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FORMULATION AND IN VITRO EVALUATION OF POLYHERBAL HAIR OIL

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ABSTRACT

Background: The main objective of the study was to formulation and *in vitro* evaluation of a Polyherbal hair oil using three different herbal oils that can be used to prevent hair fall, gray hair, baldness and dry hair. **Method:** The developed formulations were subjected to evaluation. The formulated Polyherbal hair oil was evaluated for its Phytochemical evaluation of powder blend of herbs, Rheological evaluation, Organoleptic evaluation of hair oil, Physiochemical evaluation like pH, viscosity, specific gravity, refractive index, acid value and saponification value. The various herbal ingredients used in this present formulation were leaves of *Murraya koenigii* (Curry Leaves), *Eclipta prostrate* (Brungaraj Leaves), *Mentha piprita* (Poodina Leaves) *Lawsonia Inermis* (Henna Leaves), *Hibiscus rosasinensis* (Mandaram Leaves) *Tridax procumbens* (Gaddi chamanthi), *Ocimum tenuiflorum* (Tulasi Leaves), gel of *Aloe barbadensis* (Aloe vera), *bark of Acacia catechu* (Tella Thumma chettu) *and* Seeds of *Trigonella foenumgraecum* (Menthulu), oil of *Ricinus communis* (Castor oil), *Cocos nucifera* (Coconut oil) *Prunus* amygdalus (Almond oil). The Polyherbal hair oil formulations were prepared by boiling the contents in three different oils of coconut oil, castor oil and almond oil at a temperature of

80℃ for 15 minutes then filter. **Result:** Out of the prepared 2%, 4% and 6% formulations, the 6% Polyherbal hair oil formulation containing castor oil (HO6) is showing more color intensity and the same intensity is maintained even after three times shampoo washing. **Conclusion:** The prepared formulations of Polyherbal hair oil were reported to have properties like hair growth, prevents premature graying of hair, and moisturizing properties. Apart from phytochemical, organoleptic, physical properties, color stain intensity on hair was also measured. All the parameters were found to be good and within the standards. Therefore, 6% (HO6) polyherbal hair oil formulation was proven to be the best formulation.

KEYWORDS: Hair growth, Hair loss, Hair oil, Phytochemical screening, Polyherbs.

INTRODUCTION

Many people in the world, both in developed and developing countries, are adopting herbal medicines to treat various diseases. Herbal products have been widely used by individuals as home remedies. With the invention of modern medicines, the use of herbal products has been down, but in recent times the use of herbal medicines has increased tremendously because they are safe, natural, non-toxic, easily available and compatible with all skin types when compared to synthetic products.[1] Herbal plant ingredients found in gels, oils, face packs, tonics and creams have been shown to be more beneficial than synthetic formulations containing chemical components. Natural origin ingredients impart smoothness, luster to the hair, and help in treating various hair problems like hair fall, gray hair, dandruff, baldness, and dry hair. Herbal cosmetics help in enriching the body with various essential nutrients and minerals.

Advantages of herbal cosmetic on traditional cosmetics

1. They do not provoke allergic reactions and do not have any negative side effects.
2. They are easily incorporated into skin and hair.
3. These are very effective than other cosmetics in small quantities.
4. Extracting the form of the plants decreases the bulk properties of the cosmetics and gives appropriate pharmacological effects.
5. Easy to availability and found in a large variety of plants.
6. They have more stability, purity, and efficacy, with their herbal constituents.
7. Easy to manufacture.
8. The storage and handling of herbal cosmetics are easier and for a prolonged period.
9. Cheap in cost.

Herbal hair care products are categorized into hair tonics and hair grooming aids.[2] Herbal hair oils are the hair care preparations that are used for preventing and treating various hair related disorders, it not only moisturizes but also reverse dry scalp and dry hair condition results in healthy hair and maintains normal functioning of sebaceous glands by providing essential minerals and nutrients required for growth of healthy hair, to stop and treat baldness, dandruff and aggression of hair. To avoid all the hair related problems, people have to apply many products for each condition. To avoid such problems, there is a need to develop a polyherbal hair oil formulation which will overcome the problem of using many natural and synthetic hair care products.[3]

