Phytochemical analysis ofcurry leaf (*Murrayakoenigii)* forHair Oil

Abstract

Murrayakoenigii(Curry leaves), member of the Rutaceae familycommonly employed in the Ayurvedic system of medicines which important herb of Indian provenance. The leaves, roots, and bark of this plant are high in carbazole alkaloids, which have powerful biological and pharmacological effects.*MurrayaKoenigii*has long been known for its hair root strengthening effects. In this study, dried leaf portions of *Murrayakoenigii*, *Hibiscus rosasinensis*and *Lawsoniainermis* were made into herbal hair oil and evaluated for their potential as an effective topical formulation for hair growth-promotingaction. The evaluation patterns like Physical appearance, pH Test, Viscosity, Determination of Refractive Index, Saponification Value were tested. Using various procedures, the produced Kadi patta hair oil was subjected to qualitative chemical analysis for the identification of numerous plant main ingredients such as sulphur, ascorbic acid, and saponins. The results showed that herbal hair oil exhibited good pH, acceptable viscosity, and was stable at room temperature. As a result, it is clear that the herbal plant may be a preferable option for future formulations. Oil roasted fresh curry leaves and spice mix of 1:1 ratio with 10% salt were found to be the best organoleptically for preparation of curry leaf paste. The sensory score of the curry leaf edible paste indicated that the changes in appearance, color, flavor, taste and overallqualityduring1-,3-,5-and7-daysstorageperiod.

Keywords

Murrayakoenigii (Curry Leaves), Hair oil, Chemical Standardization, GCMS analysis

Introduction

Curry leaves, botanical name *MurrayaKoenigii*, belongs to the Rutaceae family. Curry leaves also known as karieppilai, karipatta, sweet neem leaves and kadipattta etc. Plants with medicinal properties are being used as a traditional medicine from time immemorial. A plant has medicinal, pharmaceutical and cosmetic potential, using it many innovative products can be prepared useful for mankind. The extract from the leaves and

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3.GCMS analysis of *Murray akoenigii*(Curry leaves)
4, the hair oil is anbiqiuous and it should be deleted of replaced
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6. the new title may sound like this

1. GCMS analysis of *Murray akoenigii* (Curry) leaves potential extract as hair growth promoting agent
2. Hair growth promoting agent and GCMS potency of *Murray akoenigii* (Curry) leaves oil extracts
3, **Hair growth promoting agent and GCMS potency of *Murray akoenigii* (Curry) leaves oil extracts**
Note the only challenge that i have if you extract the oil or not, i will check the body of your work but you can adapt an of the title that is suitable for your work
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5. the other plant , where did it come from like hibiscus, coconut oil and etc , you need to to be more explicit

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stem of various medicinal plants have been employed as a natural remedy in curing various ailments and diseases (Mishra, 2018).Among them *Murrayakoenigii*have a lot of bioactive principles due to which plant has been proven as the medicinally important plant but least or no attention received by the scientist. (Saikia *et al.*, 2006).

Curry leaves is widely distributed throughout India except in higher altitude of Himalayas. It is found abundantly in forests and waste lands in natural, wild and cultivated forms up to1650m altitude (Joseph and Peter, 1985). In southern India it is found in homestead gardens of every house hold (Gahlawa*et al.*, 2015).Natural products could be found in the treatment of almost all diseases and skin problem sowing to their high medicinal value, cost effectiveness, availability and compatibility (Solanki, 2011).*Murrayakoenigii*originates from east and south part of India, Pakistan, Sri Lanka, China and Hainan but widely cultivated in South-East Asia and some parts of the United States and Australia. It grows throughout India up to the height of 1500 to 1655m from sea level and in the Andaman Islands. Soil and climate - Red sandy loam soils with good drainage are ideal for better leaf yield (Jain *et al.*, 2012). The optimum temperature requirement is 26°to37°C. *Murrayakoenigii*is semi deciduous, unarmed aromatic small spreading shrub or tree with strong woody stem but slender with the stem which is dark green to brownish in color the tree is 4–8.7m (13–31 feet) tall, with a trunk up to 81cm diameter.

The leaves, roots, and bark of this plant are high in carbazole alkaloids, which have powerful biological and pharmacological effects. *MurrayaKoenigii*has long been known for its hair root strengthening effects. In this study, dried leaf portions of *Murrayakoenigii, Hibiscus rosasinensis*and *Lawsonia inermis* were made into herbal hair oil and the phytochemicals were evaluated.

