IAMJ

INTERNATIONAL
AYURVEDIC
MEDICAL JOURNAL

Research Article | ISSN: 2320-5091 | Impact Factor: 6.719

PHYSICO-CHEMICAL ANALYSIS OF MALTYADI TAIL

Deepti Negi [1], Anoop Kumar Singh [2], Vipin Kumar [3], Shweta G. Shukla[4]

[1]MD. Scholar at UAU in Agadtantra, Rishikul Campus, Haridwar, Uttarakhand, India
[2]Associate Professor at UAU in Agadtantra Rishikul Campus, Haridwar, Uttarakhand, India
[3]Assistant Professor, Dept. of pharmaceutical Sciences, Gurukul, Kangri, Vishwavidyala, Haridwar, Uttarakhand, India
[4]Assistant Professor at UAU in Kayachikitsa, Rishikul Campus, Haridwar, Uttarakhand, India

Corresponding Author: dr.deeptinegi@gmail.com

https://doi.org/10.46607/iamj03p5022021

(Published online: January 2020)

Article Received: 25/01/2021 - **Peer Reviewed:** 03/02/2021 - **Accepted for Publication:** 12/02/2021

Check for updates

ABSTRACT

Having a healthy and flake free scalp is a great part of hair health. Dandruff can be a very common aliment to reduce our scalp health. If ones want to take care of his/her hair and scalp, oiling is the best thing. Herbal oils are now-a-days widely used by the people because less or no side effects. The present work was aimed to formulate *Maltyadi Tail* oil for antidandruff purpose (application in Hair and scalp) and was evaluated analytical study. The organoleptic parameters are appearance, color, touch and odor. The physicochemical parameters are Solubility test, Viscosity test, pH, Acid value, Peroxide value, Iodine value, Saponification value, Volatile matter, Ester value, TLC and Test for heavy / toxic metals. The result of the study showed that *Maltyadi Tail* fulfills all the criteria for ideal hair oil.

Keywords: Hair health, Dandruff, Herbal oil, *Maltyadi tail*, physicochemical parameters.

INTRODUCTION

Hair is the important part of one's personality. Thinning hair and itching scalp can be very annoying. It affects one's self-confidence. Scalp is thick skin layer with many sebaceous glands. There are so many cosmetic products are present in market to take care peoples scalp health. Oil is very common product to use on our scalp regularly. Hair oil works as hair tonics. Regular oiling can reduce hair fall, dryness and chances of occurring dandruff. Natural oil without any additives is very safe for our scalp. The *Maltyadi tail*[1] is herbal antidandruff oil. Present article is deal with formulation of *Maltyadi tail* and evaluation in physicochemical parameters.

Aim – To assess *Maltyadi Tail* on standardization parameters.

Objectives –

To authenticate ingredients of *Maltyadi Tail.*

To prepare *Maltyadi Tail.*

To evaluate *Maltyadi Tail* on physicochemical analysis.

Materials and methods- Collection of drugs-

Jaati Patra (Jasminum officinale (Linn.)- *Rishikul Parisar, Rajrajeswari* Nursery, *Gurukul Parisar, Karveer Moola (Nerium Odorum* Soland*)- Rishikul Parisar, Chitrak Moola* (*Plumbago zeylanica* Linn.) and *Karanj Beeja (Pongamia pinnata* (L)Pierre*)- Pannalal Brijlal* General Merchant*, Tila Tail (Sesamum indicum linn.)- Patanjali Ayurvedic* shop *haridwar* (*ranipur* mod)

Identification: All samples of dry herbs were authenticated by *Dravyaguna* Department Rishikul Campus, Haridwar.

Place of Preparation - Preparation of drug was done in pharmacy department of Hans Ayurved Bhavan, Haridwar.

