

02/07/2021

To

The Principal,
JKK Munirajah Institute of Health Sciences College of Pharmacy,
TN Palayam.

Subject: Proposal for Research Collaboration – Reg.

Dear Sir,

Greetings. I am writing on behalf of **Sri Selvanayagi Bio Care Pvt. Ltd.** to propose a collaboration that aligns with our mutual interests and scientific objectives.

We are impressed by your institution's expertise and research capabilities, particularly in the area of pharmacognosy and the study of natural extracts. Our organization is keen to explore the possibility of engaging JKK Munirajah Institute of Health Sciences College of Pharmacy in conducting research on the "**Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff**"

Our interest in this project stems from our dedication to advancing pharmaceutical research and developing innovative solutions to Formulation of Herbal Hair Oil for Dandruff. Given the esteemed reputation of your institution, we believe that a collaboration with JKK Munirajah Institute of Health Sciences College of Pharmacy would significantly enhance our research efforts in this specific area.

In this regard, we would like to propose that your institution undertakes the research project outlined above, with funding and logistical support provided by Sri Selvanayagi Bio Care Pvt. Ltd. We are committed to ensuring the success of this project and will facilitate all necessary resources required for its completion.

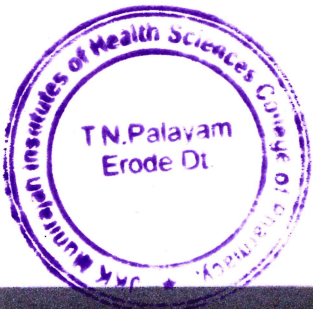
Thanking you,

Principal

JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506.

Sincerely,

SRI SELVANAYAKI BIOCA
Door No. 14, Jawaharlal Nehru Stre
Karattur, Gobichettipalayam,
Erode District-638 476,



96880 36697
86670 16584



கோயில்குளம் (கரட்டூர் ஆர்)

V. மீனாகனிசுமார் M.Sc., Agri..

www.ssbiocare.com



JKK MUNIRAJAH INSTITUTE OF HEALTH SCIENCES COLLEGE OF PHARMACY

(Approved by Tamil Nadu Govt. & Pharmacy Council of India - New Delhi, Affiliated to The Tamil Nadu Dr. M.G.R Medical University, Chennai)
Thookanaickenpalayam, Gobichettipalayam (TK), Erode (DT) - 638506, Tamil Nadu.

DR. P. PERUMAL M.Pharm., Ph.D., FIC.,
Professor & Principal

06.07.2021

To

Sri Selvanayagi Bio Care Pvt. Ltd.,
No: 14, Jawagarlal Nehru Street,
Karattur, Gobi-638452.

Subject: Response to Proposal for Research Collaboration - Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff.

Dear Sir,

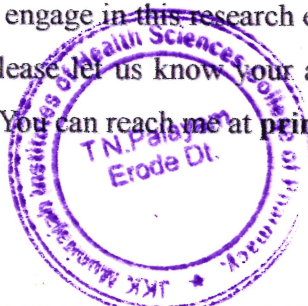
I hope this letter finds you well. We greatly appreciate your interest in collaborating with JKK Munirajah Institute of Health Sciences College of Pharmacy for the research project titled "**Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff.**"

First and foremost, we are honoured and excited about the possibility of working with **Sri Selvanayagi Bio Care Private Limited** on this significant research endeavour. Your organization's dedication to advancing pharmaceutical research resonates with our mission to contribute to the field of pharmacology and improve healthcare outcomes.

We have carefully reviewed your proposal, and we are enthusiastic about the potential impact of this collaboration. The research project aligns perfectly with our expertise and ongoing efforts in the area of natural extracts and their therapeutic applications. We believe that this partnership will not only enhance our research capabilities but also foster valuable contributions to the scientific community.

We would like to express our gratitude for your willingness to provide financial support and logistical assistance for this project. We are confident that this collaboration will yield substantial results and advancements in the Formulation and Characterization of Herbal Hair Oil.

To move forward, we propose scheduling a meeting to discuss the specific details of the collaboration, including project timelines, budget considerations, and other essential aspects. Our team is excited to engage in this research endeavour and is committed to ensuring the successful completion of the project. Please let us know your availability, and we will coordinate a meeting that accommodates your schedule. You can reach me at principal@jkkmihsdp.org to coordinate further.




Principal

JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N. Palayam,
Gobi (Tk), Erode (Dt) - 638 506



JKK MUNIRAJAH INSTITUTE OF HEALTH SCIENCES COLLEGE OF PHARMACY

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DR. P. PERUMAL M.Pharm., Ph.D., FIC.,
Professor & Principal



We look forward to a productive partnership and the opportunity to contribute meaningfully to the advancement of pharmaceutical research.

With reference to the letter dated 02/07/2021, JKKMIHSCP is permitting the following faculty members to do collaborative research with Sri Selvanayagi Bio Care Private Limited, and a proposal on the mentioned title "Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff" is submitted along with this letter. The faculty members were assigned to do research work with Sri Selvanayagi Bio Care Private Limited, Gobi.

1. DR. P. PERUMAL, Principal cum Professor, Department of Pharmaceutical Chemistry.
2. Ms. R. SANGARI, Assistant Professor, Department of Pharmaceutical Chemistry.
3. Mr. N. DEVARAJ, Assistant Professor, Department of Pharmaceutical Chemistry.

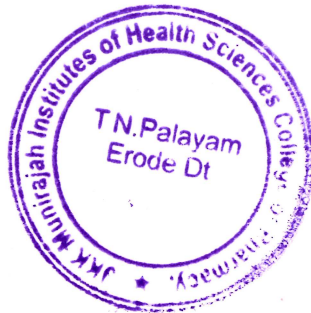
Kindly permit the above faculty members to execute the above research work, We are expecting a positive reply from your end.

Thanking you,

Principal Investigator

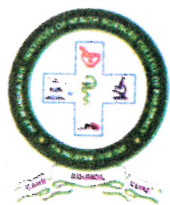
Principal

JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506



Principal

JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
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DR. P. PERUMAL M.Pharm., Ph.D., FIC.,
Professor & Principal

BUDGET AND FACULTY DETAILS

Project Title: Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff

Project Duration: 6 months

Project Budget:

S. No	Budget category	Amount in lakhs
1.	Laboratory Equipment and Supplies (Glassware, Instruments)	0.4
2.	Raw Materials (Herbal Ingredients, Oils)	0.5
3.	Chemicals and Reagents	0.35
4.	Miscellaneous Expenses	0.25
Total Budget		1.5 lakhs

Project Team:

Principal Investigator (PI):	DR. P. PERUMAL, Principal cum Professor, Department of Pharmaceutical Chemistry, JKKMIHSCP.
Co-Investigators:	Ms. R. SANGARI, Assistant Professor, Department of Pharmaceutical Chemistry, JKKMIHSCP.
	Mr. N. DEVARAJ, Assistant Professor, Department of Pharmaceutical Chemistry, JKKMIHSCP.

We kindly request an opportunity to discuss this funding application further. Your support will contribute significantly to the success of our project.

Thank you

Yours Sincerely,

Principal

Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506

Principal

JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506

22.07.2021

Dear Sir,

Sub: Financial assistance for Student Project scheme of Sri Selvanayagi Bio Care Pvt. Ltd. - reg.

This is to invite your attention to the reference cited and to inform that the project proposal titled "FORMULATION AND CHARACTERIZATION OF HERBAL HAIR OIL FOR THE TREATMENT OF DANDRUFF" submitted by DR. P. PERUMAL, as Principal Investigator, Ms. R. SANGARI and Mr. N. DEVARAJ as Co-investigators for the project, and it has been approved. An amount of ₹ 1,50,000 /- is sanctioned by the Sri Selvanayagi Bio Care Pvt. Ltd. The budget estimate of the project is as detailed below.

S.No.	ITEMS	AMOUNT (₹)
1.	Laboratory Equipment and Supplies (Glassware, Instruments)	40000
2.	Raw Materials (Herbal Ingredients, Oils)	50000
3.	Chemicals and Reagents	35000
4.	Miscellaneous Expenses	25000
	Total	1,50,000


The PI has to submit the signed Terms and Conditions (as per the guidelines) and the date of start of the project within two weeks to the undersigned. The project should be completed within six months and submit the certified soft copy of the final report, Statement of Expenditure and Utilization Certificate counter signed by the Head of the Institution for releasing the grant.

Thanking you,

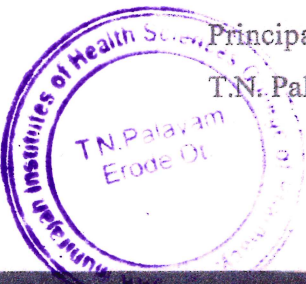

Yours sincerely

Copy to:

DR. P. PERUMAL,
Principal Cum Professor, JKKMIHSCP,
T.N. Palayam, Erode, 638506.


Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506

SRI SELVANAYAKI BIOCARE
Door No. 14, Jawaharlal Nehru Street,
Karattur, Gobichettipalayam,
Erode District-638476.