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Material and Methods

1.1. Collection of plant part

The leaves of *Murrayakoenigii* were collected from Forest College and Research Institute, TNAU. The leaves of *Lawsonia inermis*, the leaves and flowers of *Hibiscus rosasinensis* were also collected from the Campus.

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1 time ,
2.place
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1.2. Ingredients

Ingredients	Plant part	Quantity (%)
Murrayakoenigii	Leaves	40
Methi	Seeds	3
Coconut Oil	Oil	40
Henna	Leaves	7
Hibiscus	Leaves	7
	Flowers	3

1.3. Working Procedure

- **Step 1** : Take 60g of Dried Curry leaves
- **Step 2** : Heat 300g of Coconut Oil
- **Step 3** : Add 60g of curry leaves, 3 tbsp of methi,10g of henna, 15 hibiscus leaves and 5 hibiscus flowers
- **Step 4** : Keep stirring it in low flame
- **Step 5** : Stir the content until the content turns Green– Don't burn
- **Step 6** : Leave it over night
- **Step 7** : Filter out the extra contents, by squeezing it

Observations

a) Physical Appearance

The general characters like color and odor were evaluated manually (Prakash and Natarajan, 1974).

b) pH Test

The pH meter was calibrated with buffer solutions of pH 4 and pH 7. The electrode was bathed in hair oil for few minutes until the pH returned to normal (Prakash and Natarajan, 1974).

c) Viscosity

A Brook field viscometer (RVDV-II+PRO) was used to measure viscosity with spindle number 6. 50 mL of hair oil was poured into the beaker, and the viscosity wastestedat100 rpm (Prakash and Natarajan, 1974).

d) DeterminationofRefractiveIndex

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There fractometer's temperature was adjusted, and the oil sample was smeared over the cleaned prism before taking readings. The prism was washed with hot water when the measurements were finished. The following equation was used to rectify the readings.

$$R = R' + K(T - T')$$

Where, R= Adjusted reading, R′= Reading at T ◦C, T′= temp at which readings taken, T= specified temp 40◦C, K= 0.00385for oil (Prakash and Natarajan, 1974).

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e) SaponificationValue

In a 250 mL conical flask, 1mL of oil was accurately weighed,and10 mL of ethanol: ether combination (2:1) was added. 25 mL of 0.5 N alcoholic KOH was added to this flask. The flask was kept for 30 minutes and then cooled. Using phenolphthalein indicator, the cooled solution was titrated against 0.5 N HCl. The blank titration was carried out in the same way but without using any oil (sample).The amount of KOH used in mg was computed (Ganesan *et al.*, 2013).

f) Ascorbic Acid Test

Added 1 drop of freshly prepared 5 percent w/v sodium nitroprusside solution and2ml of dilute sodium hydroxide solution to 1ml of 2 percent w/v solution and 5ml of water.Dropin0.6mlofhydrochloric acid, mix, and records found (Ganesan *et al.*, 2013).

g) SulphurTest

On the test paper, a drop of hydrogen peroxide was placed. When exposed to fumes, the paper becomes brown (Ganesan *et al.*, 2013).

h) Quantitative Phytochemical analysis using GC-MS:

Quantitative phytochemical analysis can be done by using GC-MS. It can identify trace elements in materials that were previously thought to have disintegrated beyond identification. Like liquid chromatography- mass spectrometry, it allows analysis and detection even of tiny amounts of a substance.

A sample of 3 ml of methanol extract of *Murrayakoenigii*leaves is taken and subjected to GC-MS for quantifying the phytochemicals present in the leaf extract(Karasek

et al., 2013).

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Results and Discussion

Evaluation parameter of kadi patta hair oil

Developed kadi patta hair oil was dark green in colour with a transparent appearance, and when applied, it was smooth. The pH of the whole kadi patta hair oil was 6.77, which was suitable for hair, implying that the herbal hair oil was compatible with hair. The viscosity of herbal hair oil was determined to be 31 cps. The refractive index was used to determine the quality of kadi patta hair oil. Kadi patta hair oil was found to have a refractive index of 1.31. This demonstrates that a simple refractive index measurement in the laboratory may also be utilized as a quality control approach. The saponification value of herbal hair oil was discovered to be 24.30% in practice (Table 1). This study was proven by Raghavan, (1957); Kumar *et al.* (1999); Ghosh *et al.* (2012) in curry leaves.

