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Analytical Study of *Keechakadi Taila* - An Unique Formulation for Dandruff

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ABSTRACT

Due to commercialization, Ayurvedic drug industry is facing difficulties in procuring authentic raw drugs. This has made many manufacturers to adopt usage of substandard drugs which may hamper the quality of end product. Analytical study of end products plays a very important role here. It plays a role in assessing the quality and stability of the prepared medicine, which intern indicates the potency of prepared medicine. With this aim *Keechakadi Taila*, one of the unexplored formulations, mentioned by *Vangasena* under *Kshudrarogadhikara* for *Darunaka Chikitsa* containing drugs like *Keechaka*, *Sarshapa Taila* and *Gomutra* was prepared and subjected to analytical standardization. Analytical standardization of *Keechakadi Taila* was carried out by considering and analysing few essential parameters mentioned for standardization of oil in Ayurvedic Pharmacopeia of India and Laboratory Guide for the Analysis of Ayurveda and Siddha Formulations published by CCRAS. The results obtained were compared with analytical standards of base oil i.e. *Sarshapa Taila*.

Key Words *Keechakadi Taila*; *Sarshapa Taila*; *Analytical Standardization*; *Darunaka*

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INTRODUCTION

Dravya being placed second in *Chikitsa Chatuspada*¹ plays a vital role in treating any ailments. Only quality *Dravya* can act potently. Quality of *Dravya/ Kalpana* depends on various factors like nature of raw drugs procured, manufacturing process involved etc. Commercialization has resulted in use of substandard raw drugs, substandard manufacturing process etc. which definitely alter

the quality of prepared medicine. Analysis of finished product according to standard guidelines will help one to assess quality of end product, which definitely have a positive impact on disease cure rate. At the same time research carried out on analytical assessment of new formulation will help in setting a basic parameter for that particular formulation which may help the future researcher. With this aim *Keechakadi Taila* one of the unexplored formulation for

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Darunaka, mentioned under *Darunaka Chikitsa* in *Kshudrarogadhikara* of *Vangasena*² was prepared and subjected to analytical study. Few essential parameters mentioned for standardization of oil in Ayurvedic Pharmacopeia of India and Laboratory Guide for the Analysis of Ayurveda and Siddha Formulations published by CCRAS³ were referred for the same. By comparing obtained value with standard analytical value of base oil *Sarshapa Taila*, its quality was determined. Also attempt was made to set an analytical standard for *Keechakadi Taila* which may help future researcher. .

MATERIALS & METHODS

Keechakadi Taila was subjected to organoleptic, physico-chemical analysis at Sri Dharmasthala Manjunatheswara Centre for Research in Ayurveda and Allied Sciences, Udupi. The organoleptic characteristics such as colour, odour, taste, consistency were analysed soon after preparation and were noted.

Physico- Chemical Analysis: Physicochemical evaluation of *Keechakadi Taila* was carried out based on following parameters.

1. Refractive index³: Refractive index of *Keechakadi Taila* was determined to know the angle of refraction in the given sample of *Keechakadi Taila* using Abbe's refractometer. A drop of water was placed on the prism and the drive knob was adjusted in such a way that the boundary line intersected the separatrix exactly at the centre. The reading was noted. Distilled water

has a refractive index of 1.3320 at 30°C. The difference between the reading and 1.33194 gives the error of the instrument. If the reading is less than 1.3320, the error is minus (-) then the correction is plus (+). If the reading is more, the error is plus (+) and the correction is minus (-). Refractive index of oil was determined using 1 drop of the sample. The correction if any should be applied to the measured reading to get the accurate refractive index. Refractive index of the test samples was measured at 30°C.

2. Specific gravity³: Specific gravity of *Keechakadi Taila* was determined to know the density of given sample of *Keechakadi Taila* using specific gravity bottle with stopper. The specific gravity bottle was cleaned by shaking it with acetone and then with ether. The bottle was dried and the weight was noted. The sample solution was cooled to room temperature and was filled carefully to the specific gravity bottle. A stopper was inserted to remove the surplus liquid. The weight of specific gravity bottle with the sample was noted. Same procedure was repeated by using distilled water in the place of sample solution.

