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FORMULATION AND EVALUATION OF ANTI-DANDRUFF HERBAL HAIR TONIC

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ABSTRACT

Background: The formulated hair tonic contains fenugreek seeds are rich in Vitamin A, K and C, ginger improves the blood circulation in the scalps and leads to hair growth and shine, Amla rich in Vitamin A, Vitamin C and it increases the antioxidants in your body. It purifies the blood and enhances hair natural color by preventing premature greying of hair. It has antifungal and antiviral properties, which prevent dandruff and other fungal infections and improve scalp health. Aloe Vera act as natural conditioner and reduces the amount of dandruff and Neem has antibacterial and antifungal properties that reduce the side effects of dandruff, dry scalp and scalp infection, rose water eliminates dandruff and reduces the level of oil from scalps, that are completely natural and will make your hair smoother, stronger, shiner and dandruff free. **Aim:** The aim of this study is to formulate and evaluate the anti-dandruff herbal hair tonic using the above ingredients with an emphasis on efficacy and safety. **Methods:** Seeds of fenugreek, Ginger extract, Aloe Vera extract, Neem or Amla powder and Rose water were used in the formulation and subjected to Physical properties and appearance pH determination, viscosity, homogeneity, anti-microbial activity and anti-fungal activity. **Conclusion:** The evaluation parameters were fulfilled and shown in acceptance range and can be further instigated for production and testing. **Result:** The prepared herbal tonic was found to be in the stipulated pH range, viscosity, no skin irritation and microbial growth.

KEYWORDS

Herbal hair tonic and Anti – dandruff.

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INTRODUCTION^{1,2}

The importance and usage of cosmetics has increased as many people want to stay attractive and young. Hair is one of the vital parts of the body which increases the general elegance of the body. Hair contains two important parts; root and shaft. Hair is a protein filament that grows from follicles found in the dermis. It is one of the defining

characteristics of mammals. Major functions of hair includes;

Thermoregulation

Protection

Facilitation for evaporation of perspiration

Heat insulation on head

Hair tonic is a mainly a hair styling product which is applied to hair to improve its appearance. Hair tonics are usually light weight and easy to apply. Herbal cosmetics are prepared using various cosmetic ingredients to form the base in which one or more herbal ingredients are used to treat various skin problems. Various plant species are highly used for developing new drug products for cosmeceuticals and pharmaceutical uses. The major advantages of herbal cosmetics include; Suitable for all skin types, no side effects, wide selection, budget friendly. The beauty and health of hair can be obtained from cleanliness, therefore the hair and scalp need much care to remain clean and healthy. Herbal formulations always have greater demand because of their better activity and comparatively lesser or no side effects with synthetic drugs. In these times, people are interested in hair preparations and conditioner materials, like shampoos, hair tonics, hair serums containing herbal extracts for prevention of dandruff.

Dandruff is a common scalp condition in which small pieces of dry skin flake off from the scalp. The dandruff may have several causes; irritated, oily skin, dry skin. The responsible agent for dandruff is a scalp specific fungus called *Malassezia globosa*, that metabolises triglycerides which is present in sebum by the expression of lipase, resulting in a lipid byproduct called oleic acid. Dandruff is commonly two types; dry dandruff (pityriasis dermatitis) and waxy dandruff (seborrheic dermatitis).

Benefits of anti dandruff herbal hair tonic;

Help to control dandruff

Moisturises dry hair

Lubricates dry scalp

Reduce split ends and broken hair

Help to hold the hair in place, making it easier to study

Helps to make the hair look shiny which is a sign of healthy hair

From losing the volume of hair to oily and greasy scalp, all of these are markers of an unhealthy hair. Proper care should be taken for the hair in summer or winter season, unless it may get prone to damage and may lose its lustre. While visiting a beauty parlour or using expensive hair products might help you retrieve back the smoothness and radiance, it may never give you the real essence of having healthy hair. So using the herbal hair tonic including fenugreek seeds are rich in Vit A, K and C, ginger improves the blood circulation in the scalps and leads to hair growth and shine, amla rich in Vit A, Vitamin C in amla increases the antioxidants in your body. Amla purifies the blood and enhances hair natural colour by preventing premature greying of hair. It has antifungal and antiviral properties, which prevent dandruff and other fungal infections and improve scalp health. Aloe vera act as natural conditioner and reduces the amount of dandruff and neem has antibacterial and antifungal properties that reduce the side effects of dandruff, dry scalp and scalp infection., rose water eliminates dandruff and reduces the level of oil from scalps, that are completely natural and will make your hair smoother, stronger, shiner and dandruff free.

