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DEVELOPMENT AND EVALUATION OF POLY HERBAL COSMETIC SERUM FOR HAIR CARE

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Abstract

The study was aimed at formulating and evaluation a complete poly herbal serumcontaining only traditionally used plant materials. The serum containedaqueous extract of Corouptia guanensis (leaves), Cyclea peltata (leaves) and Myristica fragrans(seed). The physicochemical parameters such as color, pH, spread ability, viscosity, redispersion, extractive value, ash value, and moisture content were studied using recommended procedures. The organoleptic evaluation of thepoly herbal serum showed good result. the pH of the polyherbal serum ranged to be 4.8 5which was near the pH required for hair. The total microbial count of serum containing plants extract for anti-microbial studies was found to be cfu less than 100 cfu/gm. The zone inhibition for antidandruff study increased with increase in concentration of plant extracts. Herbal hair serum is free from any type of irritants and synthetics. So, it is safer for your hair and achieve better result without harming hair and environment. Synthetic and chemical based hair products are unhealthy as compared to organic hair products because they contain harmful chemicals but overall herbal hair serum is more effective and offer more benefits as compared to chemical hair serum.

***Key word**: serum, herbal serum, Anti- dandruff, Antimicrobial activity*

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INTRODUCTION

Cosmetics are defined as "items with mild action on the human body for the purpose of cleaning, beautifying, adding to the attractiveness, altering the appearance, or keeping or promoting the skin or hair in good condition," whereas functional cosmetics, even if classified as cosmetics, are defined as "items fulfilling specific actions such as skin whitening, minimizing the appearance of lines in the face and body, protecting from the sun, and sun tanning. "Cosmetics are a vital part of human society.

The usage of cosmetics has health concerns; so, modern cosmetic science is looking for naturally-derived cosmetics (44,15). Cosmetics are divided into scent, "makeup cosmetics" (foundation creams, lipsticks, and eye makeup), and "skin care cosmetics" (facial cream, skin lotion, and skin milk). Cosmetics are divided into fragrance, "makeup cosmetics" (foundation creams, lipsticks, and eye makeup), "skin care cosmetics" (facial cream, skin lotion, skin milk, and cleansing cream), and "hair care products" (hair dye, shampoo, and hair treatment). Cosmetics are products that are intended to wash, protect, and alter the appearance of our bodies' external parts.

Cosmetics, in general, are exterior preparations that are applied to the body's external components. Men and women have always decorated their bodies to improve their attractiveness. Men wore vegetable plants and animal parts, whilst ladies wore coloured stones and flowers around their neck and wrist. They gradually begin to apply coloured dirt and ointments to their face and bodies. People started wearing bangles and necklaces made of baked earth minerals. Cosmetics are now regarded as necessary components of life (33). They not only lure people to it, but they also have psychological affects on them. It has grown in popularity over the previous three to four decades, and its use has increased exponentially in both males and females.

Examples of cosmetics in Skin-care creams, powders, lotions, lipsticks, nail polishes, eye and face makeup, deodorants, baby products, hair colorants and sprays etc

Hair serum

Fig No. 1: Hair serum

Hair serum is a silicone-based treatment that is designed to make hair look smoother and shinier while also protecting it from damaging UV rays(17). In the 1990s, celebrity stylist John Freida launched this nourishing lotion to the market, and there was no turning back. It was introduced as a product aimed at women with straight or curly hair, with the goal of achieving a salon-like finish at home with just a few drops of product (42,24). Frizz Ease was the first hair serum to be granted liberty, and it accomplished precisely what the name indicated.

Benefits of Hair Serum

- Controls frizz
- Boosts smoothness
- Enhances straightness or curls
- Protects against damage
- Reduces tangles
- Promotes shine

Types of hair serum:-

1) Intense Moisturizing Hair Serum
2) Straightening Hair Serum
3) Hair Growth Serum

Advantages:-

- Hair serum makes your hair shinier and healthier and reduces tangles.
- As the serum reflects light, it makes hair look lustrous and healthy. It also protects your hair from dust and humidity(38).
- Its low pH level prevents swelling and holds the hair fibers together, thus preventing damage.
- Hair serum also protects your hair from the damaging effects of the sun, pollutants, other harmful chemicals, and heat styling tools.