Method: All these ingredients were taken through proper identification and cleaned and dried. These ingredients (*Jaati, Karveer, Chitrak, Karanj*) were separately crushed by mortar and pestle to prepare coarse powder. Required amount of these ingredients were taken and kept in a container. These ingredients were mixed with each other very well, after that dip in Adequate amount of water. Allowed to soak in water overnight. Keep oil in container and put that container on flame. Put all the ingredients (coarse powder) into the oil container. Heating was done over mild fire using L.P.G gas burner with continuous stirring of the mixture using a spatula to prevent sticking of the Kalka to the bottom of vessel. All water content removed from oil. After observing all qualities of *Snehasiddhi,* the vessel is taken out from the fire and the oil is filtered through a clean cloth. Obtained *Maltyadi Taila* was preserved in moisture free bottles. The ratio between the *Kalka, Sneha,* and *Drava Dravya (*water) (table no.1) were taken as per the reference (1:4:8).[2]

Table 1

Ingredients	Required Amount
Jaati (Jasminum officinale (Linn)	1.25kg
Karveer (Nerium Odorum Soland*)*	1.25kg
Chitrak (Plumbago zeylanica Linn*)*	1.25kg
Karanj (Pongamia pinnata (L)Pierre*)*	1.25kg
Tila Tail (Sesamum indicum linn.)	20lit
Water	As per requirement

Analytical study-

Organoleptic Parameter- Prepared drug were studied organoleptically, with naked eye with the help of pharmacognostical procedure i.e. Appearance, colour, odour, taste, and findings were recorded.

Physiochemical parameters- Parameters were taken according to "Protocol for testing of Ayurvedic Siddha and Unani Medicines", written by Dr. D.R.

Lohar, printed by Government Of India , Department of Ayush, Ministry of Health and Family Welfare, and Pharmacopoeial Laboratory For Indian Medicines, Ghaziabad.

Place of work- Multani pharmaceuticals limited (analytical division), Haridwar.

Methods

a) **Solubility-**Transfer a suitably weighed quantity (depending on the fixed oil content) of the air dried, crushed drug to an extraction thimble, extract with *solvent ether* (or *petroleum ether,* b.p.400 to 600) in a continuous extraction apparatus (Soxhlet extractor) for 6 hours. Filter the extract quantitatively into a tared evaporating dish and evaporate off the solvent on a water bath. Dry the residue at 105^0c to constant weight. Calculate the percentage of ether-soluble extractive with reference to the air-dried drug.

b) **Specific gravity-** The specific gravity of a liquid is the weight of a given volume of the liquid 25^0c (unless otherwise specified) compared with the weight of an equal volume of water at the same temperature, all weighing being taken in air.

Method- Proceed as described under wt. per ml. obtain the specific gravity of the liquid by dividing the weight of liquid contained in the pycnometer by the weight of water contained, both determined at 25 unless otherwise directed in the individual monograph.

c) **Weight per ml(g)-** The weight per ml of a liquid is the weight in g of 1 ml of a liquid when weighed in air at 25^0, unless otherwise specified.

Method

Select a thoroughly clean and dry pycnometer. Calibrate the pycnometer by filling it with recently boiled and cooled water at 25^0 C and weighing the contents. Assuming that the weight of 1 ml of water at 25^0 C when weighed in air of density 0.0012 g per ml, is 0.99602 g. Calculate the capacity of the pycnometer (Ordinary deviations in the density of air from the value given do not affect the result of a determination significantly). Adjust the temperature of the substance to be examined, to about 20^0 C and fill the pycnometer with it. Adjust the temperature of the filled pycnometer to 25^0 C, remove any excess of the substance and weigh. Subtract the weight of pycnometer from the filled weight of the pycnometer. Determine the weight per milliliter dividing the weight in air, expressed in g, of the quantity of liquid which fills the pycnometer at the specified temperature, by the capacity expressed in ml, of the pycnometer at the same temperature.

