were made aseptically with cork borer round the margin of the plates equidistantly [Fem part] into each of these wells gel solution was placed carefully plates were left for diffusion for 30 min. After the place were incubated at 30+2or30-2degreescentigrade'sfor24hr. After incubation was over,zone of inhibition was measured

Hair gel guava leaves extract

RESULT

The poly herbal anti-dandruff hair gel was formulated by adding the required amount of herbal ingredients and other excipients as given in formulation table. These prepared polyherbal anti dandruff hair gel was evaluated for various parameters like physical, evaluation , wash ability. PH determination, spread ability, homogeneity, skin irritation test and antifungal activity.

Physical evaluation	OBSERVATION
color	Light pink in color
Appearance	Smooth
Consistency	Good
Wash ability	Good
pH	7
Spread ability	8.1
Homogeneity	No lump
Skin irritation	No irritation

TableNo.3: Result Table

Sr.no	Inoculum	Zone of inhibition
1.	Guava leaves extract	3.3 cm
2.	Hairgel	3.7 cm

TableNo.4: Zone of inhibition

Discussion

Guava leaves and Hibiscus generally have many benefits in real life. The vitamins B and C found in the leaves help to nourish the follicles and aid hair growth. As guava leaves have such good benefits, it is favourable for formulation. Hibiscus have thickening and strengthing property, hence it is also favourable for hair gel formulation. In addition are

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also show activities such as antimicrobial, antioxidant as well as antifungal. On basis of the known theory we performed microbial assay on Candida and the perfect result was obtained at2mg/ml concentration of methanolic extract of guavaleaves.Phytochemical test performed showed the presence of tannins, saponins, Terpenoids, alkaloids, glycosides and phenol compounds which are antifungal compounds, the inhibition activity on microbial assay we performed also gives additional proof. By using 5 mg /ml concentration we prepared formulation of guava leaves for hair problems because of all it's good activity. The gel was formed with consideration of all standard parameters of evaluation. We conclude that from above results that we can use guava leaves extract for hair problem in form of hair gel.

II. CONCLUSION

The present work was carried out with the aim of preparing the poly herbal hair gel that can prevent dandruff formation due to fungal infection Herbal hair gel was formulated using extracts of medicinal plant a like Guava leaves, Amla, and Aloe ,hibiscus ,instead of synthetic antidandruff agents .To evaluate for good product performance of the prepared hair gel, many test were performed. By using 2 mg/ml concentration we prepared formulation for hair problem but it is not effective as that of formulation which we have prepared by using 5mg/ml. The results of the evaluation study of the developed hair gel revealed a comparable result for quality control test, but further scientific validation is needed for its overall quality

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