- Fig No. 3: Tree of Couroupita Guanensis
- It helps moisturize dry hair or hair that has been damaged from color.

Disadvantages: -

- Regular use and over-application can make the hair unhealthy and ultimately dry.
- Applying the serum more than 2drops on the scalp can lead to inflammation.
- Silicones present in hair serums can be harmful for the hair in the long run. Serums also contain chemicals that can react badly with the hair depending on the hair type(21).
- Too much application could cause hair fall due to inflammation..

Applications:-

- Heat protectant
- Prolonged sun exposure
- It can help protect hair from the elements, helping it retain moisture.

Plant profile

Fig No. 2: Leaves of Couroupita Guanensis

Couroupita guianensis,known by a variety of common names including cannonball tree, is a deciduous tree in the flowering plant family Lecythidaceae. It is native to the tropical forests of Central and South America,and it is cultivated in many other tropical areas throughout the world because of its beautiful, fragrant flowers and large, interesting fruits[6]. Fruits are brownish grey. There are potential medicinal uses for many parts of Couroupita guianensis, and the tree has cultural and religious significance in India. In Sri Lanka, the cannonball tree has been widely misidentified as Sal, after its introduction to the island by the British in 1881, and has been included as a common item in Buddhist temples as a result.

Kingdom: Plantae

Clade: Tracheophytes

Clade:Angiosperms

Clade:Eudicots

Clade:Asterids

Order:Ericales

Family:Lecythidaceae

Genus:Couroupita

Species:C. guianensis

Uses

Courouptia guanensis is planted as an ornamental plant for its showy, scented flowers, and as a botanical specimen for its interesting fruit. The fruit is edible, but is not usually eaten by people because, in contrast to its intensely fragrant flowers, it can have an unpleasant smell[34]. It is fed to livestock such as pigs and domestic fowl.Parts of the plant have been used in traditional medicine. It has been used to treat hypertension, tumors, pain, and inflammation, the common cold, stomachache, skin conditions and wounds, malaria, and toothache.

Cyclea Peltata

Fig No. 4:Leaves of cycleapeltate

Cyclea peltata, is very common plant in the west coast of india. The leaves of *cyclea peltata* are being used in Ayurvedic system of medicine for various medicinal properties[4]. The leaves are also used traditionally as a coolant ,antidandruff and diuretic.

Kingdom:Plantae

Clade:Tracheophytes Clade:Angiosperms

Clade:Eudicots

Order:Ranunculales

Family:Menispermaceae Genus:Cyclea

Species:C. peltata

Uses

Cyclea peltata is used in Indigenous Indian Medicinal systems as a wound healer, an antidote to poisons, and for various digestive, skin and inflammatory disorders[15]. It is a common component of the traditional Ayurvedic Polyherbal formulation Shaddharana Choornam, along with Plumbagozeylanica, Holarrhenaantidysenterica, Picrorhizakurroa, Aconitum heterophyllum, Terminaliachebula, Berberisaristata and Cyperusrotundus, whose formulation is mentioned in Vagbhata'sAshtāṅgasaṅgraha and Charaka'sCharakaSamhita.

Myristica Fragrans

Fig No .5: MyristicaFragrans

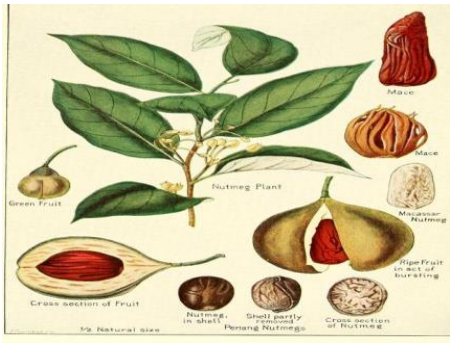

Fig No. 6: MyristicaFragrans

Kingdom: Plantae
Clade:Tracheophytes
Clade:Angiosperms
Order:Magnoliales
Family: Myristicaceae
Genus:Myristica
Species:M. fragrans

Uses

- ❖ It strengthens the hair follicles by providing antioxidants which benefits the hair growth.
- ❖ Nutmeg provides shine to the hair.
- ❖ Helps with Dullness.
- ❖ Helps with Hair Fall.
- ❖ Helps with Oily Hair.
- ❖ Helps with Dandruff.