V. டீமாகன்குமார் M.Sc., Agri.

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DR. P. PERUMAL M.Pharm., Ph.D., FIC.,
Professor & Principal

PROJECT COMPLETION REPORT

Title of the Project: Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff

Category of the Project: Research project

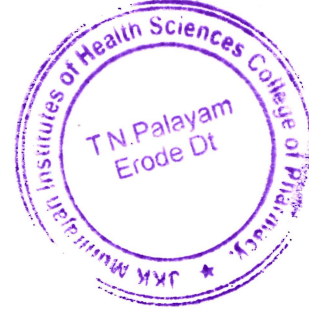
Date of approval of competent authority : 22/07/2021

Total cost of the Project : Rs: 1,50,000/-

S. NO.	ITEMS	AMOUNT (₹)
1.	Laboratory Equipment and Supplies (Glassware, Instruments)	40000
2.	Raw Materials (Herbal Ingredients, Oils)	50000
3.	Chemicals and Reagents	35000
4.	Miscellaneous Expenses	25000
	Total	1,50,000

Date of start of the Project : 22/07/2021

Date of completion of Project : 15/12/2021



Name and Signature of Principal Investigator

[Signature]
Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N. Palayam,
Gobi (Tk), Erode (Dt) - 638 506

[Signature]
Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N. Palayam,
Gobi (Tk), Erode (Dt) - 638 506

[Signature] *[Signature]*
Name and Signature of Co-investigator

LETTER OF APPRECIATION

Date: 20.12.2021

To

The Principal,
JKK Munirajah Institute of Health Sciences College of Pharmacy,
T.N. Palayam, Erode, 638506.

Subject: Completion of project – reg.

Dear Sir,

We extend our heartfelt appreciation to you and your research team for the successful completion of the research project, "Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff," which was supported by **Sri Selvanayagi Bio Care Pvt. Ltd.**

Your dedication, commitment, and hard work throughout the project have resulted in valuable contributions to the field of pharmacognosy. The outcomes of this project have not only met but exceeded our expectations, and we are excited about the potential impact of your research findings.

We look forward to the dissemination of your research findings and anticipate that they will further enrich the academic and professional community. Your success reflects positively on our mission to support meaningful research and innovation.

Once again, congratulations on the successful completion of this project, and thank you for your dedication to advancing knowledge in your field. We hope to continue our collaboration on future projects.

Thank you

V. M...
Sincerely,

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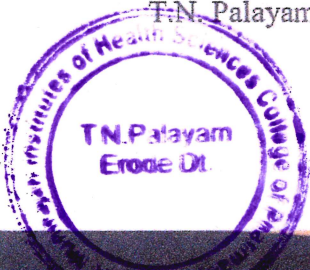
DR. P. PERUMAL,
Principal Cum Professor, JKKMIHSCP,
T.N. Palayam, Erode, 638506.

SRI SELVANAYAKI BIO CARE
Door No. 14, Jawaharlal Nehru Street,
Karattur, Gobichettipalayam,
Erode District-638478.

caol

Principal

JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506



V. டீமாகன்குமாந் M.Sc., Agri..

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DR. P. PERUMAL M.Pharm., Ph.D., FIC.,
Professor & Principal

UTILIZATION CERTIFICATE

Certified that out of Rs. 1,50,000/- sanctioned by Sri Selvanayagi Bio Care Pvt. Ltd. towards financial assistance for the student project titled "FORMULATION & CHARACTERISATION OF HERBAL HAIR OIL FOR THE TREATMENT OF DANDRUFF", an amount of Rs. 1,50,000/- was utilized for the purpose for which it was sanctioned, leaving a balance of Rs. NIL at the close of 15.12.2021. As shown in the Statement of Expenditure annexed.

Name & Signature

of the Principal Investigator

Principal

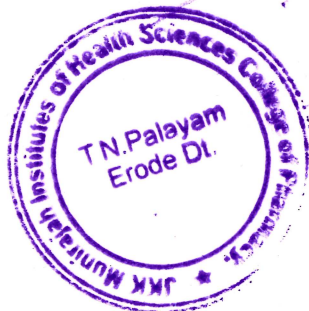
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506

Name & Signature

of Head of Institution

Principal

JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506



**“FORMULATION AND CHARACTERIZATION OF HERBAL HAIR OIL
FOR THE TREATMENT OF DANDRUFF”**

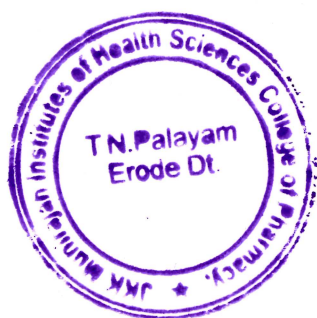
PRINCIPAL INVESTIGATOR


DR. P. PERUMAL, M. Pharm, Ph. D, FIC.,
Principal cum Professor,
Department of Pharmaceutical Chemistry,

CO-INVESTIGATORS

Ms. R. SANGARI, M. Pharm.,
Assistant Professor,
Department of Pharmaceutical Chemistry,

Mr. N. DEVARAJ, M. Pharm.,
Assistant Professor,
Department of Pharmaceutical Chemistry,




Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506

DECEMBER-2021

JKK MUNIRAJAH INSTITUTE OF HEALTH SCIENCES
COLLEGE OF PHARMACY,
T.N-PALAYAM-638506, GOBI (TK), ERODE (DT),
TAMILNADU.

CERTIFICATE

This is to certify that the Research entitled “**FORMULATION AND CHARACTERIZATION OF HERBAL HAIR OIL FOR THE TREATMENT OF DANDRUFF**” submitted to The **Sri Selvanayagi Bio Care Pvt. Ltd.**, is the bonafide project work carried out in the Department of Pharmaceutical Chemistry, JKK Munirajah Institute of Health Sciences College of Pharmacy, T.N-Palayam, Gobi, Erode, Under the guidance of **DR. P. PERUMAL, M. Pharm, Ph. D, FIC., Principal cum Professor, Department of Pharmaceutical Chemistry, JKK Munirajah Institute of Health Sciences College of Pharmacy, T.N Palayam,Gobi, Erode.** During the academic year 2021-2022.



Place: T.N-Palayam

Date: 15-12-2021

A handwritten signature in green ink, appearing to be "Perumal".

Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506

A handwritten signature in blue ink, appearing to be "Perumal".

Dr. P. Perumal. M.Pharm,Ph.D,FIC

PRINCIPAL

Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506

DECLARATION

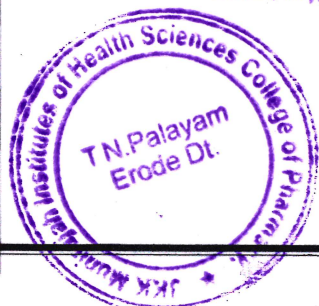
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Place: T.N-Palayam

Date: 15.12.2021

Principal

JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 508



DR. P. PERUMAL, M. Pharm, Ph. D, FIC.,
Principal Investigator

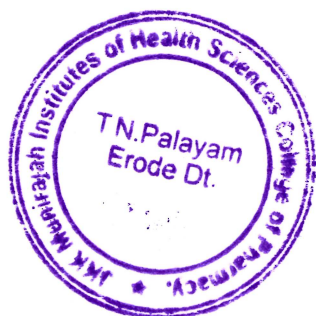
Ms. R. SANGARI, M. Pharm.,
Co-Investigator


Mr. N. DEVARAJ, M. Pharm.,
Co-Investigator

DECLARATION

The research work embodied in this work entitled “Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff” was carried out by us under the direct supervision of DR. P. PERUMAL, Principal cum Professor, Department of Pharmaceutical Chemistry, JKK Munirajah Institute of Health Sciences College of Pharmacy, T.N-Palayam, Gobi.

The Project submitted to the **Sri Selvanayagi Bio Care Pvt. Ltd.**, during the academic year 2021-2022.




Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N. Palayam,
Gobi (Tk), Erode (Dt) - 638 506

ACKNOWLEDGEMENT

First and for most we express our heartfelt sense of gratitude and faithfulness to God 'grace and our family members, which has enabled us to finish our project work successfully.

With the blessing of our Founder chairman Dr. J.K.K Munirajah, M.Tech, (Bolton). D.Litt., and Secretary Mrs. Kasthuripriya Kirupakarmurali, M.B.A.,

J.K.K Munirajah Institute of Health Sciences College of Pharmacy, T.N-Palayam, Gobi, Erode for providing all the facilities to carry out this work.

Our sincere gratitude to our beloved sir, Dr. P.Perumal, M.Pharm, Ph.D,FIC., Principal and Head of the Department of Pharmaceutical Chemistry, J.K.K Munirajah Institute of Health Sciences College of Pharmacy, T.N-Palayam, Gobi, Erode for his kindly support for our project work and for his encouragement and also providing all facilities in this Institute to the fullest possible extent enabling us to complete this work.

With the immense pleasure and pride, we would to take opportunity in expressing our deep sense of gratitude to our beloved guide DR. P. PERUMAL, Principal cum Professor, Department of Pharmaceutical Chemistry J.K.K Munirajah Institute of Health Sciences College of Pharmacy, T.N-Palayam, Gobi, Erode under whose active guidance, innovate ideas, constant inspiration and encouragement of the work entitled "Formulation and Characterization of Herbal Hair Oil for the Treatment of Dandruff" has been carried out.

We also express our grateful thanks to all the teaching and non-teaching staff members of J.K.K Munirajah Institute of Health Sciences College of Pharmacy for their valuable advice and cooperation.

We express our heartfelt gratitude to the almighty, for giving us the right way to achieve the best of our project.


We would like to give sincere thanks to our classmates for their timely help and co-operation.

We also extend our thanks to all staff members of Department of Pharmaceutical Biotechnology, Pharmaceutical Chemistry, Pharmacognosy, Pharmaceutics and Pharmacology for their co-operation.

We would like to thank Sri Selvanayagi Bio Care Pvt. Ltd., to give a Financial and moral support to completion of the project being a successful manner on the duration of 2021-2022.

Last but not least, great thanks from the heart to our beloved MOTHER and FATHER. They are our living god, as who guided us in the rightful way to achieve all our activities. They gave the incredible effort to become a successful for bright future in this world. Thanks a lot, to my parents.




Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N. Palayam,
Gobi (Tk), Erode (Dt) - 638 506

INTRODUCTION

1.1. THE USE OF NATURAL SOURCES:

The use of natural cosmetics is growing among the population. Beauty products considered as natural, bring an approach of association between the environment preservation and health protection. Thus, consumers of that kind of cosmetic search for products are really natural,


Herbal Cosmetics, formulated, using various permissible cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide defined cosmetic benefits only, shall be called as "Herbal Cosmetics", (21

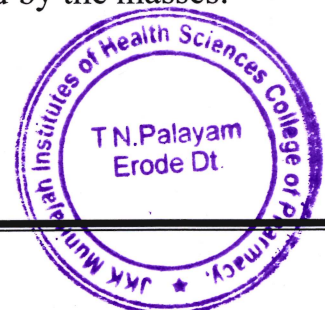
Herbal cosmetics include the natural source and their parts which are being used as maquillage purpose. Herbal cosmetics are one of the oldest types of cosmetics in human history. It is very popular and widely practiced all over the world. Herbal cosmetics also known as "natural cosmetics".

In the present era, there were no fancy fairness creams or any cosmetic surgeries. The only thing they had was the knowledge of nature, compiled in the natural source.

Ayurvedic (natural) cosmetics not only beautified the skin but acted as the shield against any kind of external affects for the body. With the science of herbal, several herbs and floras were used to make natural cosmetics that really worked. Natural cosmetics also known as the herbal cosmetics have the same estimable assets in the modern era as well.

There is a wide gamut of the herbal cosmetics that are manufactured and commonly used for daily purposes. Herbal cosmetics like herbal face wash, herbal conditioner, herbal soap, herbal shampoo and many more are highly acclaimed by the masses.


Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gudi (TK), Erode (Dt) 638 506



The best thing of the herbal cosmetics is that it is purely made by the herbs and shrubs. The natural content in the herbs does not have any side effects on the human body, instead enrich the body with nutrients and other useful minerals

Herbal cosmetics are comprised of floras like henna/mehndi, sandal (Chandan), rose, neem, saffron (Kesar) and many more that is augmented with healthy nutrient all the other necessary components. I

1.2. HERBALISM:

According to the World Health Organization (WHO), herbalism is the use of crude plant material such as leaves, flowers, fruit, seed, stems, wood, bark, roots, rhizomes or other plant parts, which may be entire, fragmented or powdered. The term herbalism refers to the long historical use of these medicines to support the healing function of the body.


Because of the long tradition of using botanicals of Henna, Green Tea, Turmeric, Almond oil, Rose oil, Eucalyptus Oil, Citronella oil etc. are used worldwide as herbal or natural cosmetics.

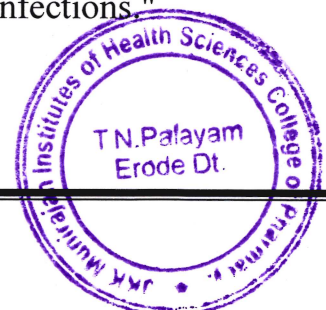
1.3. ROLE OF HERBAL SHAMPOO:

They are the cosmetic preparations that with use of traditional ayurvedic herbs are meant for cleansing the hair and scalp just like the regular shampoo. They are used for removal of oils, dandruff, dirt, environmental pollution, etc.

Herbal shampoo are made up of pure and organic ingredients and there are no synthetic additives or surfactants are free of any side effects.

They are made up of natural essential antiseptic properties that prevent our hair and scalp from the harsh UV rays of the sun thus preventing skin infections."


Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T. N. Palayam,
Gobi (Tk), Erode (Dt) - 638 505



1.4. ROLE OF HERBAL OIL:

Herbal hair oil not only moisturizes scalp but also reverses dry scalp and dry hair conditions. It provides numerous essential nutrients required to maintain normal functions of the sebaceous gland and promote natural hair growth.

There are two categories of hair care products. They are hair tonics and hair grooming aids. Hair oil those contains herbal drugs are called as hair tonics. These are formulated by herbal extracts in an oil base. Hair oils are the hair care formulations applied for treatment of hair disorders such as baldness, greying of hair, hair falling and dryness of hairs.


Poly herbal hair oil is an herbal product, formulated specifically for all ages of men, women & children. Herbal anti-dandruff hair oil is a perfect blend of ancient herbs that have been used from centuries to provide dandruff free scalp giving sufficient strength and vitality to scalp.

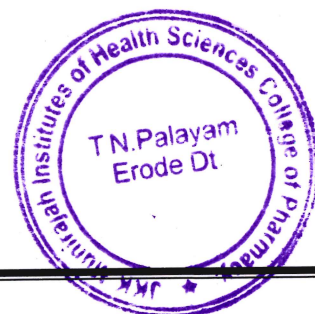
Herbal product also provides all the necessary nourishments to the root of hair and promotes the natural growth of hair. It also checks and controls hair fall, dandruff, thinning of hair and more.

1.5. HAIR:

Hair are the integral part of human body. Hair is a protein filament that grows from follicles on the dermis or skin. Scientific name of the hair is pili or pilus.

Hair is a component of the integumentary system and extends downward into the dermal layer where it sits in the hair follicle.


Principal
JKK Munirajah Institute of Health Sciences
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The hair follicle is one of the characteristic features of mammals serves as a unique miniorgan. In humans, hair has various functions such as protection against external factors, sebum, apocrine sweat and pheromones production, and thermoregulation. The hair also plays important roles for the individual's social and sexual interaction.

The hair follicle serves as a reservoir for epithelial and melanocyte stem cells, and it is capable of being one of the few immune privileged sites of human body. Hair follicle development is related to the interactions between epithelial and mesenchymal cells.

PROBLEMS RELATED TO HAIR

- Dandruff
- Dry hair
- Split ends
- Oily hair
- Frizzy hair
- Limp hair
- Hair loss
- Heat damage
- Color damage .
- Grey hair.

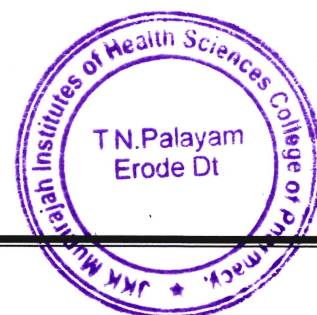
1.6. DANDRUFF:

Dandruff is a chronic scalp condition, which involves excessive shedding of dead skin cells from the scalp. It is caused by a fungus called *Malassezia restricta* and *Malassezia globosa*, *Malassezia* formerly called *Pityrosporum* is a yeast causing infection of skin and scalp.



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Dandruff is caused due to excessive shedding of dead skin cells from the scalp. It affects 5% of the population and mostly occurs after puberty, between 20 and 30 years and dandruff affects male more than a female.

The skin of scalp renews itself about once a month Usually, scalp sheds dead cells in nearly invisible way, but sometimes cell turnover becomes unusually rapid and dead cells are shed as visible flakes called dandruff. Warm and humid atmosphere, overcrowding, and poor personal hygiene promote the growth of Malassezia.

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Types of Dandruff:

Two types of dandruff are found. One is the dry type which contains greyish white flakes. These flakes shed when the scalp is scratched. Another one is the oily type in which flakes stick to the nails when the scalp is scratched


A) Oily-type (Seborrheic scale) Seborrheic scales appear due to excessive sebaceous secretion, generally during the time of summers and rainy season when the climate is humid. Sebaceous secretion is also excessive due to excess androgenic hormone and Keratinization. Keratinization phenomenon was accelerated by physical irritation or chemical irritation. Physical irritation includes scratching with the nails, excessive combing or use of hair dryers, Chemical irritation may occur from drug

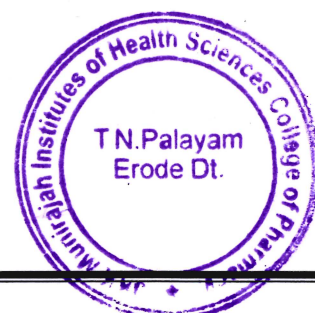
B) Dry and flaky type (Pityriasis scale) During winters when the air is dry, and there is little or no sebum, then Pityriasis scale will appear due to drying of the outer layer of the skin i.e., (the stratum corneum).

Causes of Dandruff:

These are the factors for the formation of the Dandruff:

- Dry Scalp
- Irritated, oily Scale


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- Not shampooing often enough
- Other skin conditions:

1.Eczema

2.Psoriasis

3.Seborrheic dermatitis

- Malassezia-yeast like fungus
- Staphylococcus Aureus – Bacteria
- →Sensitivity to hair products (contact dermatitis).

Symptoms of Dandruff

- Presence of fragments,
- Itching of the scalp.
- Redness around the scalp,


1.6.4. Dandruff composition:

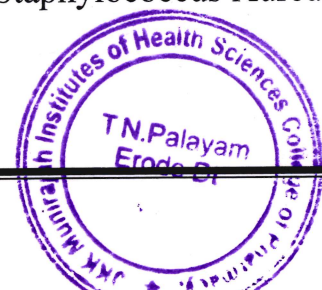
A) Microbial Factors:

1.Bacterial:

Disequilibrium in the proportion of the two main bacterial populations found on scalp Propionibacterium acnes and Staphylococcus epidermis's may also be a cause of dandruff.

Bacteria are more critical than fungi to the formation of dandruff, mostly Staphylococcus & Propioni bacteria.⁷⁴⁾ Staphylococcus bacterial species are more responsible for the formation of dandruff rather than fungi,^[75] Staphylococcus Aureus


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is gram-positive & round shaped bacteria which are a component of the firmicutes and normal body fluids, mostly seen in the nose, breathing tract & skin.(76.771 Evolution of antibiotic resistant strains of S.aureus, for ex: Methicilin resistant S.aureus (MRSA) that is a global clinical problem.74) In previously reported studies, Sdtaphyloccoci bacteria are responsible for dandruff pathogenesis.