MATERIAL AND METHODS^{3,4}

The following ingredients were used for the preparation of anti- dandruff herbal hair tonic.

Amla

Botanical source

Amla is obtained from the fruit of *Embllica officinalis* belongs to the family, Euphorbiaceae.

Uses

Amla can boost hair growth and can protect the hair from external damage.

It can reduce hair loss and also to help balance a flaky scalp.

Chemical constituents

Emblcanin A and B, punigluconin and pedunculagin, Gallic acid, chebulagic acid,

geraniin, ellagic acid, and corilagin, Quercetin, rutin.

Neem

Botanical source

Neem consists of the fresh or dried leaves and seed oil of *Azadirachta indica*, belongs to the family, Meliaceae.

Uses

For hair, it is a natural and safe way of preventing dandruff and dry scalp

Chemical constituents

Leafs: quercetin, nimbosterol, nimbin.

Flowers: nimbosterol, kaempferol, melicitrin.

Bark: nimbin, nimbidin, nimbosterol, margosine.

Seed: azadirachtin, azadiradione, nimbin, vepinin, vilasinin fraxinellone.

Fenugreek

Botanical source

Fenugreek consist of seed of *Trigonella foenumgraceum*, belongs to the family Fabaceae.

Uses

It act as a emollient and it help in preventing hair fall.

Chemical constituents

Alkaloids, Trimethylamine, Neurin, Trigonelline, Choline, Gentianine, Carpaine and Betain, Amino acids Isoleucine, 4-Hydroxyisoleucine, Histidine, Leucine, lysine, 1-tryptophan, Arginine.

Ginger

Botanical source

Biological Source: Ginger consists of either the scraped or unscraped rhizomes of *Zingiber officinale* belonging to family Zingiberaceae.

Uses

Reduce pain and muscle soreness, sweet floral scent, sooth and softens skin and reduces inflammation.

Chemical constituents

Chemical Constituents: Ginger contains about 0.25-3% of volatile oil, 5-8% resinous matter, 56% starch and protein. Volatile oil contains a mixture of more than 25 constituents containing monoterpenes and sesquiterpenes. The pungent taste of ginger is due to the presence of gingerol.

Aloe vera

Botanical source

Aloe vera is the dried leaf of *Aloe perri*, *Aloe curacao*, *Cape aloe* and *Socotrine aloe*, belongs to the family, Liliaceae.

Uses

Calms Itchy Scalp, Reduces Dandruff, Deep Cleans Oily Hair, Strengthens and Repairs Hair Strands and Promotes Hair Growth

Chemical constituents

Anthracene glycosides (11 to 40%). Barbaloin or Aloin, C glycoside

Isobarbaloin, aloe-emodin and aloesone.

Aloinosides A and B (only in Cape aloes).

Rose

Botanical source

Rose is the flower of *Rosa canina*, *Rosa gallica*, *Rosa demascena*, belongs to the family, Rosaceae

Uses

Spraying rose water on your hair & scalp after hair wash can add shine and make hair silky. Add few drops tea tree oil to rose water and spray on scalp before and after a hair wash.

Chemical constituents

Citronellol (31 to 44%), Geraniol (9 to 24%), Nerol (5 to 11%)

Other constituents are geranyl acetate, nonanal, citronellyl formate, citronellyl acetate, eugenol.

Sandalwood oil

Botanical Source

Sandalwood oil is obtained by distillation of sandalwood, *Santalum album* Linn., belonging to family Santalaceae.

Chemical Constituents

The main odorous and medicinal constituent of Sandal-wood is santalol.

primary sesquiterpene alcohol forms more than 90% of the oil and is present as a mixture of two isomers, α -santalol and β -santalol, hydrocarbons santene, nor-tricycloekasantalene, α -, and β - santalenes

Uses

Sandalwood oil is highly used in perfumery creations

Sandalwood oil has brilliant astringent properties. It can ward off excess scalp sebum secretion, treat

split ends and foster hair growth. It reduces dryness, refills lost moisture, and increases skin elasticity.