Materials and methods

Collection And Authentication Of Plant Material

The leaves of Couroupita guianensis were collected from Aluva ,Ernakulam (shiva temple) and Cyclea Peltata leaves were collected from Sreevalsam herbs ,Mullakkara,Thrissur during winter. Myristica Frgrans seeds were collected from kottakkal arya vaidhya sala Chalakudy,Thrissur during summer. Botanical identification and authentication (certificate no: H.No.10/January/2022) were done by Mr.Anto PV, Assistant Professor of Research and PG Department of Botany ST.Thomas College, Thrissur.

Preparation And Extraction Of Plant Material

The leaves were initially washed using a running tap water to remove the dirt or dust and are dried under Sun shade for about 30 to 35 days at 350C during summer and size reduced by sevieing in 120 mesh size(9,46). The Powder sample was weighed and stored in an airtight container and extraction commenced.

Extraction Of *Couroupita Guianensis* by Maceration

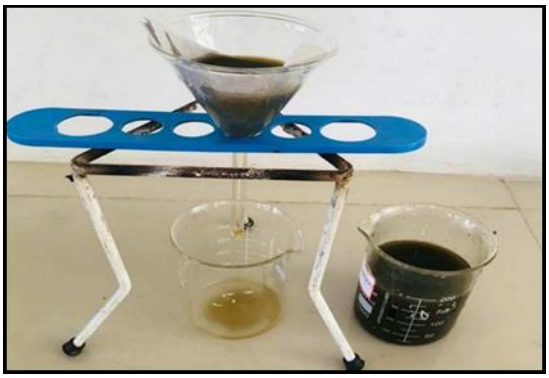

Fig no. 11: extraction of Couroupita GuanensIs

The leaves were dried under shade for 4 weeks to make it suitable for grinding and also to avoid the degeneration of active constituents[44]. Grind the leaves into powder and put in an airtight container and perform maceration using ethanol and water solvents. Remove the solvent, filtered with a filter paper and

allow it to heat using water bath until extract is obtained that was collected and incorporated into the herbal hair serum.

Extraction Of *Myristica fragrans* by maceration :

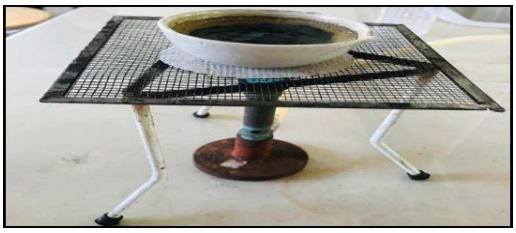

Fig No. 12: Extraction of Myristica fragrans

The seed were washed with distilled water and the parts reduced in grinder into small pieces and were dried at 35^0C .Macerated by adding sample in 70 ml of ethanol in a beaker and kept in room temperature overnight [(34)].The extract was filtered through whatman filter paper no.1 and filtrate was stored until used.

Extraction Of *Cyclea Peltata* by Maceration :

Fig No. 13: Extraction of Cyclea Peltata

Leaves powder was extracted using ethanol. The obtained extract was filtered using whatman filter paper No1(4). Remove the solvent, allow it to heat using water bath until extract is obtained that was collected and incorporated into the herbal hair serum.

Physicochemical Evaluation Determination of Extractive Values

This method determines the number of active constituent in each amount of plant material when extracted with the solvent. The extractive value used as a means of evaluating crude drug which are not readily estimated by other means.