Hair is an epidermal derivative which is one of the vital parts increasing the overall elegance of the body. Hair fall, dandruff, lice, spilt ends, grey hair are few problems involved with hair faced by human1. To overcome these, human takes many measures by applying many cosmetics for each. Hair oil is one among them used to solve almost all of these problems.[4]

Herbal cosmetics are in high demand due to the increasing interest of mankind towards them because they are more effective with nil or less side effects, easily available ingredients etc. Hair care cosmetics are now added with herbs and they are well recognized compared with synthetic ones.[5]

Herbal hair oil is more preferred and is used in many ailments of hair. They promote hair growth, improve elegance of hair and prevent hair fall. Hair oil not only promotes hair growth they also provide necessary moisture to the scalp rendering in beautiful hair.[6]

The present work was aimed to formulate and *in vitro* evaluate a polyherbal hair oil containing herbs like Curry Leaves, Brungaraj Leaves, Poodina Leaves, Henna Leaves, Mandaram Leaves Gaddi chamanthi, Tulasi Leaves, gel of (Aloe vera, bark of Tella Thumma chettu and Seeds of Menthulu, Castor oil, Coconut oil, Almond oil. All these herbs have well known traditional potential in the treatment of hair care.

MATERIALS AND METHODS

Materials

Collection of plant products

For the preparation of polyherbal hair oil formulation, various plant parts were collected from the Medicinal garden of College of Swami Vivekananda Institute of Pharmaceutical Sciences,

Vangapally, leaves of *Murraya koenigii* (Curry Leaves), *Eclipta prostrate* (Brungaraj Leaves), *Mentha piprita* (Poodina Leaves) *Lawsonia Inermis* (Henna Leaves), *Hibiscus rosasinensis* (Mandaram Leaves) *Tridax procumbens* (Gaddi chamanthi), *Ocimum tenuiflorum* (Tulasi Leaves), gel of *Aloe barbadensis* (Aloe vera), *bark of Acacia catechu* (Tella Thumma chettu) *and* Seeds of *Trigonella foenumgraecum* (Menthulu), oil of *Ricinus communis* (Castor oil), *Cocos nucifera* (Coconut oil) *Prunus* amygdalus (Almond oil) were purchased from the local market of Yadadri-Bhongir –Dist and authenticated by Senior botanist of SLNS Degree and PG College, Bhongiri, Yadadri-Bhongiri-Dist, Telangana, India.

The formulation table was given in the Table 2. All the organoleptic properties was identified of given materials and given in Table.

Description of the Ingredients of the Polyherbal Hair oil[7-19]

Table no. 1: Description of herbs used in the polyherbal oil.

Name of the Herb	Biological source	Picture of Herb	Uses
1. Curry Leaf	Dried leaves of *Murraya koenigii* Family: Rutaceae		Prevents hair fall and premature greying of hair.
2. Brungaraj, Eclipta- White, False, daisy'	Dried Leaves of *Eclipta prostrata* Family: Asteraceae		Helps in boosting blood circulation to hair follicles
3. Aloe Vera	Dried leaves of *Aloe barbadensis* miller Family-Liliaceae		Conditioner and moisturizing effect, remove dandruff, boost hair growth, nourishing the hair.

4. Black catechu Katha, cutch, khadir, Khair, catechu.	Dried heartwood of *Acacia catechu*. Family: Fabaceae		Skin erruptions and ulcers, colouring of hairs.
5.Tulasi	Dried Leaves of *Ocimum tenuiflorum* Family: Lamiaceae		Medicinal and spiritual properties in Ayurveda, treat cough, asthma, diarrhea, fever, dysentery, arthritis, eye diseases, indigestion and gastric ailments, hair tonic.
6. Henna, Egyptian privet	Dried leaves of *Lawsonia inermis* Family: Lythraceae		Hair colorant, helps in hair growth.
7.Hibiscus, china rose	Dried Leaves of *Hibiscus rosasinensis* Family: Malvaceae		Nourishes and thickens hair.
8.Pudina, Mentha Peppermint	Dried Leaves of *Mentha piperata* Family-Labiatae		Its fragrance is pleasant and it may help with dryness, itching or scalp problem. It also boosts hair growth.