d) **Refractive index at 25°C -**The refractive index (η) of a substance with reference to air is the ratio of the sine of the angle of incidence to the sine of the angle of refraction of a beam of light passing from air into the substance. Sample should be free from moisture and any residual matter. The prism of Abbe type Refractometer was opened and cleaned with soft cotton. A drop of the sample was placed on the lower part of the prism and Refractometer was closed. Eyepiece was observed and the dispersion correction knob was turned until the colored indistinct boundary seen between the light and dark field became a sharp line. The knob was adjusted until the sharp line exactly intersected the midpoint of the cross wires in the image. Reading of Refractive index was noted

e) **Viscosity test-** Viscosity is a property of a liquid, which is closely related to the resistance to flow. The sample under test was filled in a U tube viscometer in accordance with the expected viscosity of the liquid so that the fluid level stands within 0.2 mm of the filling mark of the viscometer when the capillary is vertical and the specified temperature is attained by the test liquid. The liquid is sucked or blown to the specified weight of the viscometer and the time taken for the meniscus to pass the two specified marks is measured. The kinematic viscosity in centistokes is calculated from the following equation:

Calculation: Kinematic viscosity = kt

Where k = the constant of the viscometer tube determined by observation on liquids of known kinematic viscosity; t = time in seconds for meniscus to pass through the two specified marks.

f) **pH value-** The pH value of an aqueous liquid may be defined as the common logarithm of the

reciprocal of the hydrogen ion concentration expressed in gram per liter. The pH of a given solution was measured by using digital pH meter. First pH meter was standardized. Tablets of different pH were taken, and one tablet was dissolved in 100 ml of distilled water to prepare solutions of different pH 4,7 and 9 (buffer solutions). Buffer solution was taken in the beaker and the electrode was dipped in it. Same procedure was repeated for the other buffer solutions after washing the electrode thoroughly with distilled water. The sample (*Maltadi* tail) was taken (10% aqueous solution) and the electrode was dipped in it and the value of pH was noted.

g) **Acid value-** The acid value is the number of mg potassium hydroxide required to neutralize the free acid in 1 g of the substance. About 5 gm of the sample (*Maltadi* tail) was weighed accurately and transferred into a 250 mL conical flask. 50 ml of neutralized alcohol solution was added to it. This mixture was heated for 10 min by using the heating mantle. Afterwards, the solution was taken out after 10 minutes and 1 or 2 drops of phenolphthalein indicator was added. This solution was titrated against KOH solution from the burette. The appearance of pink color indicated the end point. The volume of consumed KOH solution was determined, and the titration of each sample was carried out in triplicate and the mean of the successive readings was used to calculate the acid-value of the respective sample by following expression. Previously, KOH aqueous solution used in this study was standardized for estimation its actual strength. Briefly, a 20 mL of 0.1 N aqueous oxalic acid was taken in a 250 mL conical flask in which 1 or 2 drops of phenolphthalein indicator was added. It was titrated against KOH taken in a burette. The appearance of pink color indicated the end point. From the volume of the KOH solution consumed taken in burette, the normality of KOH was calculated (Laboratory Handbook, 1997).

Calculation:

$$\textbf{Acid Value} = \frac{\textbf{Volume of KOH X Normality of KOH X Eq. wt X 1000}}{\textbf{Weight of sample}}$$

h) **Peroxide value-** The peroxide value is the number of mill equivalents of active oxygen that expresses the amount of peroxide contained in 1000 g of the substance. 5.0 gm sample was taken into 250 ml Erlenmeyer Flask/Iodine Flask. 30 ml acetic acid chloroform solvent mixture was added & swirled/stirred until dissolved. 0.5 ml Saturated KI solution was added, allowed to stand for exactly 1 min with occasionally shaking, 30 ml water was added. It was titrated gradually with continuous & vigorous shaking with 0.01 M Sodium thiosulphate until yellow colour was almost disappeared. 0.5ml starch solution was added as an indicator at the end until the blue colour formed was disappeared. Number of ml of 0.01M Sodium thiosulphate required was noted (A). A blank titration was conducted in the same manner as test sample but without oil (B). (The volume of 0.01 M Sodium thiosulphate in the blank determination must not exceed 0.1 ml)

Calculation:

$$\textbf{Peroxide Value} = \frac{\textbf{(A - B) X Normality of sodium thiosulphate X 1000}}{\textbf{Weight of sample (gm)}}$$

i) **Iodine value-** The Iodine value of a substance is the weight of iodine absorbed by 100 parts by weight of the substance, when determined by one of the following methods: -

Iodine Monochloride Method- Accurately weighed substance was taken in dry iodine flask. 10 ml of carbon tetrachloride was added to it and dissolved. Now 20 ml of iodine monochloride solution was added and the stopper was inserted and allows standing in a dark place at a temperature of about 17ºC for thirty minutes. 15 ml of solution of potassium iodine and 100 ml water were added and shake. It was titrated with 0.1 N sodium thiosulphate, using solution of starch as indicator. Number of ml required was noted. At the same time the operation was carried out in exactly the same manner without the substance being tested, and the number of ml of 0.1 N sodium thiosulphate required was noted.