Determination Of Alcohol Soluble Extractive Value

Weigh about 5 gram powdered drug with 100 ml of alcohol in a stoppered flask for 24 hours and shaking for 6 hours. Filter rapidly through filter paper. Taking precaution against excessive loss of alcohol. Evaporate 25 ml of alcoholic extracted to dryness in a tared flat bottomed dish (32). Dry at 800C and weigh. Keep it in a desiccator. Calculate the percentage w/w of alcohol soluble extractive with the reference to the air dried drug.

Determination of Water Soluble Extractive Value

Determination of water soluble extractive value follows the procedure as above using chloroform. Water is used instead of alcohol.

Determination of Ash Value

Weigh about 3 gram of the powderd drug in a tared silica crucible and incinerate the powdered drug by gradually increasing the temperature until free from carbon and cool it. Keep it in a desiccators(37). Weigh the ash and calculate the percentage of total ash with reference to the added dried sample.

Determination Of Moisture Content

Place 10 gram of drug in a tared evaporating dish. For unpowered part the sample was prepared by cutting. Placing the drug in a tared evaporating dish dry at 105°C for 5 hour(7). Then weigh it and continue the drying and weighing at one hour interval until the difference between two successive weight corresponding to not more than 0.25%. constant weight is reached when two consecutive weight after drying for 30 minutes and cooling for 30 minutes in a desiccator.

Phytochemical Screening

Phytoconstituents	Test	Observation
Alkaloids	Hager's Test : 2ml extract + few drops of hager's reagent	Yellow precipitate
Flavonoids	Ammonia test : Filter paper dip in alcoholic solution of drug was exposed to ammonia vapour	Formulation of yellow spots on filter paper
Carbohydrates	Molisch's Test : 2ml extract + 10ml water + 2ml drops ethanolic alpha naphthol (20%) + 2ml concentrared. sulphuric acid	Reddish violet ring at the junction
Glycosides	Liebermann's test : add 1 ml extract + 2ml chloroform acetic acid	Violet to blue to green color
Tannins	Braymers Test: 2ml extract+ 2ml water + 2 drops of ferric chloride (5%)	Green precipitate
Steroids	Salkowski Test: 2ml extract + 2ml chloroform + 2ml concentrated sulphuric acid	Reddish brown ring at the junction
Proteins	Ninhydrin Test : 1ml extract + 2ml ninhydrin reagent	Violet precipitate
Saponins	Foam Test : 5ml extract + 5ml water + heat	Froth appear
Phenols	Ferric chloride Test: extract was treated with 3-4 drops of ferric chloride.	Formation of bluish black colour

Formulation

Phase-A: xanthan gum and glycerin are stirred together until a uniform mixture is formed. Phase-B Purified water is added into phase-A. To the above mixture contents of Phase-C extracts of *mystica fragans , couroptia guanensis, and cyclea peltata a*re added and continue stirring[9,24]. Finally the mixture is added with contents of phase-D Tea tree oil, sodium benzoate. Twelve different formulations were prepared. These preparations are denoted as F_1, F_2, F_3, F_4, F_5 and F_6 for alcohol and F_7, F_8, F_9, F_{10}, F_{11} and F_{12} aqueous extract.

Table no: 2 Formulation of hair serum using alcohol extract

Composition of serum formulation	F1 %w/w	F2 %w/w	F3 %w/w	F4 %w/w	F5 %w/w	F6 %w/w
Cycleapeltata	0.3	0.7	1.1	1.5	1.8	2.2
Couroupita guanensis	0.3	0.7	1.1	1.5	1.8	2.2
Myristica	0.2	0.30	0.3	0.4	0.5	0.6
Xanthan gum	0.2	0.2	0.3	0.3	0.3	0.3
Sodium benzoate	0.1	0.1	0.1	0.1	0.1	0.1
Glycerin	1.1	1.2	1.2	1.2	1.3	1.3
Tea tree oil	0.1	0.1	0.1	0.1	0.1	0.1
Distilled water q.s	15	15	15	15	15	15

Table no: 3 formulation of hair serum using aqueous extract.