3. Viscosity³: Viscosity of *Keechakadi Taila* was determined using Ostwald's viscometer. The sample of *Keechakadi Taila* was filled in a 'U' shaped 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 was attained by the test liquid. The liquid was sucked or blown to the

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specified height of the viscometer and the time taken for the sample to pass the two marks was measured. Viscosity was measured using the formula

$$\eta_1 = \frac{\rho_1 t_1}{\rho_2 t_2} \times \eta_2$$

η_1 – Viscosity of sample

η_2 - Viscosity of water

t_1 - Time taken by the sample to pass the meniscus

t_2 - Time taken by the water to pass the meniscus

ρ_1 - Density of sample

ρ_2 – Density of water

X= Specific gravity of sample x 0.9961/specific gravity of water

Π = X x Time for sample x 1.004/specific gravity of water x 70sec

4. Acid value⁵: Acid value of *Keechakadi Taila* was determined to know the number of mg of potassium hydroxide required to neutralize the free fatty acid present in the oil. 2- 10g of oil was weighed in a conical flask. 50 ml of acid free alcohol-ether mixture (25 +25ml) previously neutralised with the 0.1M potassium hydroxide solution was added to it and was shaken well. 1 ml of phenolphthalein solution was added and titrated against 0.1M potassium hydroxide solution. Appearance of pale pink colour was considered as the end point. The experiment was repeated twice to get concordant values.

5. Saponification value⁵: Saponification value of *Keechakadi Taila* was determined to know the amount of free fatty acid present in the given

sample of *Keechakadi Taila* using reflux condenser. 2g of the oil was weighed and added into a 250 ml round bottom flask fitted with a reflux condenser. 25ml of 0.5M alcoholic potash was added and was refluxed on a water bath for 30 minutes. It was then cooled, added with 1 ml of phenolphthalein solution and was titrated immediately with 0.5 M hydrochloric acid ('a' ml). The above procedure was repeated by omitting the substance being examined (blank) ('b' ml). The experiment was repeated twice to get concordant values.

6. Iodine value⁵: Iodine value of *Keechakadi taila* was determined to know the weight of iodine absorbed in 100 parts of the sample of *Keechakadi taila* using Iodine flask with stopper. 0.1g of sample was accurately weighed in a dry iodine flask. It was dissolved with 10ml of CCl₄ (Carbon tetrachloride) and 20ml of iodine monochloride solution was then added. Stopper was inserted, which was previously moistened with solution of potassium iodide and flask was kept in a dark place at a temperature of about 17°C for 30 min. 15ml of potassium iodide and 100ml of water was added and shaken well. This was titrated with 0.1N sodium thiosulphate, starch was used as indicator. The number of ml of 0.1N sodium thiosulphate required ('a') was noted. The experiment was repeated with the same quantities of reagents in the same manner omitting the substance. The number of ml of 0.1N sodium thiosulphate required ('b') was noted. The experiment was repeated twice to get concordant values.

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7. **Unsaponifiable matter⁵**: Unsaponifiable matter of *Keechakadi Taila* was determined using reflux condenser. 5g of the substance/sample was weighed into the flask and 50ml alcoholic KOH was added into it. The mixture was boiled gently, steadily under reflux condenser for one hour. The condenser was washed with 10ml of ethyl alcohol and the mixture was collected and transferred to a separating funnel. The transfer was completed by washing the sample with ethyl alcohol and cold water. Altogether, 50ml of water was added to the separating funnel followed by an addition of 50ml petroleum ether. The stopper was inserted and was shook vigorously for 1 minute and was then allowed to settle until both the layers were clear. The lower layer containing the soap solution was transferred to another separating funnel and the ether extraction was repeated six more times using 50ml of petroleum ether for each extraction. All the extracts were collected in a separating funnel. The combined extracts were washed in the funnel 3 times with 25ml of aqueous alcohol and was shook vigorously, drawing off the alcohol-water layer after each washing. The ether layer was again washed repeatedly with 25ml of water until the water no longer turned pink on addition of a few drops of phenolphthalein indicator solution. The ether layer was transferred to a tarred flask containing few pieces of pumice stone and was evaporated to dryness on a water bath. The flask was placed in an air oven at 85°C for about 1 hour to remove the last traces of ether. A few ml of acetone was added and evaporated to dryness on a water bath.

It was then cooled in a desiccator to remove last traces of moisture and was then weighed.