Glycerine

Synonyms: Glycerol, Glycerin

Description

Glycerol is a triol with a structure of propane substituted at positions 1, 2 and 3 by hydroxy groups.

Molecular Formula

$C_3H_8O_3CH_2OH-CHOH-CH_2OH$

Uses

When it comes to hair, glycerin is a humectant, meaning it can actually pull in moisture from the air, keeping hair hydrated and healthy. It's common ingredient in both skin and hair care products because it's so effective. It's also colorless and scentless, so it won't alter the smell or look of a product.

Sodium benzoate

Synonyms

Sodium benzoate, Antimol, Sobenate.

Description

Sodium benzoate is an organic sodium salt resulting from the replacement of the proton from the carboxy group of benzoic acid by a sodium ion.

Molecular Formula

C_6H_5COONa

Uses

The sodium salt of BENZOIC ACID. It is used as an antifungal preservative in pharmaceutical preparations and foods. It may also be used as a test for liver function.

METHOD OF PREPARATION

Step 1: Rose water prepared using rose petals [common vehicle].

Step 2: Fenugreek is soaked in rose water and boiled to get a solution.

Step 3: Ginger is macerated to get an extract.

Step 4: Aloe vera gel is mixed with rose water.

Step 5: The contents of step 2, 3, 4 mixed together.

Step 6: To the above mix add Neem / Amla powder.

Step 7: Add 10ml of glycerine, 1 drop of sandalwood oil, 0.1 g sodium benzoate.

Step 8: Make up to 50ml using rose water.

EVALUATION OF ANTI- DANDRUFF HERBAL HAIR TONIC^{5,6}

Homogeneity

The homogeneity of formulation is tested by touch and appearance.

Physical appearance

The prepared formulations were evaluated in terms of their clarity and fluidity.

Ease of rinsing

The time taken to remove hair tonic and time taken for complete removal of product after wash was determined.

Ease of combing

Ease of combing was performed by passing a comb through the hair and checking whether the comb glides smoothly.

Luster of hair

The luster of hair was tested by checking the shine on the hair.

Determination of pH

The pH meter was calibrated using pH 4 and pH 7 buffer solutions. Then, the electrode was soaked in the hair tonic and left until the pH normalized after a few minutes.

Viscosity

The viscosity measurement was performed with spindle number 64 on a Brookfield viscometer. In the beaker, 50ml of hair serum was placed and the viscosity was measured at various rpm, i.e. 20, 30, 50, 100.

Anti-microbial activity

Bacteria *Escherichia coli* was used in the study to determine anti bacterial activity by cup and plate method. Nutrient agar was used as culture media and cavity were aseptically made in the culture plates using borer (9mm internal diameter). The cavities were filled with formulations (F1 to F 6) these plates were incubated at 37 degree celcius for 24 hours. The activities were determined by measuring the radius of zone of inhibition.

Anti- fungal activity

Fungus *Malassezia globosa* was used in the study to determine the anti fungal activity by cup and plate

method. Nutrient agar was used as culture media and cavity were aseptically made over the culture plate using borer (9mm internal diameter). The cavities were filled with formulations (F1 to F 6) these plates were incubated at 28 degree celcius for 48 hours. The activities were determined by measuring the radius of zone of inhibition.

RESULTS AND DISCUSSION

Determination of pH

As shown in the table all tonic were acid balanced and were ranging from 4.5 -5.5 which is ideal for hair and scalp. Hair's pH falls in the acidic range at around 4.5 - 5.5 and maintaining it at this level is important for its overall health. Extreme alkalinity can eat away skin and hair. At a more alkaline point on the scale, bacteria and naturally-occurring oil might also cause dandruff. So, maintaining the hair pH level becomes important.

Determination of viscosity

The rheological study of the formulations indicated that as the RPM increases the viscosity decreases. The most common type of viscosity behavior is pseudo plasticity, where a material's viscosity decreases as the shear rate increases.

Anti-bacterial activity^{7,8}

The zone of inhibition obtained was shown in table (figure) and it was observed that all the formulation have anti-bacterial activity. From the results, the formulation containing 15ml amla F1 and 15ml neem F4 has maximum activity compared to other formulations. In that, formulation with neem was found to be more active than formulation with amla.