Composition of serum formulation	F7 %w/w	F8 %w/w	F9 %w/w	F10 %w/w	F11 %w/w	F12 %w/w
Cycleapeltata	0.3	0.7	1.1	1.5	1.8	2.2
Couroupita guanensis	0.3	0.7	1.1	1.5	1.8	2.2
Myristica	0.2	0.30	0.3	0.4	0.5	0.6
Xanthan gum	0.2	0.2	0.3	0.3	0.3	0.3
Sodium benzoate	0.1	0.1	0.1	0.1	0.1	0.1
Glycerin	1.1	1.2	1.2	1.2	1.3	1.3
Tea tree oil	0.09	0.09	0.09	0.09	0.09	0.09
Distilled water q.s	15	15	15	15	15	15

Evaluation

Physical Appearance

The physical appearance, color, and feel of the prepared herbal hair serum are visually tested.

Homogeneity Test

-A clean and dry object glass was smeared with the hair serum, and a cover glass was sealed. The appearance under the light of some coarse particle/homogeneity was investigated[22,35]. Herbal hair serum was tested by visual examination for homogeneity and tested for some lumps, flocculates, or aggregates.

P^H Test

The pH test will be determined by using Digital pH meter. Dipper of digital pH will be dip into the sample of serum formulation and the pH value will be recorded. The pH meter was calibrated using pH 4 and pH 7 buffer solutions[43]. Then, the electrode was soaked in the hair serum and left until the pH normalized after a few minutes.

Viscosity

The viscosity measurement was performed with spindle number 64 on a Brookfield viscometer (DVE AMETEK) in the beaker, 50 ml of hair serum was placed, and the viscosity was measured at various rpm, 10, 20,50,100.

Spreadabiliy Test

The product spreads on the skin or affected area are denotes the extent of area to which the serum was applied. Some sizes of filter paper are chosen and each filter paper is measure the total area of filter paper (A_1) and weighing of each filter paper (W_1). Choose the formulation to be tested and draw several milliliters into the B-D 5mL syringe and drawn onto the center of filter paper for 20 drops[17]. When latest drop hits the filter paper, start a timer or stopwatch to count down for exactly 10 minutes. During the 10 minute test, the liquid will spread in a relatively uniform circular pattern over the filter paper. After 10 minutes, cut exactly on the line between saturated spread and dry filter paper by using scissor. Weigh the remaining dry filter paper. Record this weight as W_2. Measure the diameter of the saturated portion of filter paper[17,8]. If the spread was not a perfect circle, then take several diameter readings around the spread area and determine an average diameter. Record this measurement as A_2.

Redispersion test

This was done by using micro centrifugation method. The formulation were centrifuged for 3 minutes at 2000 Rpm. After centrifuging, the product was shaken and noted for redispersion. If it is redispersed, the formulation is found to be good.

Antibacterial Evaluation

Weigh accurately required quantity of nutrient agar and add 50 ml of water in an autoclave conical flask. Autoclave it at 121^{0}C for 15 min[37]. When the temperature reduces to 45^{0}C add 1ml of dilution of the product to autoclave petridish and add 20ml of nutrient agar medium and mix by rotating in the clock wise and anticlockwise direction allow the plate to solidify.Incubate this plate for 48 hours at 37^{0}C.

Antifungal Evaluation

Pipette out in duplicate 1ml of pretreated sample aseptically into 5 sterile petridishes. Pour 15 to 20 ml of molten sabouraud'chloranphenicol agar (SCA) maintained at about 45^{0}C mix the content of the plate by swirling[26]. Allowing the plates to solidify, invert and incubated at 23+2^{0}C for three days. Count the number of colonies in each plate.