2.Fungal:

Malassezia furfur is considered as the leading cause of dandruff. The fungi - Malassezia can lead to dandruff by either or both of the following mechanisms- Malassezia stimulates the enzyme called Lipase on the scalp. The enzyme causes oxidation of triglycerides of sebum to produce unsaturated and

TREATMENT DANDRUFF:

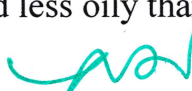
UNANI:

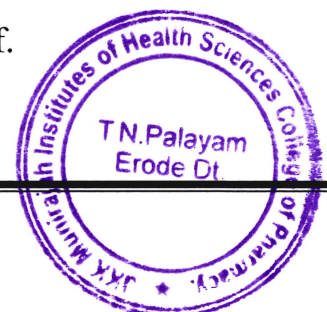
This is a very common condition, and it is generally the first sign of ill health of the scalp and hair. Dandruff'scurf (Pityriasis capitis) is due to the excessive shedding of dead skin cells from the scalp. It is normal for skin cells to die and flake off and small amount of flaking is normal. Excessive flaking could also be a symptom of seborrheic dermatitis, psoriasis, fungal infection or excoriation. Literature related the fungus Malassezia furfur (previously known as Pityrosporum ovale) to the cause of dandruff. It has recently been shown that a scalp specific fungus Malassezia globosa produced white oily flakes of dead skin resulting in itchy and scaling scalp.

Many conditions cause excessive skin scaling, including the following:

Dry Skin:

Simple dry skin which is generally seen in winter when the air is cold and rooms are overheated, this is the most common cause of itchy, flaking skin. But flakes from dry skin are generally smaller and less oily than caused by dandruff.


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Seborrheic dermatitis:

This condition, a frequent cause of dandruff, is marked by red and greasy skin covered with flaky whites or yellow scales. It affects not only scalp but also other areas rich in glands, eyebrows, and sides of nose, backs of ears, breastbone, groin areas and armpits. The similar observations are also described by Ibn Sina in Al-Qanoon. Galen (Jalinoos) said that dandruff can affect the whole body but commonly it occurs on scalp and eyebrows, [19,20,21]

Psoriasis:

This skin disorder causes an accumulation of dead skin cells that form thick silvery scales. Psoriasis commonly occurs on the knees, elbows and trunk, but it can also affect the scalp.


Cradle cap (Seborrheic dermatitis of the scalp):

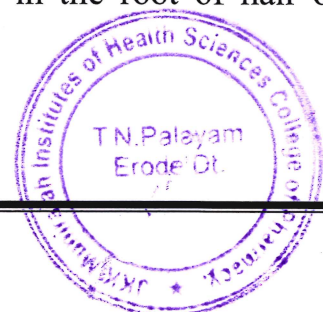
This occurs most commonly in new-born or in infancy resulting scaling and crusty scalp. It can be alarming for parents and is usually clears on its own by the time a baby is a year old.

Contact dermatitis:

; Sometimes sensitivities to certain hair care products or hair dyes can cause red, itchy and scaling scalp.

The affected parts of the body should be cleaned by using anti seborrheic detergent and anti-inflammatory drugs, to make hair potent and growing well. Many physicians have suggested accumulation of phlegm (balgham) in the root of hair or disorder in particular humours.


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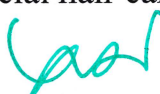
Other causes that contribute to dandruff are: dry or oily skin, poor diet, stress, constipation, shampooing too often or not often enough and use of too many chemical treatments. Dandruff can affect large number of people in every age group. There is controversy over whether dandruff is caused by fungus or by excessive sebum production of scalp. Dandruff can manifest either on very dry and flaky scalp or on very oily scalp with flakes. Table below suggests a number of internal and external factors that caused dandruff.

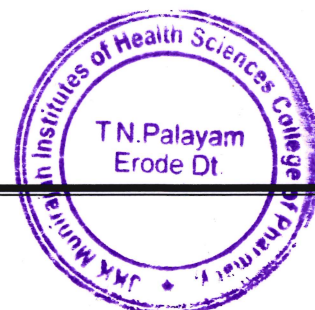
Almost any adult can have dandruff but certain factors can make us more susceptible:

1. **Age:** Dandruff usually effect in adulthood and continues through middle age.
2. **Sex:** more men than women have dandruff, some researchers think male hormones might have a role and secondly males have more sebaceous glands that produce oil called sebum.
3. **Oily hair and scalp:** Malassezia feeds on oils of the scalp therefore oily skin is more prone to dandruff.
4. **Certain illnesses:** Adults with neurological diseases (Parkinson's disease etc.) or stressful conditions (e.g. heart attack or stroke) and those with immune suppressed state may develop seborrheic dermatitis

General Treatment and Management

1. Cleanliness of head, scalp and hair.
2. Stress management for general body health.
3. Less use of styling or artificial hair care products.


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4. Healthy diet for overall development and maintenance of body skin and scalp.

5. In cases where regular shampoos fail, use of anti-bacterial or antifungal shampoo may help in effectively reducing dandruff. The antibacterial and anti-fungal shampoo may contain ketoconazole, zinc pyrithione, selenium sulphide etc..

Ibn Sina suggested to use drugs which are good (latif hararat) for the skin and have absorbent and astringent properties. He suggested to prepare roghan of myrtle (*Myrtus communis*) black celery seeds (*Piper nigrum* L), beet root seeds, myrtle end (*Myrtus communis* Linn.), atraf ausaj, atraf aas, rocket plant, adiantum (fern) (*Adiantum capillaries-veneris* Linn), laazin (*Citrus ladanum*) in old wine for local application. P

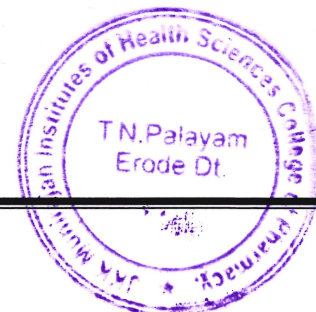
Hakim Ghani in Qarabadeen suggested a preparation for the cure of loss of hair from head and beard. The medicine consisted of ash of hairs of red goat, ash of shell, sulphur and roasted borax. This mixture is boiled with roghan gul till the volume is reduced to one fourth the extract is rubbed with copper stick till the preparation becomes black, and sheep butter is added and mixture is applied to the hairs. For black and strong (firm) hair a preparation was suggested which consisted of small mangoes, mazu (*Quercus infectoria*), iron dust, citrus pomegranate (*Punica granatum*), sesamum oil (*Sesamum indicum*). The mixture is grinded, placed in clay pot and buried for 40 days before local application

For huzaz, Alvi Khan has advised a formulation consisting of gram powder (*Vigna radiata* Linn.), fenugreek (*Trigonella corniculata* Linn), and salt of tartar, corn, wheat (*Triticum aestivum* Linn.), white catechu (*Acacia catechu* Linn. f. Willd.) and rose of marshmallow. The mixture is pounded and grinded in vinegar turned wine and poultice is used on the scalp. For the maintenance of health and growth of hair on scalp. Alvi Khan has suggested formulation containing amla leaves (*Phyllanthus emblica*



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Linn.) , black aromatic cumin seed (*Nigella indica*), rose petals, myrtle leaves, soaked in the water of mint and gall (mazu), the same is used to wash the head. In another formulation and oil (*Phyllanthus emblica* Linn), myrtle (*Myrus communis* Linn.). liber of pine tree in equal amount soaked and boiled in water, the filtrate is boiled with equal amount of sesame oil (*Sesamum indicum*) till water is evaporated. The roghan thus prepared is useful for treatment of hair loss. De

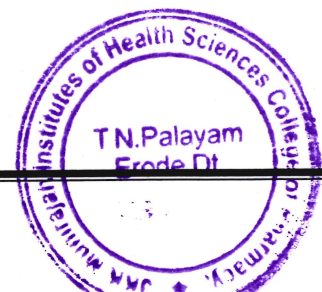
AYURVEDIC:

As Darunak or dandruff is an ancient affliction, several tropical mixtures have been known to be used as a remedy of Dandruff. Among them the treatment using Tea tree oil or *Melaleuca alternifolia* extract has emerged as an effective remedy for inflammatory and fungal disorders related to the skin. Its anti-inflammatory properties have made it popular as an ingredient for first aid of dermal wounds. A 5% concentration of Tea tree oil has also shown significant results in controlling and eradication of *Malassezia* sp. Associated with the occurrence of dandruff.

Recent literature points out that many naturopathic agents, independently and combined, help in antidandruff activity. Thus, the recognition of herbal formulations results indicates the validity of the Ayurvedic methodology and approach to dandruff treatment. Further, the literature also validates the finding that naturopathic medicine is scientifically validated in-vitro and in-vivo research studies

It is interesting, however, to note that, stress and sleep deprivation are associated with increased sebum secretion in the scalp. This causes the *Malassezia* sp. to proliferate and thereby cause dandruff and other hair problems. Concentration of Tea tree oil has also shown significant results in controlling and eradication of *Malassezia* sp. Associated with the occurrence of dandruff. Thereby, to deter the recurrence of dandruff, the need of the time is to adopt a holistic approach that includes lifestyle changes, preventive as well as curative methods.


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As a life science, Ayurveda looks at all ailments as a result of metabolism, physiology, nutrition intake as well as overall attitudinal aspects of individuals. 24

The aims to not only cure the subject of the ailment, but also to establish the causal relation between the causative factors and the outcomes thereof. Ayurveda is therefore, a holistic science that advices on maintaining overall health and building natural immunity to avoid recurrent conditions. As has been already stated, Ayurveda aims at overall balance of health through topical and ingested medicinal formulation.

Ayurvedic formulations are devised on the premise that health and beauty are mutually dependent.