Calculation:

$$\textbf{Iodine Value} = \frac{\textbf{(b - a) X 0.01269 X 100}}{\textbf{Weight of sample (gm)}}$$

Saponification Value- The saponification value is the number of mg of potassium hydroxide required to neutralize the fatty acids, resulting from the complete hydrolysis of 1 g of the oil or fat. The sample (*Maltadi* tail) was melted and filtered through a filter paper to remove any impurities and the last traces of moisture to make sure that the sample (*Maltadi* tail) is completely dry. 2gm sample (*Maltadi* tail) was weighted in 250ml Erlenmeyer flask. 25ml of alcoholic KOH was added and mixed well. It was attached to a reflux condenser for 1 hr. on water bath, boiled gently and steadily until Saponification was complete, as indicated by absence of any oily matter and appearance of clear solution. It was cooled & stirred frequently for 30 min. 1 ml Phenolphthalein solution was added as an indicator. Pink color was observed. The excess potassium hydroxide was titrated with 0.5N hydrochloric acid. Pink color was disappeared at end point. Required number of ml of HCl was noted (A). The same procedure was repeated without taking sample for Blank Titration, required number of ml of HCl was noted (B).

Calculation:

$$\textbf{Saponification Value} = \frac{\textbf{(B - A) X Normality of HCL X 56.10}}{\textbf{Weight of Sample (gm)}}$$

Ester Value: Ester value of a substance is the number of mg of potassium hydroxide required to neutralize the acids resulting from the complete hydrolysis of 1 gm of sample and note the fatty acids present in it.

Method: The value is obtained by subtraction of Acid value from Saponification value.

Ester value = Sap. value – Acid value

Reagent- Potassium hydroxide

j) Heavy Metals by Atomic Absorption Spectrophotometry:

Procedure: Prepare a test solution of the substance being examined the sample (*Maltadi* tail), adjust the concentration to fall within the concentration range of the reference solution. Measure the absorbance 3 times, record the readings and calculate the average value. Interpolate the mean value of the readings on the calibration curve to determine the concentration of the element.

Determination of Lead (Pb) (Graphite Oven Method):

Preparation of lead standard stock solution: Measure accurately a quantity of lead single element standard solution to prepare standard stock solution with 2 per cent nitric acid solution, which containing 1 µg per ml, stored at 0-50.

Preparation of test solution: Weigh accurately 0.5 g of the coarse powder of the substance being examined, transfer into a Kasparian flask, add 5-10 ml of the mixture of nitric acid and perchloric acid (4:1), add a small hopper on the flask-top, macerate overnight,

heat to slake on the electric hot plate, keep somewhat boiling, if brownish-black, add again a quantity of the above mixture, continuously heat till the solution becomes clean and transparent.

Determination of Cadmium (Cd) (Graphite Oven Method)

Preparation of Cd standard stock solution: Measure accurately a quantity of Cd single-element standard solution to prepare standard stock solution Cd with 2 per cent nitric acid, which containing 0.4 µg per ml Cd, stored at 0-50.

Determination: Pipette accurately 10-20 µl of the test solution and its corresponding reagent blank solution respectively; determine their absorbance according to the above method of "Preparation of calibration curve. If interference occurs, weigh accurately respectively 1 ml of the standard solution, blank solution and test solution, add 1 ml of a solution containing 1per cent ammonium dihydrogen phosphate and 0.2 per cent magnesium nitrate, shake well, determine their absorbance according to the method above, calculate the content of Cd in the test solution from the calibration curve.