Anti-dandruff study

The herbal anti-dandruff shampoo formulations (F1-F5) were subjected to anti-fungal activity by adopting disc-diffusion method. Potato Dextrose Agar (PDA) medium was used for growing fungus. PDA was prepared with addition of Buffer. Malassezia furfur inoculum was dispersed in Potato dextrose broth for its further use as inoculum. The inoculum obtained was serially diluted to 10-6 and 10-7 dilutions and 100µl of inoculum was inoculated onto the PDA plate which was spread using an L-Shaped spreader[24,32]. The Petri plates were then sealed using a paraffin and incubated at 30 ^{0}C for 48 hours to get plates with uniform growth of fungus. Then different dilutions of serum as prepared and poured into petri plates and incubated, the growth of fungus were checked at regular intervals. Disk diffusion method was used to check the zone of inhibition for all the dilutions of serum .

Result and discussion

Phyisicochemical Evaluation of alcohol extract

Table no: 4 Result of physicochemical evaluation of alcohol extract.

Parameters	*Couroupita Guianensis*	*Cyclea peltata*	*Myritica fragrans*
Extractive value Alcohol soluble extractive value	24.92%	5.56%	32.5%
Water soluble extractive value	37.21%	5.77%	19.80%
Moisture content	10.52%	9.9%	51.02%
Ash value	08.16%	9.30%	4.44%

Phyisicochemical Evaluation of aqueous extract

Table no: 5 Result of physicochemical evaluation aqueous extract

Parameters	*Couroupita Guianensis*	*Cyclea peltata*	*Myritica fragrans*
Extractive value Alcohol soluble extractive value	20.7%	3.6%	28.5%
Water soluble extractive value	33.1%	5.5%	13.80%
Moisture content	8.52%	5.9%	45.02%
Ash value	06.16%	6.30%	2.44%

Phytochemical Screening of alcohol extract

Table no:6 Result of phytochemical screening of alcohol exatract

Name of compounds	Name of the test	Couroupita Guianensis	Cycleapeltata	Myristica
Alkaloids	Hagers Test	-	+	+
Flavonoids	Ammonia Test	+	+	+
Carbohydrates	Molischs Test	+	-	-
Glycosides	Liebermanns Test	+	_	_
Tannins	Braymers Test	+	+	+
Steroids	Salkowski Test	_	_	+
Proteins	Ninhydrin Test	_	_	_
Saponins	Foam Test	_	+	_
Phenols	Ferric choride Test	_	_	_

Phytochemical Screening of aqueous extract

Table no:7 Result of phytochemical screening of aqueous exatract.

Name of compounds	Name of the test	Couroupita Guianensis	Cycleapeltata	Myristica
Alkaloids	Hagers Test	_	+	+
Flavonoids	Ammonia Test	_	+	+
Carbohydrates	Molischs Test	+	_	_
Glycosides	Liebermanns Test	+	_	_
Tannins	Braymers Test	+	+	+
Steroids	Salkowski Test	_	_	+
Proteins	Ninhydrin Test	_	_	_
Saponins	Foam Test	+	+	_
Phenols	Ferric choride Test	_ _	+ _	_ _

Physical Appearance

The physical appearance, color, and feel of the prepared herbal hair serum are visually tested. Serum formulation was green viscous liquid preparation with a smooth homogeneous texture and glossy appearance [(42)]. Consistency was found to be good. Consistency and appearance was found to be appreciable in formulation F_5.

Fig No. 14: Physical Appearance

Homogeneity Test

By visual examination of the appearance and presence of any lumps, flocculates, or aggregates, the produced herbal hair serum was checked for homogeneity[(25,50)]. The homogeneity of prepared serum has been shown to be fine.

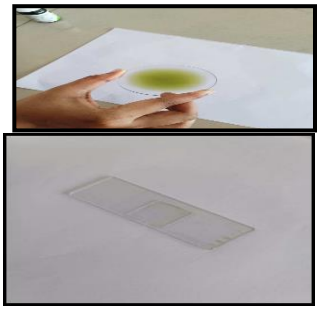

Figure No. 15: Homogeneity Test

pH test

The pH of the whole herbal hair serum was found to be in the range of 3.5-5.5 which was sufficient for the hair, suggesting that the herbal hair serum was suitable for the hair.

fig no. 16: p[h]test

F1	F2	F3	F4	F5	F6
4.45	4.57	4.66	5.25	4.84	5.63

Table no:8 pH of alcohol extract.