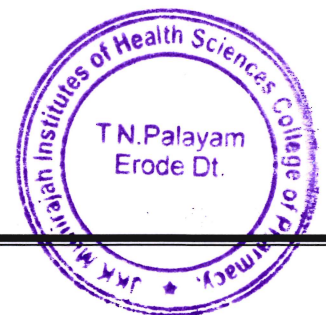
In current times, lifestyle changes affect the health adversely. Some of the characteristic features of contemporary lifestyle are sedentary living, erratic schedules, exposure to ambient pollutants and ingestion of harmful chemicals in food and medicines. The lifestyle effects are seen in varied forms, most easily and widely observed in issues such as dandruff. Dandruff leads to loss of lustre and health of the hair, which in extreme cases may also lead to loss of hair.

In Ayurveda, dandruff correlates with Darunak, as mentioned in Kshudrarogadhikaar. Darunak is predominantly ascribed as Vatakaphaj and is a disease disorder of the scalp. The symptomatic indications in Darunak (as in dandruff) are Kandu (Itching), Rukshata (Dryness), Keshbhumi Kathinya (Changed normal structure of scalp) and Twaksphutan (Scaling).

Broadly, Ayurveda aims to treat dandruff by restoring the balance in the body by building the immunity through ingested medicinal formulations. However, Ayurveda also suggests topical application of lepa, dhupan, varti, kaval, gandusha and shirobasti.



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BhaishajyaKalpana is one of the facets in Ayurveda that lays down the guiding principles of dosage preparation based on availability, acceptability (subject-specific) and nature of ailment/complaint.

The principle aim is to make use of natural abundance, adequate potency, ease of application, and cost effectiveness in the preparation of the medicines for all age group.

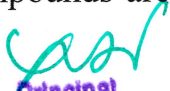
Various references are found in Ayurvedic texts about hair problems wherein ingredients are made in paste form and applied on hair to overcome darunak, reversal of hair greying, promote hair growth and stoppage of hair fall

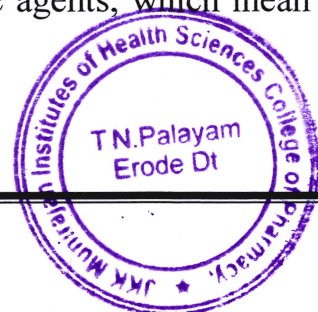
Oils mentioned in the treatment of dandruff are triphalady tails, chitrakadya uila gunja taila, swalpa bhringraj tails, bhringraj taila, malatyadi taila and prapaundrikadya taila in bhaishajyaramavali.

ALLOPATHIC:

Treatments to control dandruff and seborrheic dermatitis can be divided into three main classes on the basis of their mechanisms of action, these include keratolytic, antimicrobial and antiproliferative agents. Simple shampooing and keratolytic treatments (eg, salicylic acid) will remove a considerable proportion of flakes in patients with milder conditions. The majority of commercially available treatments for dandruff and seborrheic dermatitis contain antifungal agents.

These treatments (eg, pyriithione zinc, selenium sulfide, ketoconazole, and ciclopiros) have been shown to improve the visible symptom of flaking and restore the underlying skin condition. There are a slew of medicated shampoos that are offered to dandruff sufferers, but many of them contain chemicals or drugs that have risks of their own. The most common dandruff shampoos are composed of either selenium sulfide or zinc pyriithione Both of these compounds are known as cytostatic agents, which mean


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they act by slowing down the growth of the outermost layer of skin, in this case on the scalp.

One of the problems with these options is that they can be very irritating to some people's skin, and therefore result in making the original dandruff problem worse instead of better. Many synthetic antifungal preparations (miconazole, ketoconazole, selenium sulfide, salicylic acid, coal tar, zinc pyrithione) have been tested against *Malassezia* species, but the frequent infections and the recurrences have made the therapy costlier.

TOPICAL THERAPY

Antifungals Examples of antifungals are ketoconazole, ciclopirox.

Antifungal agents are the mainstay of anti-seborrheic therapy, mostly in the azole foam. These agents work by inhibiting ergosterol, so important component of the fungal cell wall, via interference with the fungal cytochrome P-450 (CYP 450) system.

This causes an increase in the production of sterol precursors, a fungi static process that does not allow the fungus to grow or reproduce. Many of the azoles also have anti-inflammatory properties; they inhibit 5-lipoxygenase production, which then blocks leukotriene B₄ synthesis in the skin.

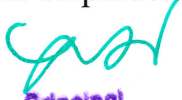
Others:

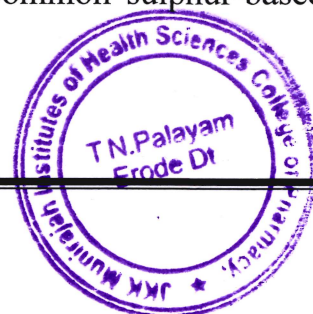
Zinc pyrithione:

Zinc pyrithione has both a non-specific keratolytic and an antifungal activity. Zinc pyrithione may be effective as a 2% shampoo, 1% shampoo 161 and in a cream formulation.

Selenium sulphide/sulphur preparations:

Sulphur has a keratolytic action due to its interaction with keratinocytes and subsequent formation of hydrogen sulphide. Perhaps the most common sulphur-based


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treatment for SD is selenium sulphide shampoo, which is available over the counter.

Coal tar shampoo:

Tar has historically been the treatment of choice for many dermatological diseases. As early as 1895, Kaposi showed its usefulness for Seborrheic dermatitis. Its method of action likely involves its inherent anti fungal properties as well as the ability to decrease the inflammatory response. Studies have also shown the ability of tar to reduce sebum production: Tar has been found to be equivalent to ketoconazole in its fungistatic properties,

Metronidazole

Metronidazole is a nitro-imidazole antibiotic, act primarily on anaerobic cells. It has also got anti-inflammatory effect through neutrophil chemo taxis and reduction in oxidative stress. Its exact mechanism of action in SD is not known but found to be effective in topical form.

SYSTEMIC THERAPY

Oral anti-fungal:

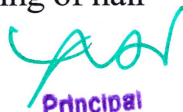
Examples of oral antifungals are itraconazole, terbinafine. Itraconazole is a highly keratinophilic and lipophilic triazole. Itraconazole is anti-inflammatory primarily because of its inhibitory effect on the synthesis of 5- lipoxygenase metabolites, which are involved in several inflammatory diseases such as SD. The anti-inflammatory activity of oral itraconazole and its efficacy on Malassezia yeast suggest that itraconazole may be one of the safe and effective treatments of SD.

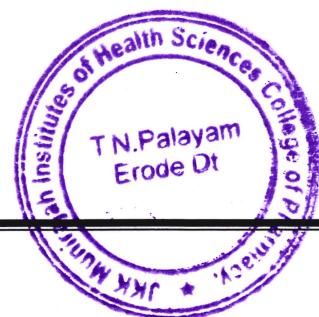
1.7. HERBAL INGREDIENTS FOR ANTI-DANDRUFF ACTIVITY:

1.7.1. BRINGRAJ (ECLIPTA ALBA) OIL:

The oil is obtained from the leaves is available in the local market which are used for the activity of

- Anti-Dandruff Anti-Bacterial
- Growth, Strength and blackening of hair


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- Premature greying and baldness,

1.7.2. ROSEMARY (ROSMARINUS OFFICINALIS LINN) OIL:

The oil is obtained from the leaves is available in the local market which are used for the activity of

- Anti-Dandruff
- Anti-Fungal
- Anti-Bacterial

1.7.3. GINGER (ZINGIBER OFFICINALE) OIL:

The oil is obtained from the rhizome is available in the local market which are used for the activity of

- Anti-Dandruff
- Anti-Bacterial
- Anti-Microbial

1.7.5. LEMON GRASS (CYMBOPOGON FLEXUOSUS) OIL:

The oil is obtained from the leaves is available in the local market which are used for the activity of

- **Anti-Dandruff**
- **Anti-Fungal**

BRAHMI (CENTELLA ASIATICA) OIL:

The oil is obtained from the leaves is available in the local market which are used for the activity of

- **Anti-Dandruff**
- **Prevent hair loss.**

1.7.7. TEA TREE (MELALEUCA ALTERNIFOLIA) OIL:

The oil is obtained from the leaves is available in the local market which are used

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for the activity of

- Anti-Microbial
- Anti-Fungal
- Anti-dandruff.

1.7.8. NEEM (AZADIRACHTA INDICA) OIL:

The oil is obtained from the seeds is available in the local market which are used for the activity of

- Anti-Bacterial
- Anti-Fungal

1.7.9. COCONUT (COCOS NUCIFERA (L.)) OIL:

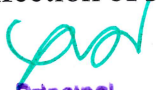
The oil is obtained from the Fresh coconut meat or Dried coconut meat is available in the local market which are used for the activity of

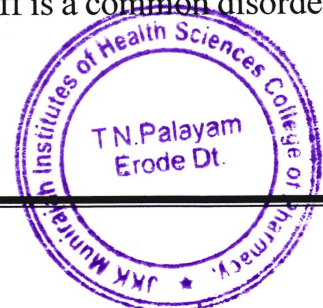
- Healthy growth of hair with shiny quality.
- Nourishing
- Healing of damaged hair

STUDY OF ANTI-DANDRUFF ACTIVITY

Cheun Hui Ng et al reports that the anti-dandruff agents are intended to reduce the formation of dandruff flakes. The cause for dandruff is not fully understood but the treatment involves the use of "actives" that function either as antimicrobial agents or as anti-mitotic agents.

Punyoyai C et al., and K. Kumar J et al. reported that the dandruff is apparently caused by a fungus called *Malassezia restricta* and *M. globosa*. *Malassezia* formerly called *Pityrosporum* is a yeast causing infection of skin and scalp. Dandruff is a common disorder


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caused by Pityrosporum yeast which affects the scalp condition. According to their report it may be stated that the dandruff can't be removed entirely but can only be handled and regulated effectively.