Determination of Arsenic (As): **Preparation Of As Standard Stock Solution**: Measure accurately a quantity of As single-element standard solution to prepare standard stock solution with 2 per cent nitric acid solution, which contain is 1.0 µg per ml As, stored at 0-50.

Determination: Pipette accurately 10 ml of the test solution and its corresponding reagent blank solution respectively, proceed as described under "Preparation of calibration curve" beginning at the words "add 1 ml of 25 per cent potassium iodide solution". Calculate the content of as in the test solution from the calibration curve.

Determination of Mercury (Hg): Preparation of Mercury Standard Stock Solution: Measure accurately a proper quantity of mercury single-element standard solution to prepare standard stock solution with 2 per cent nitric acid solution, which containing 1.0 µg per ml Hg, stored at 0-50.

Determination: Pipette accurately a quantity of the test solution and its corresponding reagent blank solution, respectively, proceed as described under "Preparation of calibration curve" beginning at the words "add 1 ml of 25 per cent potassium iodide solution". Calculate the content of mercury (Hg) in the test solution from the calibration curve.

From the above it is inferred that the ratio of heavy metals in sample of *Maltyadi tail* was observed below than the maximum limit.

k) **Thin layer chromatography:**

It is a chromatography technique used to separate nonvolatile mixtures. Thin-layer chromatography is performed on a sheet of glass, plastic, or aluminium foil, which is coated with a thin layer of absorbent material, usually silica gel, aluminium oxide or cellulose. This layer of adsorbent is known as the stationary phase. After the sample has been applied on the plate, a solvent is drawn up the plate. The mobile phase has different properties from the stationary phase. After this, the spots are visualized. Then calculate the Rf value.

Reagents-

1- Dragendroffs spray
2- Anisaldehyde spray
3-Chloroform
4-Methanol
5- Ethyl acetate

Observation and results-

Organoleptic study – The organoleptic parameters results shown in table no.-2

Table 2

Parameters	
Appearance	Oily
Color	Light yellow
Touch	Smooth
Odour	Slightly pungent

Physicochemical test – The physicochemical test results shown in table no.-3

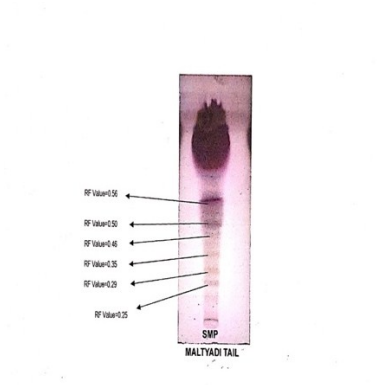
Table 3

S. No	Test parameters	Results	Method reference
01	Description	A yellow coloured oil	Visual
02	Identification (by TLC)	Picture	API
03	Solubility	Free soluble in Ether	API
04	Specific Gravity	0.918	Visual
05	Weight per ml (g)	0.915	Visual
06	Refractive index at 25^0c	1.4724	API
07	Viscosity (cps) (Spindle no. 64 at 45 RPM)	64.5	API
08	pH	5.99	API
09	Acid value	1.64	API
10	Ester value	180.47	API
11	Peroxide Value	6.16	API
12	Iodine Value	71.63	API
13	Saponification	182.11	API
14	**Heavy Metals**		
	Lead as Pb(ppm)	0.43	API
	Cadmium asCd (ppm)	0.04	API
	Arsenic as AS (ppm)	<0.50	API
	Mercury as Hg(ppm)	0.20	API

TLC Report of *Maltyadi Tail*

Table 4

No. of spots	**R_f Value**
1	**0.25**
2	**0.29**
3	**0.35**
4	**0.46**
5	**0.50**
6	**0.56**