F7	F8	F9	F10	F11	F12
3.5	3.57	4.66	6.25	6.84	5.63

Table no:9 pHof aqueous extract.

Viscosity Test

The viscosity measurement was performed and recorded using Brookfield viscometer

Fig No. 17: Viscosity Test

The viscosity was recorded for five different concentrations of formulations and formulation F_5 and F_4 was found to have most appropriate viscosity.

F1	F2	F3	F4	F5	F6
2987	3285	3360	3445	3550	3156

Table no:10 Viscosity of alcoholic extract

F7	F8	F9	F10	F11	F12
3112	3542	4252	4563	5123	5541

Table no :11 Viscosity of aqueous extract

Spreadability Test

From the result of evalvuation, it is showed that formulation 1 given the higher percentage of spreadability with 24% compared to other formulations[5,7]. Secondly, the formulation 2 and 3 also showed more than 20% percent of spreadability during the test carried out while formulation 4 and 5 only give 16.8% and 16% of spreadability respectively and formulation F6 with 17.5% spreadability.

Fig No. 18: Spreadability

F1	F2	F3	F4	F5	F6
24	22	21	16.8	16	17.5

Table no:12 Result of spreadability of alcohol extract.

F7	F8	F9	F10	F11	F12
26	25	24	25.5	27.9	28.5

Table no:13 Result of spreadability of aqueous extract.

Redispersion test

Redispersion test carried out using the formulation was redispersed within seconds after doing there dispersion test micro centrifuge each formulation gave satisfactory redispersion results upon redispersion.

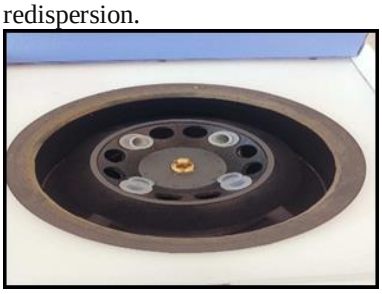

Fig No. 19:Redispersion test

Evaluation of Hair Serum of alcohol extract

Formulation code	Physical appearance	Ph	Homogenicity	Viscocity (poise)	Spreadability	Redispersion
F1	Smooth and uniform appearance	4.45	Fairly smooth and homogenous	2987	Low spreading	redispersed
F2	Fair smoothness and not shiny	4.57	Even but not smooth	3285	Unevenly spread	Moderate redispersion
F3	Moderate appearance and smoothness	4.66	Even homogenity	3360	Evenly spread but not smooth	Fair redispersion
F4	Shiny, smooth with fair appearance	4.52	Fair homogenous texture	3445	Fair spreading	Good redispersion
F5	Excellent appearance and good shiny	4.84	Smooth and homogenous texture	3550	Evenly spread	Uniform redispersion
F6	Moderate appearance and smoothness	5.63	Even homogenity	3156	Evenly spread but not smooth	Fair redispersion

Table no:14 Evaluation of hair serum of alcoholic extract.

Evaluation Of Hair Serum of aqueous extract

Formulation code	Physical appearance	Ph	Homogenicity	Viscocity (poise)	Spreadability	Redispersion
F7	Not uniform appearance	3.5	Fairly smooth and homogenous	3112	Low spreading	redispersed
F8	Fair and not shiny	3.57	Even but not smooth	3542	Unevenly spread	Moderate redispersion
F9	Moderate appearance	4.66	Even homogenity	4252	Evenly spread but not smooth	Fair redispersion
F10	Not shiny appearance	6.25	Smooth and homogenous texture	4563	Evenly spread	Uniform redispersion
F11	Fair shiny	6.85	Fair homogenity	5123	Moderate spreading	Fair redispersion
F12	Moderate appearance and smoothness	5.63	Even homogenity	5541	Evenly spread but not smooth	Fair redispersion

Table no:15 Evaluation of hair serum of aqueous extract

Antibacterial Evaluation

The total microbial count of serum containing plant extract was found to be cfu less than 100 cfu/gm[6]. Therefore the given serum formulations pass the antibacterial test.