Luis J. Bords reports that dandruff and Seborrheic Dermatitis (SD) are the continuations of the same condition that affect skin areas with high sebum secretion. Dandruff is restricted to the scalp and involves itchy, flaking skin without visible inflammation. SD affects the scalp and other seborrheic areas and both involves itchy and flaking or scaling skin, inflammation, and pruritus.

Deangelis YM et al., reports that three main factors encourage the formation of dandruff. They are fungal infections of the scalp, sebaceous secretions, and individual sensitivity to various chemical substances.


Zisova LG and Piérard-Franchimont C et al., reports that the most widely accepted microbial organism is the lipophilic yeast which belongs to the genus Malassezia. M. restricta and M. globosa are the commonest species causing dandruff.

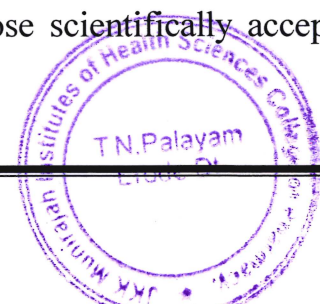
Clinical symptoms associated with dandruff are skin flaking, pruritus, irritation, and the feeling of a dry or tight scalp. Loosely adherent, small white or grey flakes are characteristic of dandruff, whereas seborrheic dermatitis presents with yellowish oily scales.

Luis J. Borda TCW states that though dandruff is not an easily contagious disease or a disease with serious clinical outcomes, it is an embarrassing condition that may affect self-confidence and even lead to psychological disturbances in more severe stages. [5

Saubolle MA et al., reports that in some of the herbal preparations have been tested, a significant anti-dandruff effects were observed. Evaluation of the in-vitro anti-malassezial effect was reported and is based on the demonstration of the zone of inhibition around a disk soaked with the aqueous or alcoholic extract of the herbal plant material under evaluation.

Ranganathan S et al, reported that apart from those scientifically accepted


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medications, hundreds of commercial products in the form of shampoo, cream, scalp lotions are being sold and advertised worldwide. Some of them are claimed to contain 'anti-dandruff herbs, despite non-availability of research evidence. Furthermore, there are many herbal treatments in the form of home remedies used by people over many years was also reported.

1.9. ANTI-DANDRUFF SHAMPOO:

The anti-dandruff shampoo comes with a soothing formula which easily calms the irritation.

It provide healthy hair which is 100% flake free.

The addition to calming down the irritation

The anti-dandruff shampoo also reduces the redness.

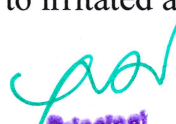
Punyoyai Cet al and Potluri A et al., reported that the Herbal shampoos are playing a good role in handling dandruff and it works to eliminate dandruff, Head & Shoulders keeps hair looking beautiful by helping prevent dandruff-related damage.

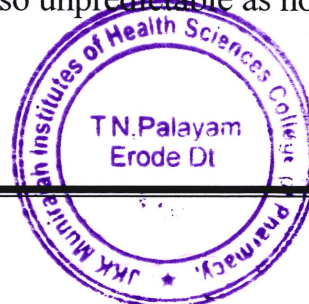
Those shiny white flakes that often brush off on the collar and shoulders are probably because of a skin condition called Dandruff. Though it looks harmless but dandruff causes itch and embarrassment. Goffin V et al., reports that it is a very common condition that is responsible for the constant flaking of scalp skin.

It may be generally stated that if not maintaining clean hygiene and not shampooing enough, as it may causes skin cells to accumulate and create flakes and itching

1.9.1. SCOPE OF HERBAL SHAMPOO:

These are intended to irritated and oily skin. It is also unpredictable as hormonal


Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T. N. Palayam,
Gobi (Tk), Erode (Dt) - 638 506



issues may be involved because dandruff is most found after puberty in young adults. These Herbal Shampoo are sometimes sensitive or allergic as sensitivity to hair care products (contact dermatitis) are also reported. The signs and symptoms may be more severe if stressed, and they tend to flare in cold, dry seasons.

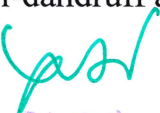
A red rash due to the itching can also be seen around the scalp, forehead, and ears or forehead when a person is suffering from dandruff.

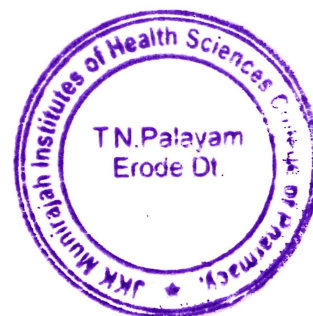
SCOPE OF ANTI-DANDRUFF OIL:

Essential oils are highly volatile substance which are obtained either from the leaves, bark, flowers, roots etc. There are several methods used for obtaining essential oils from plant parts such as water distillation, water and steam distillation, steam distillation, colobation, maceration and enfleurage are the most traditional.

There is a wide variation in the chemical composition and yield of different essential oils which depends on the herbal source, chemotype of the plant species and analytical methods used,

Because of their numerous active ingredients and therapeutic properties, several essential oils show medicinal importance and they exhibit antimicrobial properties. Hence the present piece of study is aimed to have a view on their potential against dandruff and also to about its antimicrobial activity. Sharma A et al., reported that the constituents present in essential oil may possess anti-dandruff activity.


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College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506



1.11. VARIOUS ESSENTIAL OILS:

Few essential oil intended to have such medicinal properties are as follows.

- Tea Tree oil
- Rosemary oil
- Cinnamon oil
- Lavender oil
- Peppermint oil Thyme oil
- Bhringraj oil Ginger oil
- Lemon oil
- Brahmi oil
- Neem oil
- Coconut oil etc

There are a variety of antifungal agents and their external use only formulations such as creams, lotions, shampoos and drugs for internal use are also available in the market. Though they provide cure, recurrence is obvious. Hence a focus is given on the essential oils which are popular for their antifungal activity.

Richa Sharma et al reported about the essential oils and alternate treatment for dandruff. There are number of essential oils such as tea tree oil, peppermint oil, rosemary oil, thyme oil etc which are shown to have antimicrobial activities. The essential oils may be extracted from the leaves, shoot, roots and flowers of the specific plants.

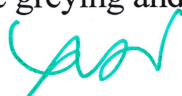
1.11.1. BRINGRAJ OIL:

Biological Name: Ecliptic Alba

Common Name: False Daisy

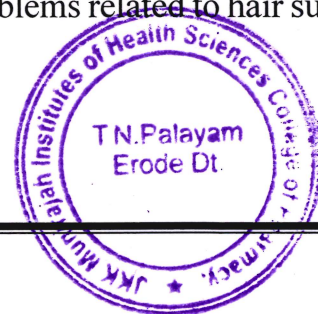
Family: Asteraceae

: It is majorly used for enhancing the growth, strength, and blackening of hair. It is used as the main ingredients in many hair oils. It is significantly treats problems related to hair such as hair fall, dandruff, premature greying and baldness.



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College of Pharmacy, T.N.Palayam,
Gobi (TK), Erode (Dt) - 638 506



Chemical Constituents: Coumestans, Alkaloids, Saponin, Sterols, Steroids, Flavonoids, Terpenoids & Glycosides.

Source: The oil is obtained from the leaves.

LEMON GRASS OIL:

Biological Name: *Cymbopogon flexuosus*

Common Name: Lemon Grass

Family. Poaceae

Lemon grass oil with antifungal activities, particularly dandruff, associated pathogens was selected as active ingredient of a hair tonic, with prolonged contact time on the scalp.

Chemical Constituents: Citral Alpha, Citral Beta, Nerol Geraniol, Citronellal, Terpinolene, Myrcene.

Source: The oil is obtained from the fresh leaves.

1.11.3. ROSEMARY OIL:

The oil was obtained from the retail pharmacy from the

Brand of Rey naturals, Batch No: B02

Biological Name: *Salvia rosmarinus*

Common Name: Rosemary

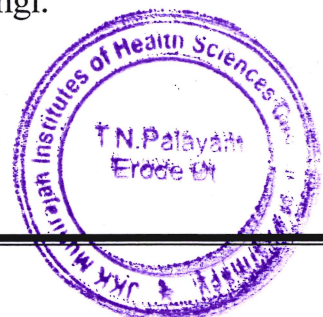
Family: Lamiaceae

It has an antifungal, antibacterial, properties to kill bacteria and fungi.



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JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 505



The rosemary is beneficial to skin the same way it helps with dandruff, by relieving dryness and providing nourishment.

It helps to treat dandruff because it has antifungal properties. It is used as a fragrant component in a creams, lotion, shampoo, soaps and perfumes.

Chemical Constituents: p- cymene, linalool, Gamma-terpinene, thymol, Beta-pinene, alpha- pinene, Eucalyptol

Source: The oil is obtained from the leaves.

1.11.4. BRAHMI OIL:

The oil was obtained from the retail pharmacy from the Brand of Deve herbes, Batch No: BM0222

Biological Name: Bacopa monnieri

Common Name: Water hyssop


Family: Scrophulariaceae

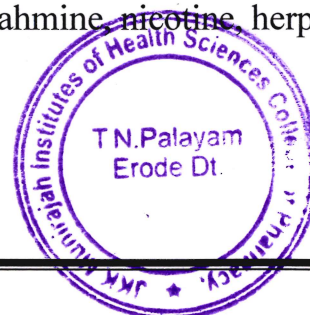
: Brahmi oil also strengthens the hair roots and provides an environment for the development of new hairs.

Brahmi oil is also applicable to remove hair dandruff.

Brahmi has a great impact over the hair properly because Brahmi is also a potent source of antioxidant provides sufficient nutrition for new hair growth and can be easily administered to hair roots.

Chemical Constituents: Saponins, bacosides, monnierin, Brahmine, nicotine, herpestine & hersaponin.


Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506



Source: The oil is obtained from leaves.

1.11.5. GINGER OIL:

The oil was obtained from the retail pharmacy from the Brand of Sage Apothecary, Batch No: 0122SA015

Biological Name: Zingier officinal

Common Name: Ginger

Family: Zingiberaceae

In daily life, ginger can be used in many aspects of health care. Washing hair with hot water with ginger steeped is effective in treating baldness and suppressing Dandruff. And it has an anti-microbial, Anti-bacterial agent. Ginger is also used to treat tooth ache, oral and gastric ulceration and respiratory problems, from the acute alcohol and avoid the heart stroke.

Chemical Constituents: a-pinene, camphene, o-phellandrene, zingiberene, o-bisabolene, genial, neral & cineole.


Source: It is extracted from the Ginger rhizome.

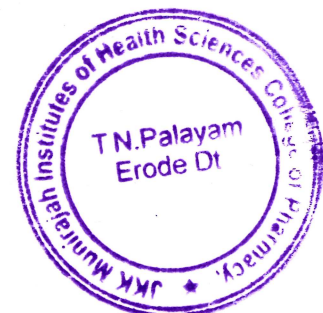
1.11.6. TEA TREE OIL:

The oil was obtained from the retail pharmacy from the Brand of Organix mantra, Batch No: 11.21

Biological Name: Malaleuca alternifolia

Common Name: Tea Tree


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Gobi (Tk), Erode (Dt) - 638 506



Family: Myrtaceae

Tree oil, an essential oil extracted from the leaves of *Malaleuca alternifolia* by steam distillation and supercritical fluid extraction has found a wide range of anti-microbial activities as antiviral, antifungal, antibacterial due to the presence of Terpinen-4-ol as the major constituent, (52)

Chemical Constituents: Terpinen-4-ol, γ -Terpinene, 1, 8-Cineole, α -terpinene, α -terpinol, cymene, & α -pinene.

Source: The oil is obtained from leaves

1.11.7. NEEM OIL:

The oil was obtained from the retail pharmacy from the

Brand of Khadi pure, Batch No: KP3273

Biological Name: *Azadirachta indica*

Common Name: Indian Lilac

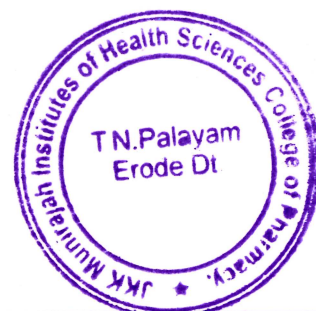
Family: Meliaceae

Neem is an omnipotent tree and a sacred gift of nature. Neem is being considered as the most important and useful medicinal plant and the neem tree is mainly cultivated in the Indian subcontinent. It has an Antibacterial, Antifungal activity.

Chemical constituents: Azadirachtin, Nimbolinin, Nimbin, Nimbodin, Nimbidol, Sodium Nimbinat, Sodium Nimbinat, Sodium Nimbinat,

Source: The oil is obtained from the seeds.

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College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 505



1.11.8. COCONUT OIL:

The oil was obtained from the retail pharmacy.

Biological Name: *Cocos nucifera*

Common Name: Coconut

Family: Arecaceae

[10:04 AM, 10/12/2023] Musheen Clg: Coconut oil is one of the best natural nutrients of the hair a shiny quality It helps in healthy growth of hair a shiny quality.

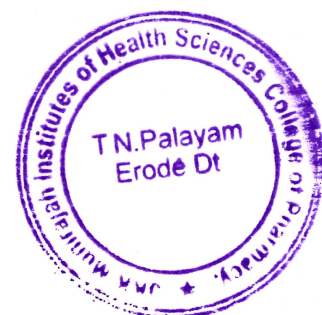
It is an excellent conditioner helps the regrowth process of damaged hair it is also used as a hair care oil and is used in manufacturing various products like conditioner dandruff relief cream.

Chemical constituents: Fatty acids, caprylic acid, lauric acid, myristic acid, palmitic acid, stearic acid, oleic acid.

Source: The oil is obtained from fresh coconut meat or dried coconut meat.



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College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506



3. AIM & OBJECTIVES

AIM:

The aim of the present study is to formulate and characterise an herbal hair oil for the treatment of dandruff as hair care cosmetics. Dandruff is a common problem for many people and who are usually suffering from itching, scaly shedding, and even an embarrassment on notice. It is also a great idea that the natural ingredients with less or so side effects may be utilised for the wellbeing of the human community. Also, it is noted that the Herbal Oils are increasingly popular for their various value-added therapeutic properties

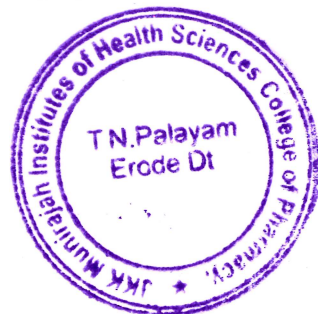
OBJECTIVES:

- To Formulate the herbal anti-dandruff hair oil
- Characterise various parameters to evaluate the quality of hair oil To determine the pH of formulated Herbal oil for its acidity or basicity
- To check the sensitivity to human whether the oil is producing any itching or irritation to the scalp.
- To determine the rancidity level of the oil
- To determine the soap forming capacity or fat content of the Herbal oil
- To determine the density of the oil to know the spreading ability of formulated oil
- To determine the adhesive ability of the oil.
- To evaluate the anti-dandruff activity by using reported Staphylococcus Aureus invitro evaluation model.



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College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 508



MATERIALS AND METHODS:

5.1. MATERIALS

Herbal Oils:

Bhringraj oil, Ginger oil, Lemon oil, Brahmi oil. Tea Tree oil, Neem oil, Rosemary oil, Coconut oil.

Apparatus required:

pH paper, measuring cylinder, weighing balance, Iodine Flask, Burette, B Sand, Water bath, Specific Gravity, Test tube, Test tube stand, Conical flask, Pipette, culturing loop, Cotton, Petri dish, conical flask etc

Chemical required:

KOH pellets, ethanol, Phenolphthalein solution, 0.1 M KOH solution, 65N alcoholic KOH, 0.5 N HCL etc

Instruments:

pH meter. Ostwald's Viscometer (or) Brook Field's Viscometer, Microscope, Incubator, Laminar air flow, Incubator, Hot air oven, Autoclave.

Nutrient Broth:

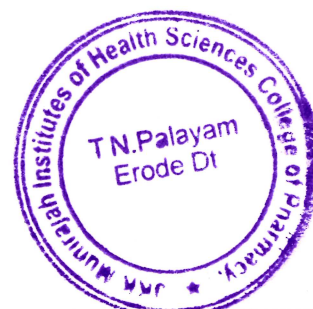
Peptone, Bees wax, Sodium Chloride, Distilled water.

Nutrient Agar Medium:

Peptone, Bees wax, Sodium Chloride, Agar Agar, Distilled Water.



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College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506



Staphylococcus Aureus collection:

The following oils were procured from the local market as it was marketed, and were used as brought without any process.

BRINGRAJ OIL:

The oil was obtained from the retail pharmacy as the Brand of Khadi omorese,

Batch No: LOT-17

LEMON GRASS OIL:

The oil was obtained from the retail pharmacy as the Brand of Isochem laboratory,

Batch No: 357107

ROSEMARY OIL

The oil was obtained from the retail pharmacy as the Brand of Rey naturals,

Batch No: B02

BRAHMI OIL:

The oil was obtained from the retail pharmacy as the Brand of Deve herbes

Batch No: BM0222

5.1.6. GINGER OIL:


The oil was obtained from the retail pharmacy as the Brand of Sage Apothecary,

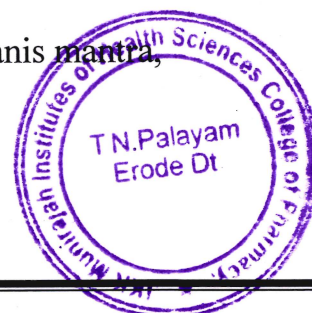
Batch No: 0122SA015

TEA TREE OIL:

The oil was obtained from the retail pharmacy as the Brand of Organics mantra,

Batch No: 11.21


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College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 500



NEEM OIL:

The oil was obtained from the retail pharmacy as the Brand of Khadi pure, **Batch No: KP3273**

COCONUT OIL:

The oil was obtained from the retail pharmacy

Procedure for Formulation 1:

Major portion of the herbal formulation was taken at first (Bhrinjraj oil) to a volume of 20 ml in a beaker. Then 5 ml of brahmi oil & Neem oil were added slowly and stirred well to ensure a uniform mixing of oils. Then added 1 ml each of Tea Tree oil, Rosemary oil, Ginger oil & Lemon Grass oil respectively with continuous stirring. Then added about 65 ml of base oil (coconut oil) to make up to 100 ml.


Procedure for Formulation 2:

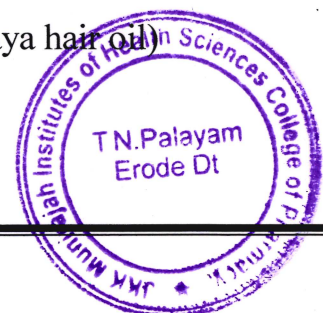
To take the major oil (Bhrinjraj oil) 25ml it was been taken in a beaker. Then 12ml of brami oil, 5ml Neem oil was added. And add 1ml of Tea Tree oil, Rosemary oil, Ginger oil & Lemon Grass oil for small amount because it has an high odour. Then add 53ml of base oil (coconut oil). The formulation contains an 50% of major oil & 50% of base oil.