8. **Peroxide value⁵**: Peroxide value of *Keechakadi Taila* was determined to know the level of oxidation in the given sample of *Keechakadi Taila* using conical flask. 5g of the sample was weighed accurately into a conical flask, 30 ml of mixture of 3 volumes of glacial acetic acid and 2 volumes of chloroform were added to it. It was then added with 0.5ml of potassium iodide and was allowed to stand for 1 minute. Later 30ml of water was added and was titrated gradually with vigorous shaking with 0.1M Sodium thiosulphate until the yellow colour disappeared. Lastly 0.5ml of starch indicator was added and titration was continued until blue colour disappeared. Peroxide value = $10(a-b)/W$ where W = weight in gm of the substance.

OBSERVATION AND RESULTS

Organoleptic observation: The result of organoleptic analysis of *Keechakadi Taila* is given in Table 1.

Physico-chemical analysis: The result of physico-chemical analysis of *Keechakadi taila* is given in Table 2.

DISCUSSION

Refractive index: Refractive index of *Keechakadi Taila* is slight higher than the refractive index of base oil that is *Murchitha Sarshapa Taila*. This indicates that more solutes are present in *Keechakadi Taila*. The drugs added

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during *Sarshapa Taila Murchana* and active principles of *kalka dravya* of *Keechakadi taila* might have been the reason for increased solutes.

Table 1 Results of organoleptic standardization of *Keechakadi Taila*

Sl. No	Parameters	Results
1.	Color / appearance	Reddish brown
2.	Sound	-
3.	Odor	Characteristic smell of <i>Gomutra</i> and <i>Sarshapa Taila</i>
4.	Taste	-
5.	Consistency	Liquid

Table 2 Results of standardization parameters for *Keechakadi Taila*

Parameters	Results <i>n</i> = 3 %w/w <i>Keechakadi Taila</i>
Refractive index	1.47229
Specific gravity	0.9351
Viscosity	48.30
Acid value	6.65
Saponification value	140.25
Iodine value	112.44
Unsaponifiable matter (%)	0.79
Peroxide value	0.60

Specific Gravity: Specific gravity of *Keechakadi Taila* is less than that of water. This indicates it is light oil with lesser density than that of water. Density plays an important role in absorption of oil. Lesser the density of oil more will be the rate of penetration thus faster the rate of absorption.

Viscosity: It indicates the resistance of liquid to flow. Less viscous liquid have lesser resistance offered by the solutes, so it can be absorbed faster. Viscosity of *Keechakadi Taila* was 48.30, which is much lesser than the viscosity of the base oil. This indicates that *Keechakadi Taila* has higher absorption rate.

Acid value: It indicates amount of free fatty acid present in the oil. Free fatty acids are responsible for rancidity of oil. *Keechakadi Taila* has less

acid value. This indicates that oil is of superior quality and may not rancidify easily.

Saponification Value: It indicates the average molecular weight/ chain length of fatty acids of particular *Sneha*. Greater the fatty acid chain length, lesser will be the saponification value i.e. long chain fatty acids have lower saponification value and shorter chain fatty acids have greater saponification value. Shorter the fatty acid chain length faster will be the rate of absorption. Saponification value of *Keechakadi Taila* is 140.25, which indicates it has shorter chain fatty acids and faster will be the rate of absorption. As bioavailability of the drug is least through the skin, faster absorption of the drug may increase its efficacy

Iodine value: It indicates the degree of unsaturation, intern the chance of rancidity of oil. The quality of oil i.e. adulteration can also be known by this parameter. Iodine value of *Keechakadi Taila* is 112.44, which indicates that it has more number of unsaturated fatty acids i.e. less iodine attached to oil. Oil is less reactive and more stable, lesser the chance of rancidity.

Unsaponifiable matter: Unsaponifiable matter in oil indicates stability of oil. Unsaponifiable matter of *Keechakadi Taila* is 0.79, which is least. This further confirms the stability and quality of the oil.

Peroxide value:

It is indicative of initial stage of fat/oil deterioration. Decreased peroxide value indicates the prepared oil is good, good

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preservation status. Peroxide value of *Keechakadi Taila* was 0.60, it justifies the same.

CONCLUSION

All the analytical parameters of *Keechakadi Taila* were in accordance with standard values of base oil *Murchitha Sarshapa Taila*, indicating the oil was of standard quality and there will be less chances of rancidity. Because of less chances of rancidity, the taila has developed prolonged shelf life period, the same has been observed in the study.

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