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Table 1. Physical parameters of Curry leaves

Parameters	Readings
Physicalappearance	Darkgreen
Odour	Good
pH	6.77±0.011
Viscosity	31.2
Saponificationvalue	24.30
Refractiveindex	1.31

Phytochemical Evaluation of *Murrayakoenigii*

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you didn't do this test ,phytochemical screening is not included in the write up ,you only did, sulphur , Ascorbic acid and saponin and you methods is wrong

Herbal hair oil contains ascorbic acid, sulphur andsaponins, according to phytochemical analysis (Table 2). Because of its powerful antioxidant action and nutritional importance as vitamin C, ascorbic acid is one of the most commonly used natural

antioxidants. The ideal amount of ascorbic acid is used to prevent oxidative degradation of the oils. For a good reason, sulphur is commonly referred to as one of the building blocks of hair. Our hair is made up of keratin, a long-lasting protein with a high sulphur concentration (Table 2).

Sulphur is needed for proteins (like keratin) to keep their structure, which helps maintain hair's overall health, strength, and suppleness. Sulphur has been shown to increase the length of your hair's growing phase. Finally, sulphur has been associated with the treatment, alleviation, and prevention of psoriasis, dandruff, eczema, and folliculitis. Saponins are the most common phytochemicals that act as natural surfactants. Natural saponins provide body and gloss to hair, making it feel fuller, silkier, and smoother. This study was proven by Raghavan, (1957); Kumar *et al.* (1999); Ghosh *et al.* (2012) in Curry leaves.

Table .2 Chemical analyses of curry leaves

Tests	Observations	Results
Ascorbic acid test	Color change from yellow to blue	+
Sulphur test	Appearance of brown color	+
Saponin test	Appearance of foam	+

Phytochemical quantification of methanol leaf extracts of *Murrayakoenigii*using GC-MS

GC-MS chromatogram of the methanolic extract ofMurrayakoengii(Figure-1) showed peaks indicating the presence of phytochemical compounds. The chemical compounds identified in the methanolic extract of the leaves ofMurrayakoengiiare presented in Table 3. GC-MS analysis revealed the presence ofpeak1-Methyl-pyrrolidine-2-carboxylic acid registered the highest (69.00%) compared to others. Kole *et al.* (2009) and Raskin et al. (2002) analyzed the effect of phytochemicals in Curry leaves. In present study showed presence of phytoconstituents and it indicates in the leaves of M.Future studies are needed to isolates and characterize the bioactive compounds.

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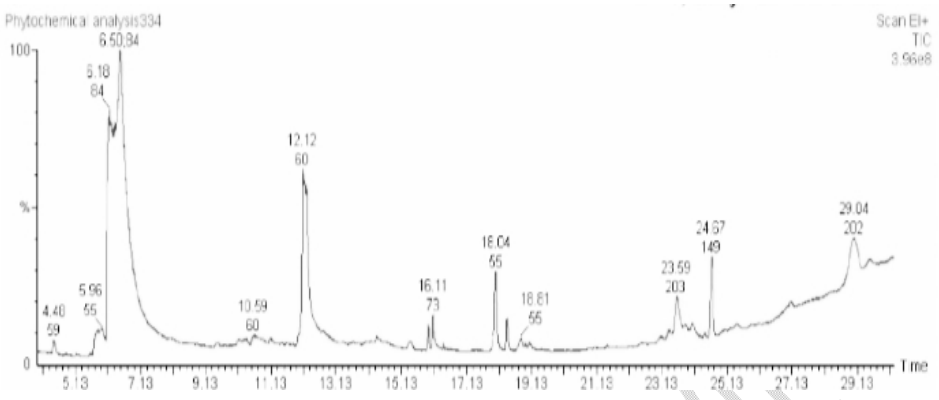