Procedure for Formulation 3:

To take the major oil (Bhrinjraj oil) 30ml it was been taken in a beaker. Then 17ml of brami oil, 5ml Neem oil was added. And add 1ml of Tea Tree oil, Rosemary oil, Ginger oil & Lemon Grass oil for small amount because it has an high odour. Then add 53ml of base oil (coconut oil). The formulation contains an 60% of major oil & 40% of base oil.

Procedure for Formulation 4: It is a marketed product (Himalaya hair oil)


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Gobi (Tk), Erode (Dt) - 638 506



RESULTS AND DISSCUSSION


Herbal hair oil is one of the most well recognised material for hair treatments Herbal hair oil not only moisturizes scalp but also reverses dry scalp and dry hair condition. Various herbal hair oils were prepared as described under materials and methods. Four Formulations namely F1, F2 and F3 were formulated Formulation 14 was procured from the market and ised as received.

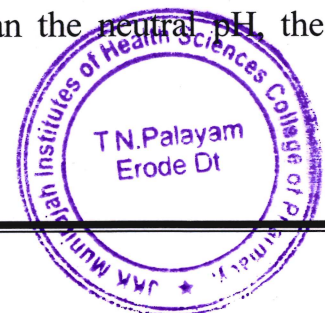
Characterization of the formulated formulations and marketed product as standard formulation was considered and experiments were carried out as per the methods described carlier. All experiments were done in (n=3) under normal conditions to get concordant values

All experiments were done with the optimized formula and evaluated by mean of various parameters like pH, Sensitivity test, Specific gravity test, Acid value, Saponification value, Colour, Odour. Thus obtained results are depicted in the Table appropriately.

Sensitivity test did not produce and itching or any noticeable effects after the prescribed period of time as that of the marketed herbal formulation. Hence it indicates that the formulated herbal formulations are suitable for application on the human skin and found all the four formulations are human usable.

All the four samples were test for their pH values under similar conditions and found that the formulated herbal oils were found with the pH ranging from 5.63, 6.48 and 6.84 for F1, F2 and F3 respectively. The marketed formulation f4 was found to possess a pH of 7.5. Though the marketed product is having the pH little higher than the neutral pH, the


Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N. Palayam
Gobi (Tk), Erode (Dt) - 638 508



formulated F1 and F2 products pH were also found almost neutral to pH. Hence those formulations are in confirmation to the marketed product. However, the pH of the F3 was found to have a pH of 5.63, which is little on the acidic side. However, it doesn't produce any symptoms to be beyond isotonic to normal tissues, as no irritation was observed.

The specific gravity of the formulated herbal oils were found to be almost similar to a range of 0.850, where as in the case of marketed product was found to be 0.764. This is a physical parameter, almost depicts the spreading character of the oils and found in a range suitable for the scalp application


Similarly, another physical parameter, Viscosity, which also fall in sane line for all F1, F2 and F3 and similar as that of the marketed formulation F4 almost in the range of 30.

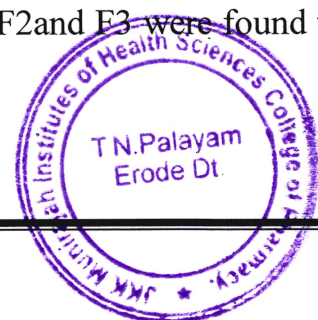
Evaluation of Test for Herbal Hair Oil

Organoleptic character (Colour and Odour) was checked and found that the formulations F1, F2 and F3 were found to be almost similar, light green in colour and odour was characteristic. Whereas in the case of F4, the appearance was colourless, may be because of the colour used in the marketed oils for Formulation 1 to 3.

Apart from theses physical characterisation, important qualitative and quantitative aspects of evaluation were also carried out. Acid value and Saponification value were determined for all the formulations and found that F1 was having lowest acid value of 2.8. F2 and F3 are having little higher as 3.48 and 3.83 respectively. Formulation F4, the marketed product was found to have an acid value of 3.90 which indicates the newly prepared oils were pure and does not have any rancidity which are better than the marketed formulation.

On the other hand, saponification value of the Formulations F1, F2 and F3 were found to


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College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 405

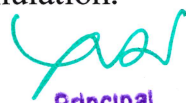


possess 364, 275 and 380 respectively. F4 was found with 352, which is almost equal as that of F3. The increasing values of Saponification no may be due to the presence of the more volume of Bhringraj or Brahmi oils, which is natural that the fatty matter content of those oils are higher. Hence it is more appropriate to apply F3 to have hairs and scalp enriched with more fatty matter for the healthy scalp conditions.

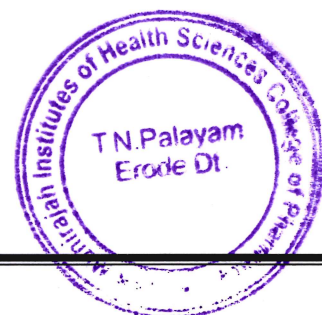
Dandruff is a condition exists when the microbial population is abnormal as per the reported research articles. Hence it is more appropriate to quantify the formulations for their ability to keep the microbes under control. Thus obtained anti-microbial study against the one of the reported organism Staphylococcus Aureus is tabulated in Table No. 3 and 4 for few parameters on all formulations of F1, F2, F3 and F4.

Before making the quantification study, each of the formulations were tested for minimum inhibitory concentration to produce effective control of said microbe's population as per the demonstrated invitro model. It is interesting to note that all the formulations were effective against Staphylococcus Aureus equally at the concentration of 1ml, 0.5ml and even in 0.25ml. In the case of F3 and F4, they were showing antimicrobial property even at 0.125ml concentration. On reducing further concentrations of formulated herbal formulations, the microbes fight against the ingredients and started survival and shown growth in the demonstrated invitro culture model.

Hence it was concluded that the Minimum inhibitory concentration of the formulations were 0.125 ml and further studies were carried out. In the further characterisation of the formulated herbal oils, it was clear from the literature that the control of Staphylococcus Aureus may be a key role in controlling Dandruff. Hence an antimicrobial assay was completed on these formulated formulations along with marketed formulation of F4 considering it as a standard formulation.



Principal
JKK Munirajah Institute of Health Sciences
College of Pharmacy, T.N.Palayam,
Sulur (Tk), Erode (Dt) - 638 506

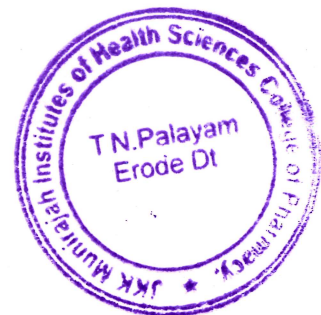


The antimicrobial study also revealing that the zone of inhibition produced by the formulations F1 was lowest to 2 to 4 mm. Whereas F2 was little higher side and F3 was found to with 8 to 9 mm in diameter in the demonstrated invitro bore plate method. It is noticeable that F4 was found to possess a zone of Inhibition to 7 to 8 mm only, which is lower than that of the formulate formulation F3. Hence it is clearly understandable that the inhibition of the growth of Staphylococcus Aureus is dose dependant in the case of Formulations Fi to F3 respectively and F3 was found to possess a maximum. The zone of Inhibition produced by F3 is higher than F4, which also indicates that the new formulation F3 is more effective against the test organism in the tested model and may be more effective than the marketed formulation F4. The effect produced may be because of the increasing concentrations of Bhringraj and Brahnui oils.

Hence the present study may be stated that it reveals the antidandruff activity of formulated herbal hair oil is very effective in the management of dandruff particularly in the aspects of effective against Staphylococcus Aureus in In-vitro.



Principal
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College of Pharmacy, T.N.Palayam,
Gobi (Tk), Erode (Dt) - 638 506



CONCLUSION


The herbs that are used in herbal hair oil preparation are safer for the scalp to reduce the itchy effect and dandruff and are found to be more effective than the synthetic preparations. In case of herbal hair oil there is no deposition of the ingredients on the scalp whereas in case of the synthetic formulation there is deposition of chemicals which causes hair damage

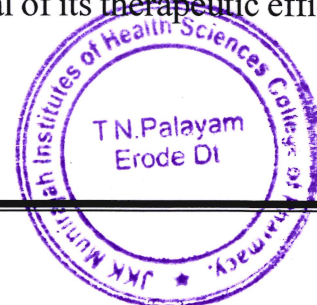
Many people suffer from hair disorders such as dandruff. Applying it is one of the best managements for these types of ailments. The awareness and need for cosmetics with herbs are on the rise, as it is strongly believed that these products are safe and free from side effects. Herbal-based oils are more effective in terms of safety and ease of manufacturing in an economic point of view,

From the present investigation it was found that the formulated herbal hair oil has better results as that of the marketed product and standard sample. Further standardization and biological screening may establish the quantitative efficacy of the formulated herbal hair oil.

Dandruff is a condition of the scalp characterized by the massive desquamation of small flakes of stratum corneum. The scales may be or trapped in film of sebum. It is caused by the bacteria called *Staphylococcus aureus* that occur when the skin is dead, producing irritating white flakes and itchy scalp as per the reported research articles we came across

Himalaya hair oil is a widely used, marketed cosmetic product nowadays because of its popularity and that was increased in recent years. Hence a systematic and thorough study or standardisation of that herbal hair oil may unveil the potential of its therapeutic efficacy.


Principal
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College of Pharmacy, T.N.Palayam,
Gobi (TK), Erode (Dt) - 638 706



Formulation F3 formulated in this piece of research shows compatibility along with better physical properties and a comparable in vitro experimental result as that of Himalaya hair oil with reference to growth inhibitory effect against Staphylococcus aureus. In fact, formulation F3 was found to have even better inhibitory effect than that of Himalaya Herbal Hair Oil in our demonstrated invitro experimental model.

Hence it is strongly submitted here that the further exploration of the formulated formulation of F3 will definitely open up a new era in the field of cosmetic herbal hair oil formulations and the product may become a boon for the people who are suffering from DANDRUFF!!!



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