9. Fenu greek,	Dried seeds of *Trigonella foenum-graecum* Family: Leguminosae		Moisturizes hair and replenishes hair growth.
10. Tridex Gaddichamanthi	*Dried Leaves of Tridax procumbens* L. Family: Asteraceae		Antidiabetic, anti-bacterial, antiplasmodial, antihepatotoxic, anti-oxidant, antimicrobial, immunomodulator, wound healing and anticancer action.
11. Castor oil Castor bean oil, oleum ricini, ricinus oil, oil of palma christi, cold-drawn castor oil.	Seeds of *Ricinus communis* Linn., belonging to Family: Euphorbiaceae.		Castor oil is mild purgative, fungistatic, used as an ointment base, as plasticizer, wetting agents, as a lubricating agent, Hair oil.
12. Coconut oil	Oil derived from dried fruits of *Cocus nucifera*. Family: Arecaceae		Moisturizer, vehicle, stimulates hair growth by unclogging pores.
13. Almond oil	Almond oil is a fixed oil obtained from the seeds of *Prunus amygdalus*. Family: Rosaceae		Hair promote blood flow to the roots of hair and encourage and strengthen of hair. If it also contains biotin, it would stimulate the keratin production, besides thickening and regrowing hair, and reactivating dormant follicles.

Table no. 2: Formulation of Polyherbal hair oil.

Ingredients	HO1	HO2	HO3	HO4	HO5	HO6	HO7	HO8	HO9
Coconut oil (ml)	100	100	100	-	-	-	-	-	-
Castor oil (ml)	-	-	-	100	100	100	-	-	-
Almond oil (ml)	-	-	-	-	-	-	100	100	100
Curry Leaves	2%	4%	6%	2%	4%	6%	2%	4%	6%
Brungaraj Leaves	2%	4%	6%	2%	4%	6%	2%	4%	6%
Aloe vera Leaves	2%	4%	6%	2%	4%	6%	2%	4%	6%
Bark of Black catechu	2%	4%	6%	2%	4%	6%	2%	4%	6%
Tulasi Leaves	2%	4%	6%	2%	4%	6%	2%	4%	6%
Henna Leaves	2%	4%	6%	2%	4%	6%	2%	4%	6%
Hibiscus Leaves	2%	4%	6%	2%	4%	6%	2%	4%	6%
Pudina Leaves	2%	4%	6%	2%	4%	6%	2%	4%	6%
Fenu greek Seeds	2%	4%	6%	2%	4%	6%	2%	4%	6%
Tridex Leaves	2%	4%	6%	2%	4%	6%	2%	4%	6%

Methods

Preparation of polyherbal hair oil[20]

- The collected plant parts are dried under the shade. Drying under the shade will retain the herb's active phytoconstituents. Hence, drying under shade is preferred compared to artificial drying.
- To convert dried parts of the plant into coarse powder a mixer was used.
- Later, all coarsely powdered drugs are passed through the sieve number 80. A uniform mixture is obtained by blending the coarse powder.
- Now, coconut oil is added to all three different concentration having 2%, 4% and 6% powdered polyherbs and mixed well and were boiled in 100ml of coconut oil at the temperature of 80℃ for 15 minutes. Allow the formulations to cool at room temperature and filter them.
- Now the volume was made up to 100ml using castor oil for all three formulations.
- Then transfer these prepared 2%, 4% and 6% formulations of Polyherbal hair oil into amber colored bottles and labeled as HO1, HO2 and HO3 respectively.
- Repeat the procedure by taking 2%, 4% and 6% of powdered polyherbs were boiled in 100ml of coconut oil and labelled as HO4, HO5, HO6 as well as Almond oil then labelled as HO7, HO8 and HO9.

Evaluation test for polyherbal hair oil

1. Phytochemical evaluation of powder blend of herbs
2. Rheological evaluation
3. Organoleptic evaluation of hair oil

4. Physiochemical evaluation

1. Phytochemical evaluation of powder blend of herbs

The prepared herbal oils were subjected to qualitative chemical analysis for identification of various plant constituents like alkaloids, glycosides, flavonoids, tannins, phenols, steroids and saponins by using different methods.[21]

A. Molisch's test

Take 1 gm of sample in dry test tube, Take 2 ml of distilled water in the sample, Add 2 to 3 drops of Molisch's reagent in solution then add few drops of concencentrated sulphuric acid to the sides of test tube, Observe color change at junction of two layers.