Anti-fungal activity^{7,8}

The zone of inhibition observed was shown that, all the formulations having anti-fungal activity. From the results, the formulations containing amla in F1 and neem in F2 shows maximum activity compared to other formulations. In that neem was showed more activity as compared to amla.

DISCUSSION

In the current study, more efforts have been made to formulate and evaluate anti-dandruff herbal hair tonic using two main herbal anti-dandruff agents including neem and amla in different combinations and concentration. Physical evaluation was done by testing the Colour, Odour, appearance and texture of the herbal hair tonic. The hair tonic was found to have pleasant Odour and having orange and green colour. All formulations provide good antidandruff property. All the formulations were acid balanced and were ranged 4.5 to 5.5 which is near to the scalp and hair pH. Test for homogeneity shows that all formulations produce uniform distribution of extracts. This was confirmed by visual appearance and by touch. Under visual inspection all formulation have uniform color dispersion. The prepared anti-dandruff herbal hair tonic formulations (F1 to F6) were subjected to antimicrobial activity using well-plate method in an agar medium. The zone of inhibition was observed successfully for formulation F1 and F4 than other formulations. The prepared anti-dandruff herbal hair tonic formulations were subjected to anti-dandruff activity using well-plate method in a sabouraud dextrose medium. The results shows that hair tonic containing neem has more activity as compared to amla.

Formula for anti-dandruff herbal hair tonic

Table No1: Formula for anti-dandruff herbal hair tonic

S.No	Ingredients	F1	F2	F3	F4	F5	F6
1	Amla	15ml	10ml	5ml	-	-	-
2	Neem	-	-	-	15ml	10ml	5ml
3	Fenugreek	8.5ml	8.5ml	8.5ml	8.5ml	8.5ml	8.5ml
4	Aloevera	6ml	6ml	6ml	6ml	6ml	6ml
5	Ginger	2.5ml	2.5ml	2.5ml	2.5ml	2.5ml	2.5ml
6	Glycerin	10ml	10ml	10ml	10ml	10ml	10ml
7	Sodium benzoate	0.1mg	0.1mg	0.1mg	0.1mg	0.1mg	0.1mg
8	Sandalwood oil	0.15ml	0.15ml	0.15ml	0.15ml	0.15ml	0.15ml

Homogeneity

Table No.2: Test for homogeneity

S.No	Formulations	Homogeneity
1	F1	Homogenous with acceptable consistency
2	F2	Homogenous with acceptable consistency
3	F3	Homogenous with acceptable consistency
4	F4	Homogenous with acceptable consistency
5	F5	Homogenous with acceptable consistency
6	F6	Homogenous with acceptable consistency

Physical appearance

Colour of formulations

Table No.3: Colour of formulations

S.No	TEST	F1	F2	F3	F4	F5	F6
1	COLOUR	Orange	Orange	Orange	Green	Green	Green

Appearance of the formulations

Table No.4: Appearance of the formulations

S.No	Formulations	Appearance
1	F1	Translucent solution
2	F2	Translucent solution
3	F3	Translucent solution
4	F4	Translucent solution
5	F5	Translucent solution
6	F6	Translucent solution

Odour of the formulations

Table No.5: Odour of the formulations

S.No	Test	F1	F2	F3	F4	F5	F6
1	Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant

Texture of the formulation

Table No.6: Texture of the formulation

S.No	Formulations	Texture
1	F1	Smooth
2	F2	Smooth
3	F3	Smooth
4	F4	Smooth
5	F5	Smooth
6	F6	Smooth

Evaluation parameters

Table No.7: Evaluation parameters

S.No	Test	F1	F2	F3	F4	F5	F6
1	Ease of distribution	Best	Better	Good	Best	Better	Good
2	Ease of rinsing	Best	Better	Good	Best	Better	Good
3	Ease of combing	Best	Better	Good	Best	Better	Good
4	luster of hair	Best	Better	Good	Best	Better	Good

Determination of pH

Table No.8: pH Determination

S.No	Formulations	pH
1	F1	4.51
2	F2	4.53
3	F3	4.57
4	F4	4.98
5	F5	5.09
6	F6	5.25

Determination of viscosity

Table No.9: Viscosity determination

S.No	RPM	F1	F2	F3	F4	F5	F6
1	20	150	150	150	150	150	150
2	30	120	140	140	140	140	140
3	50	80	70	70	70	70	70
4	100	42	48	48	42	48	48