Fig No. 20: Antibacterial Evaluation

Antifungal Evaluation

The total microbial count of serum containing plant extract was found to be cfu less than 100 cfu/gm[34,8]. Therefore the given serum formulations pass the antifungal test.

Fig No. 21: Antifungal Evaluation

Anti dandruff study

The results of antifungal activity are described in table no 16 and zone of inhibition was shown in fig no 22[45,25] . The formulation F_5 showed maximum zone of inhibition. Therefore it is concluded that as the concentration of the herbs increased, the zone of inhibition was also increased, hence the formulation F_5 was the formulation showing best antidandruff action.

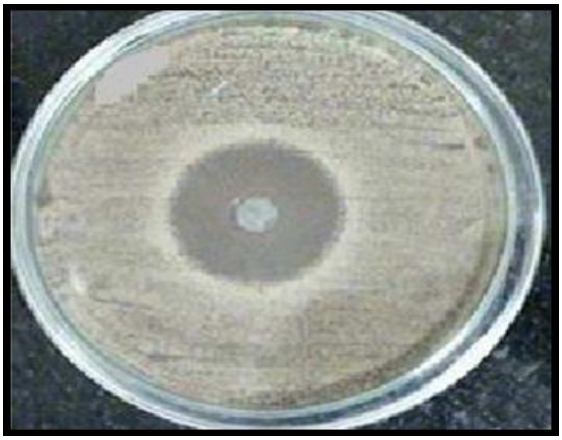

Fig No. 22: Antidandruff Study

Fig No. 23: Incubator

Figure.22 shows Antifungal activity of prepared herbal serum formulation F_5 against malassezia furfur.

Anti-dandruff Study

FORMULATION CODE	ZONE OF INHIBITION
F_1	21.03
F_2	22.8
F_3	24.02
F_4	25.9
F_5	27.06
F_6	28.1

Table no: 16 Antidandruff studies

CONCLUSION:

In cosmetic formulations, the use of bioactive ingredients has a valuable impact on body characteristics and offers nutrients that are important for preserving good and beautiful hair. It can be inferred that prepared herbal hair serum has a beneficial effect on the mechanism of hair growth and increased consistency.

The data obtained from phytochemical screening shows that the prepared extracts of *corouptiaguanensis, cycleapeltata and myristica fragrans* are rich in various phytochemicals .The serum was formulated in 12 formulations in which six of acoholic and aqueous extract (F1, F2, F3, F4, and F5and F6).All the formulation gives the pH value within the limit of normal pH range which is suitable for hair. Again the tests like extractive value, ash value confer more confidence on the purity and reliability of the crude drug material collected and processed. All the followed evaluation procedures are in accordance with the cosmetic standardization and shown rather satisfactory results.

Formulated serum shows appreciable antidandruff activity and it is evaluated using standard procedures. The test product is safe to use topically. The result of the study shown that the application of the hair serum formulation is safe and effective. Herbal cosmetics have become

increasingly common in the personal care industry, and there is a high demand for them in everyday life due to their lack of parabens and sulphates.

Thus conclusion can be made that the poly herbal serum containing *corouptiaguanensis, cycleapeltata and myristica fragrans* have helps to maintain healthy hair as a cosmetic. Results have shown that herbal hair serum provides various essential nutrients needed to preserve the proper function of the sebaceous glands and support the growth of natural hair. Medicinal plants have been used for the treatment of hair diseases since antiquity because of fewer side effects and hypersensitivity reactions. The present study was intended to use different herbs to formulate herbal hair serum .Thus, this poly hebal hair serum could be a safe alternative to manage hair thinning and induce hair growth.

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