B. Volatile oil test

Sample + alcoholic solution of Sudan 3

Observe the color.

C. Mayer's test (For alkaloid)

Sample + Mayer's reagent

Observe the color

2. Rheological evaluation

A. Bulk density

Weight accurately 18 gm of powder dye and transfer in 100 ml of measuring cylinder. Carefully level the powder blend without compacting and read the unsettled apparent value.

Bulk density = Bulk mass / Bulk volume

B. Tapped density

Accurately 5 gm of powder dye and transfer in 100 ml measuring cylinder. Then precisely tap the chamber.

Tapped Density = Mass / Tapped volume

C. % Carr's index

% Weigh Carr's index = (Tapped Density – Bulk density)/ tapped density X100

D. Hausner's ratio

Hausner's Ratio was measured by the following formula.[22]

Hausner's Ratio = Tapped density /Bulk density.

E. Angle of repose

3. Organoleptic evaluation of hair oil

Physical state, Colors and Odor of formulation, appearance and texture performed and got good result.[23]

4. Physiochemical evaluation

The physical and chemical feature of the herbal hair dye were evaluated to determine the pH, its moisture content for the purpose of stability, compatibility and the amount of inorganic matter present in it.[24]

pH

pH of polyherbal hair oils is measured using a digital pH meter. All herbal oil formulations were taken in a beaker and dip the pH electrode in the beakers and wait for one minute till we get a constant reading without fluctuations. Now, note down the readings. Before using the pH meter, it must be calibrated using pH 7 buffer and pH 4 buffer.[25]

Viscosity

Viscosity is determined by using Brookfield's viscometer. The oils were taken in a small sample adapter, fixed to the viscometer and the temperature is maintained at 25℃ 0.2℃ for viscosity determination. Start the viscometer and wait for a minute to get a constant reading and the viscosity was noted in centipoise.[26]

Specific gravity

Take the pycnometer, rinse it with distilled water and dry it, take the weight of the empty pycnometer (W1), then take the weight of the pycnometer with oils (W2). The weight of the oils is determined by using the formula.[27]

Weight of the sample = W2 – W1

Refractive index

The refractive indices of all herbal hair oil formulations were determined by using the Abbe's Refractometer.

Acid value

Preparation of 0.1 molar solution: Weigh 0.56g of potassium hydroxide pellets and dissolve in distilled water with continuous stirring. The prepared 0.1 molar potassium hydroxide solution was filled in the burette.

Preparation of sample: Measure 10ml of each oil and dissolve in 25ml of ether mixture and shake it continuously. Add 1 ml of phenolphthalein solution as an indicator and titrate it against 0.1 molar potassium hydroxide solution.[28] The acid value of the prepared oils was calculated by using formula.

Acid value = 5.61 n/w

Where n = Volume of 0.1 molar potassium hydroxide solution consumed.

w = weight of oil.

Saponification value

2g of oils were accurately weighed and transferred into a 250 ml of iodine flask each, 25 ml of 0.5 M of alcoholic potassium hydroxide solution was added to all three formulations and boiled under reflux in a water bath for 30 minutes. Few drops of phenolphthalein were added as an indicator in each formulation and titrated against 0.5 M hydrochloric acid (a) Similarly, the blank was performed without the samples (b). The saponification value of the prepared oils was calculated by using the formula.

Saponification value= 28.05(b-a)/w

Where w =weight in a gram of the solution

Color intensity

The prepared herbal hair oil was tested on white hair for color intensity property. The human white hair was collected from the barber shop and is used for testing the color intensity property of the hair. The different percentages of hair oils 2%, 4%, 6% is applied to the white hair and after 1 hour they are observed for the coloring property of the hair. After that the hair was washed with shampoo and observed for the color of the hair. Compare the three different concentrations of three different oils (Coconut oil, Castor oil and Almond oil) with blank (Without apply of oil).

Sensitivity test

The prepared Polyherbal hair oil was applied on 1 cm skin of hand and exposed to sunlight for 4-5 min.

Irritation test

The prepared Polyherbal hair oil was applied on 1 cm skin of hand and wait for 5 min.

Grittiness: The prepared Polyherbal hair oil was applied on skin and observed after 5 min.

Sedimentation: Keep the whole preparation aside for overnight and check for sedimentation.