Anti-bacterial activity^{7,8}

Table No.10: Anti-bacterial activity study

S.No	Bacterial strain used	Amla	ZOI (mm)	Neem	ZOI (mm)
1	<i>Escherichia coli (E. coli)</i>	F1	5.4	F4	5.6
2	<i>Escherichia coli (E. coli)</i>	F2	5	F5	4.9
3	<i>Escherichia coli (E. coli)</i>	F3	4.7	F6	4.6

Anti-fungal activity^{7,8}

Table No.11: Anti-fungal activity

S.No	Fungal strain used	Amla	ZOI (mm)	Neem	ZOI (mm)
1	Malassezia	F1	5.5	F4	5.7
2	Malassezia	F2	4.2	F5	4.6
3	Malassezia	F3	4.4	F6	4.7



Figure No.1: Anti bacterial activity



Figure No.2: Anti-fungal activity

CONCLUSION

In the current study, efforts have been made to prepare and evaluate anti-dandruff herbal hair tonic mainly using two herbs such as neem and amla by various combinations. Physical evaluation was done by testing the colour, odour, appearance and texture of the anti-dandruff herbal hair tonic. The hair tonic have found to be pleasant odour and having orange and green in colour. The texture of hair tonic appears to be smooth. All the hair tonics were acid balanced and were ranged 4.5 to 5.5, which is near to hair and scalp pH. Test for homogeneity shows that all formulations are homogenous with acceptable consistency of hair tonic and it was confirmed by visual appearance and by touch. The prepared anti-dandruff herbal hair tonic formulations F1 to F6 were subjected to antimicrobial activity using well-plate method in an agar medium. The zone of inhibition was observed

successfully for formulation F1 and F4 than other formulations. The prepared anti-dandruff herbal hair tonic formulations were subjected to anti-fungal activity using well-plate method in a sabouraud dextrose medium. The results shows that hair tonic containing neem has more activity as compared to amla. From the above results it is shown that the formulation F1 and F4 has more anti-dandruff activity. All the preliminary parameters were satisfactory. The total activity of the formulation was therefore comparable to or even better, according to the results of antifungal and antimicrobial experiments.

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CONFLICT OF INTEREST

None to declare.

REFERENCES

1. Nurul Arfiyanti Yusuf, Besse Hardinti, Rahma. Hair tonic formulation of black tea extract as hair growth, *Journal of Fundamental and Applied Pharmaceutical Science*, 2021, 1-2.
2. <https://en.wikipedia.org/wiki/Dandruff>.
3. Therapeutics Role of Azadirachta indica (Neem) and Their Active Constituents in Diseases Prevention and Treatment.
4. Amla: Pharmacognosy and Phytochemistry.
5. Tamil Salvan N, Hind T P, Jisna. Development and evaluation of medicated scalp serum, *International Journal of Creative Research Thoughts (IJCRT)*, 10(4), 2022, 7-8.
6. Ruchi Tiwari, Gaurav Tiwari, Ajeet Yadav. Development and evaluation of herbal hair serum: A traditional way to improve hair quality, *The Open Dermatology Journal*, 15, 2021, 3-5.
7. Nanda Badhe, Sachin Tekawade, Lina Shirode, Shivam Lale. Formulation and evaluation of herbal hair tonic, *World Journal of Pharmaceutical Research*, 4(10), 2015, 4-5.
8. Rohan R. Vakhariya, Srushti A. Oza, Chaitanya S. Bhingardev, Smita J. Patil, Sofiya. Formulation, development and evaluation of herbal hair serum: A classical approach to enhance hair quality, *International Journal of Pharmaceutical Sciences Review and Research*, 76(2), 2022, 3-4.
9. Randad Shubham Shrinivas, Hingane L D. Preparation and evaluation of hair serum, *International Journal of Advances in Engineering and Management (IJAEM)*, 4(6), 2022, 2389-2393.
10. Gholap Chirag, Dhole Pratik, Badhekar Akanksha, Shinde. Review on the formulation and evaluation of herbal hair serum, *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*, 2(1), 2022, 2-3.

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