Fig 1. Phytochemical analysis of curry leaf using GCMS

Table 3. Phytochemical quantification of curry leaf using GCMS analysis

S. No	R. Time	Name of the compound	Peak Area (%)
1.	4.48	Propane,1,1,3-triethoxy	0.56
2.	5.96	1,2-Ethanediol,monoacetate	2.79
3.	6.50	1-Methyl-pyrrolidine-2-carboxylicacid	69.00
4.	12.12	Ethyla-d-glucopyranoside	13.36
5.	15.41	Pentadecanoicacid,14- methyl, methylester	0.39
6.	16.11	n-Hexadecenoicacid	0.81
7.	16.43	Hexadecenoic acid, ethylester	0.11
8.	18.04	Oleicacid, methylester	2.54
9.	18.39	Phytol	0.72
10.	18.81	9,12-Octadecadienoicacid(Z, Z)	0.60
11.	23.59	c-Himachalene	2.88
12.	24.67	1,2-Benzenedicarboxylicacid, diisooctylester	2.55
13.	29.04	Isolongifolene,4,5-dehydron	3.68

Summary and Conclusion

The currentstudy aidedin elucidatinginformation on"Standardizingthe recipeforthepreparation of curry leaf hair oil" using curry leaves and its overall quality.One of the most well-known hair treatments is herbal hair oil. Herbal hair oil not only hydrates the scalp, but also helps to heal dry scalp and hair. It contains various vital nutrients that support regular

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sebaceous gland activity and encourage natural hair growth. The results shows that the fresh leaves of *Murrayakoenigii*consists of phytochemicals and these elements can be useful for further studies in developing hair oil which helps in reduction of hair fall and enhancing growth of the hair. The metabolites are reported to have many biological and therapeutic properties so it is expected to have high potential for medical uses. However, further investigation with purified fractions is required to predict the exact mechanism of action.

References

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Chakraborty DP, Chemicaltaxonomy XXXV.Structureof murrayacine, an ewcarbazole alkaloid from Murrayakoenigii(London).1974;4:165–166.

Chelliah R, Ramakrishnan SR, Premkumar D, Antony U. Bio-fortification shelf-life extension of idly batter using curry leaves (Murrayakoenigii).Journal of Food Science and Technology2016; 53(6): 2851–2862.

Drisya CR,Swetha BG, VeluV, Indrani D, Singh RP. Effect of dried Murrayakoenigii leaves on nutritional, textural and characteristics of cookies. Journal of Food Science and Technology 2015; 53(6): 2851–2862.

GanesanP, and Phaiphan A. Comparative study of bio active compounds in curry and coriander leaves: An update. Journal of Chemical andPharmaceuticalResearch.2013;5(11):590–594.

Jain V, Momin M, Laddha, K. Murrayakoenigii: An Updated Review. International Journal of Ayurvedic and Herbal Medicine 2012; 2(4):607-627.

Karasek FW, & Clement RE. Basic gas chromatography-mass spectrometry: principles and techniques 2012. Elsevier.

Khatoon J, Verma A, Chacko N, Sheikh S. Utilization of dehydratedcurry leaves in food products. Indian Journal of Natural Products and Resources 2011; 2(4):508-511.

Kumar VS, Sharma A, Tiwari R. Journal of Medicinal and Aromatic Plant Sciences 1999 ;21:1139.

Kumar AS, Reddy, TSK. Importance of traditional system of medical-A Review. International Journal of Phytotherapy 2013; 2,1-60.

Lal M, Kaur N. Nutritional and anti-nutritional composition of fermented food products developed by using dehydrated curry leaves (Murrayakoenigii). International Journal of Food and Fermentation Technology 2017; 7(2): 295-301.

Lal M, Kaur N. Effect of processing on nutritional and anti nutritional composition of Murrayakoenigii. International Journal of Home Science2019; 5(3):186-190.

Leela KS and Natarajan AV. Chemical composition of aqueous leafextract of Murrayakoenigii. International Journal of Pharmaceutical & BiologicalArchives.2013; 4(3):493–497.

Nandita B, Prabha Sankar P. Antioxidants in food Products: A Review. Journal of Critical Reviews in Food Science and Nutrition 2009;49(1):1-129.

Patidar DK, Yadav N, Wound healing activity of MurrayakoenigiiLeaf extract.2010;4(9):1–2.

PrakashV, Natarajan CP. Studies on Curry Leaf. Food Science and Technology. 1974;11(6):284–286.

Shanthala M, Prakash J. Acceptability of curry leaf (Murrayakoenigii) products and attitude toward consumption.Journal of Food Processing and Preservation 2005;29,33-44.

Singh S, More PK, Mohan SM.Curry leaves (Murrayakoenigii Linn. Sprengal): Amiracle plant. Indian Journal of Scientific Research 2014;4(1): 46-50.

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