Application of hair dye

The pack, which is powder, ought to be utilized week after week on wet hair, shaping a glue in water with ideal consistency. It ought to be applied uniformly to the hair with the assistance of a brush, covering the roots to the hair tip. The scalp ought to be covered. It should be left for 2–3 hours on the scalp for complete drying. Then it should be removed by dye washing with plain water and drying the hair to give the color to the hair.

Advantages of polyherbal hair oil

They are gentler on the scalp and hair and less likely to cause skin irritation or allergic reactions. They are providing more vibrant and long-lasting color intensity. They are less expensive. Less susceptible to sunlight. Available in a variety of color shades.[29]

RESULT AND DISCUSSION

The prepared herbal hair oil is used to treat various hair related ailments like hair fall, gray hair, dandruff, baldness and dry hair. Polyherbal hair oil containing herbs like *Murraya koenigii* (Curry Leaves), *Eclipta prostrate* (Brungaraj Leaves), *Mentha piprita* (Poodina Leaves) *Lawsonia inermis* (Henna Leaves), *Hibiscus rosasinensis* (Mandaram Leaves) *Tridax procumbens* (Gaddi chamanthi), *Ocimum tenuiflorum* (Tulasi Leaves), gel of *Aloe barbadensis* (Aloe vera), *bark of Acacia catechu* (Tella Thumma chettu) *and* Seeds of *Trigonella foenumgraecum* (Menthulu), oil of *Ricinus communis* (Castor oil), *Cocos nucifera* (Coconut oil) *Prunus amygdalus* (Almond oil). Which have a special role in the formulations such as Hair growth, prevents premature graying, anti-dandruff and moisturizes the hair. The various parameters evaluated were phytochemical constituents, organoleptic properties and physical parameters like pH, viscosity, specific gravity, refractive index, acid value and saponification value are summarized Table 3, 4 and 5. Figure 1 represented the Crude form of Different Polyherbal drugs (Leaves, Bark, Gel and Seeds), figure 2, 3 and 4 showed the prepared formulation of polyherbal hair oil (HO1-HO9 with different concentrations of polyherbs like 2%, 4% and 6%).

Table no. 3: Evaluation of phytochemical screening of individual polyherbs.

Ingredients	Curry Leaves	Brungaraj Leaves	Poodina Leaves	Henna Leaves	Mandaram Leaves	Gaddi chamanthi	Tulasi Leaves	Aloe vera	Block catchu	Seeds Menthulu
Carbohydrates **Molish's Test**	-	+	+	-	-	-	+	-	-	+
Proteins **Biuret test**	-	+	-	+	-	+	+	-	-	-
Lipids **LB test**	-	+	-	-	-	-	-	-	-	+
Alkaloids **Dragendorff's test**	+	+	+	+	+	+	-	+		+
Glycosides **Borntrager's test**	-	+	+	+	+	-	-		+	+
Saponins **Froth test**	-	-	+	+		+		+	+	+
Flavonoids **Shinoda test**	+	+	+	+		+	+		+	+
Tannins **Ferric Chloride Test**	+	+	+	+	+	+	-		+	+
Phytosterols **Salkowski test**	-	+	-	+	+	-	-	+	+	+
Volatile oils **Treat with alcohol**	-	+	-	-	-	-	-		+	+

+ Sign Prsence of compounds; - Sign Absence of compounds

Figure no. 1: Crude form of Different Polyherbal drugs (Leaves, Bark, Gel and Seeds).

Table no. 4: Evaluation of Rheological properties of polyherbal powder blend.

Ingredients	HO1	HO2	HO3	HO4	HO5	HO6	HO7	HO8	HO9
Loose bulk density (g/cm^2)	0.36	0.36	0.43	0.37	0.36	0.36	0.43	0.37	0.43
Tapped bulk density (g/cm^2)	0.47	0.47	0.6	0.51	0.47	0.47	0.6	0.51	0.6
Carr's index (%)	23.40	23.40	28.33	27.0	23.40	23.40	28.33	27.0	28.33

Hausner's ratio	1.30	1.30	1.39	1.37	1.30	1.30	1.39	1.37	1.39
Angle of repose (^{o})	39.45	38.21	38.63	39.45	39.45	38.21	38.63	39.45	38.63

Figure no. 2: Prepared Formulation of Polyherbal hair oil (HO1-2%, H02-4%, H03-6%)

Figure no. 3: Prepared Formulation of Polyherbal hair oil (HO4-2%, H05-4%, H06-6%).