Picture no.-1.1

DISCUSSION

Color and odor of the *Maltyadi tail* were characteristic of their constituents. The viscosity of any fluid is a measure of their resistance to deformation at a given rate. For liquids, it relates to the informal concept of "thickness"[3]. The viscosity of *Maltyadi tail* is 64.5 cps. It is easy to spread on hair and scalp. Iodine value can be used to measure the degree of unsaturation of oils and fats. Oil with an iodine number higher than 115 are considered to be "drying oils". Drying means hardening into a polymerized, tough and solid film after exposure to air, a reaction sequence that is accelerated by elevated temperatures[4]. Most cases of dandruff feed on saturated fatty acids[5]. *Maltyadi* tail is not saturated and the iodine value is 71.63. Peroxide value is the most commonly used assay for assessing the state of oxidation in fats and oils and its value measures the oxidative rancidity or degree of oxidation of the fat/oil, but not its stability[6]. It shows that how much oil is fresh. The Peroxide value of *Maltyadi tail* is 6.16. Acid value is the mass of potassium hydroxide (KOH) in milligrams that is required to neutralize one gram of chemical substance.

Low Acid value indicates good cleansing by soap[7]. The acid value of *Maltyadi tail* is 1.64. Human hair and scalp oil, sebum, has a pH balance of between 4.5 and 5.5. This natural hair acidity prevents fungi and bacteria in the hair and scalp, and keeps the cuticle closed and healthy[8]. If one has to balance your scalp pH, so you have to use a natural acid to bring your hair into an acidic pH range. pH of *Maltyadi tail* was 5.99 and found suitable for application on hair, because hair pH lies near this range. Saponification value of *Maltyadi tail is* 182.11. It is essential that the saponification value should be high, if saponification value would be small the fatty acid salts will not be sufficient enough to remove or saponify the fat or oil and less soapiness[9]. These test results showed that oil complies all physico- chemical parameters.

CONCLUSION

The ayurvedic cosmetics wildly used in present time. The popularity of herbal products is in our society because of lesser or nil side effects. Synthetic hair oil contains various colors, preservatives, fragrances and other additives which cause harm to scalp. *Maltyadi tail* is purely herbal and effective in dandruff. All type of synthetic additive was excluded in *Maltyadi tail*. The physiochemical result showed that the formulation of *Maltyadi* tail contains all effective characters of ideal hair oil.

REFERENCES

1. Priya Vrat Sharma, Cakradatta (Sanskrit text with English translation), Chaukhambha publishers varanasi,3rd edition 2002, page no. 445
2. Priya Vrat Sharma, Cakradatta (Sanskrit text with English translation), Chaukhambha publishers varanasi,3rd edition 2002, page no. 445.
3. Zhendi Wang, Merv Fingas, Crude oil and Refined product fingerprinting: Principles; Environmental forensics Academic press, 1964, pages- 339-407
4. G.K. Sandha and V.K. Swami, Jojoba Oil As An Organic, Shelf Stable Standard Oil-Phase Base For Cosmetic Industry , Rasayn, J. Chem, Vol.2, No.2 (2009), 300-306 ISSN: 0974-1496
5. Nengimoyo Biobelemonye, Dandruff Aetiology And The Effects Of Edible Lipids On The Growth Of Isolates, European Journal Of Pharmaceutical And Medical Research, *EJPMR, 2016,3(9), 71-76.* ISSN 3294-3211 .
6. Kouba, M.; Mourot, J. A review of nutritional effects on fat composition of animal products with special emphasis on n-3 polyunsaturated fatty acids. Biochimie, 2011, 93, 13–17
7. Azra Kamal, Physicochemical Investigation of Some Herbal Hair Oil, Int. J. Pharm. Sci. Rev. Res., 30(2), January – February 2015; Article No. 15, Pages: 93-94, ISSN 0976 – 044X
8. https://www.naturalgirlsrock.com/blogs/rockin-guest-bloggers-speak/12212729-how-to-balance-ph-in-hair-naturally
9. Joshi P, Nanda D, Nainwal P and Saini P, Standardization of herbal ayurvedic oil formulation-Ksheer Bala Taila Asian Journal of Pharmaceutical Research and Development, 11, 2013, 23- 126.

Source of Support: Nil
Conflict of Interest: None Declared

How to cite this URL: Deepti Negi et al: Physico-chemical Analysis of Maltyadi Tail. International Ayurvedic Medical Journal {online} 2021 {cited January, 2021} Available from: http://www.iamj.in/posts/images/upload/2663_2670.pdf