Figure no. 4: Prepared Formulation of Polyherbal hair oil (HO7-2%, H08-4%, H09-6%)

Table no. 5: Evaluation of organoleptic properties and physical parameters.

Ingredients	HO1	HO2	HO3	HO4	HO5	HO6	HO7	HO8	HO9
Physical state	Greasy	Greasy	Greasy	Greasy	Greasy	Greasy	Greasy	Greasy	Greasy
Colour	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
pH	5.86	5.69	5.62	5.82	5.80	6.0	5.82	5.71	5.60
Viscosity (cps)	0.42	0.68	0.72	0.40	0.66	0.70	0.43	0.69	0.76
Specific gravity	33.41	33.29	31	35.86	41.23	43.42	34.72	40.64	42.51
Refractive index	1.54	1.57	1.73	1.52	1.58	1.75	1.54	1.58	1.74
Acid value	9.52	10.66	12.23	9.62	10.63	11.83	9.76	10.82	11.41
Saponification value	18.65	24.78	27.36	19.23	23.16	28.52	19.72	24.59	27.82
Colour intensity	Block	Block	Block	Block	Block	Block	Block	Block	Block
Sensitivity test	No irritation	No irritation	No irritation	No irritation	No irritation	No irritation	No irritation	No irritation	No irritation
Irritation test	No irritation	No irritation	No irritation	No irritation	No irritation	No irritation	No irritation	No irritation	No irritation
Grittiness	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth
Sedimentation	No sediment	No sediment	No sediment	No sediment	No sediment	No sediment	No sediment	No sediment	No sediment

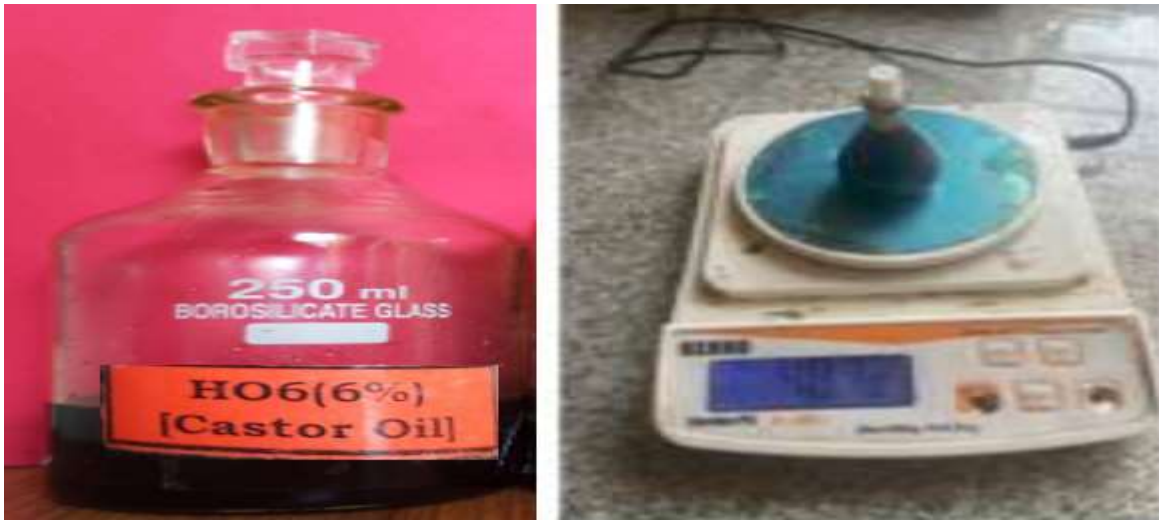

Figure no. 5: Measurement of Specific gravity of Prepared Polyherbal hair oil (HO6-6%).

Figure no. 6: Measurement of pH of Prepared Polyherbal hair oil (HO6-6%).

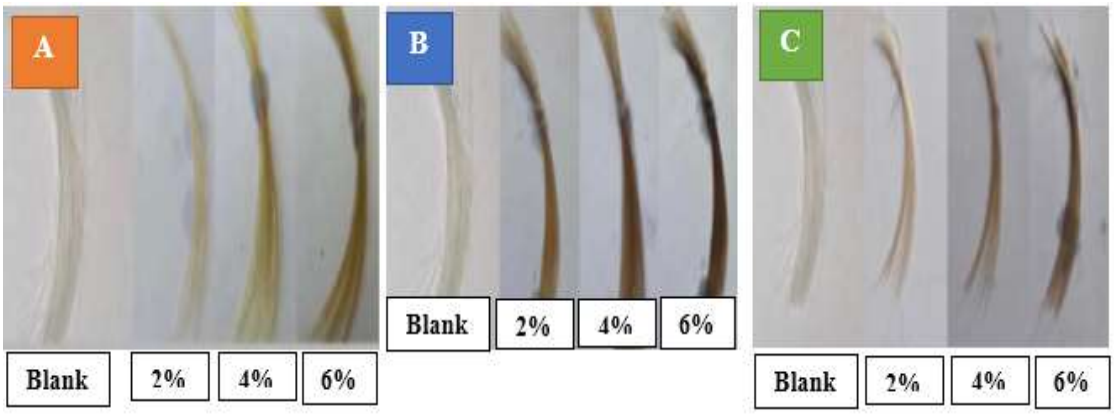

Figure no. 7: A-After one time application Polyherbal hair oil (HO1-2%, H02-4%, H03-6%) B- After two times application of Polyherbal hair oil (HO4-2%, H05-4%, H06-6%) C-After three times application of Polyherbal hair oil (HO7-2%, H08-4%, H09-6%).

The different percentages of hair oils 2%, 4%, 6% is applied to the white hair and after 1 hour observed for the coloring property of the hair. Later the colored hair was washed with the shampoo and observed for the Colour intensity of the hair for all three formulations**. Figure 7- A, B, C** depicts successive application of the Polyherbal hair oils on white hair. From these figures we concluded that (HO6) 6% formulation of polyherbal hair oil showed more color intensity when compared to 2% and 4% formulations respectively. It is also concluded that three time application of hair oil is showing more Colour intensity than second and first time application**.** From these it is concluded that 6 % (HO6) hair oil (Castor oil) formulation is showing more color intensity and the same intensity is maintained even after three times shampooing of hair. Hence, the formulated herbal hair oils have hair growth, prevent graying of hair and moisturizing properties. All the parameters were evaluated for 2%, 4% and 6% hair oil formulations and they are within the acceptable limits. Therefore, 6% (HO6) polyherbal hair oil formulation was proven to be the best formulation.

CONCLUSION

Polyherbal hair oil was one of the most efficient and well known hair treatments. Herbal ingredients and phytoconstituents used for the formulation of polyherbal hair oil were reported to have good properties like hair growth, prevents premature graying of hair and moisturization. The formulated Polyherbal hair oil was evaluated for its Phytochemical evaluation of powder blend of herbs, Rheological evaluation, Organoleptic evaluation of hair oil, Physiochemical evaluation like pH, viscosity, specific gravity, refractive index, acid value and saponification value. The Polyherbal hair oil formulations were prepared by boiling the contents in three different oils of coconut oil, castor oil and almond oil at a temperature of

80℃ for 15 minutes then filter. Out of the prepared 2%, 4% and 6% formulations, the 6% polyherbal hair oil formulation containing castor oil (HO6) is showing more color intensity and the same intensity is maintained even after three times shampoo washing. Lastly we can predict with the above findings that the formulation is promising and even better results are expected with variation in the proportion of these drugs. All the parameters were found to be good and within the standards. Therefore, the Polyherbal hair oil is very important in treatment of various hair ailments and the prepared hair oil is possessing minimal or no side effects. Apart from phytochemical, organoleptic, physical properties, color stain intensity on hair was also measured. All Ingredients that are used in this expression that are natural and that are less lateral effect as compared to the synthetic chemical products. So people like to use this Polyherbal hair oil product much as compared to synthetic or other hair oil.

Future scope

Hence, from the present investigation it was found that the formulated an *in vitro* evaluated Polyherbal hair oils has optimum standards and further standardization and biological screening (*in vivo*) establishes the efficacy of formulated Polyherbal hair oil using animal models.

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