

ANALYTICAL STANDARDIZATION OF "PARADADI MALHARAM"

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ABSTRACT

Rasa Shastra is a branch of medicine which deals with preparation of drugs which deals with metals and minerals having wide range of therapeutic efficacy possessing innate qualities like quick action, less dose, tastelessness, prolonged shelf life and better palatability. *Paradadi Malharam* is one such *Rasoushadhi* mentioned in *Rasa yoga sagara* indicated in *Dustavrana*. As *ghrita* is the base of this *malhara*, standardization methods of *ghrita* are adopted in this *malhara* preparation. In the current study *Paradadi Malharam* was analyzed through Refractive index at 40⁰c, Acid value, Saponification value, Iodine value, Peroxide value. Refractive index at 40⁰c is 1.46965, Acid value is 5.42, Saponification value is 209.8, Iodine value is 51.4, Peroxide value is nill. The detailed analytical study of *Paradadi Malharam* will be discussed in the full paper.

Keywords: *Paradadi Malharam*, Refractive index at 40⁰c, Acid value, Saponification value

INTRODUCTION

Ayurvedic drugs are time tested for their efficacy and need no validation for their administration to patients. But, in present era there is change in mind set of patients. Safety of the drug to be administered is at par with its efficacy. The aim of an analytical study is to enable prediction about how a change in a system will affect that system's future performance or prediction as to which plans or strategies for future action on the system will be superior. It gives us valuable information about safety, efficacy, stability, and contraindications etc of any formulation. Here standardization methods of *ghrita* are adopted to standardize the present preparation *Paradadi Malharam* because *ghrita* was taken as base. Shelf life,

rate of decomposition, adulteration, stability etc can be assessed through Refractive index, Acid value, Saponification value, Iodine value, Peroxide value.

Pharmaceutical process

The pharmaceutical processes involved in the preparation of *Paradadi Malharam* are *Shodhana*, *Mardana*, *Malhara nirmana*. *Shodhana* is done for *Parada*¹, *Gandhaka*,² *Mriddarashringa*³, *Kampillaka*⁴, *Tuttha*⁵. *Mardana* is done for making all the *Shodita* materials into homogeneous mixture. Homogeneous mixture was added to molten *Goghrita* in *Khalwa yantra* and triturated up to the *Malharam* consistency⁶.

After completion of Pharmaceutical

process, the final drug *Paradadi Malharam* was subjected to analysis through Refractive index at 40⁰c, Acid value, Saponification value, Iodine value, Peroxide value.

Materials and Methods:

Double distilled Mercury (*Parada*), crystals of sulphur (*Gandhaka*) and Copper sulphate (*Tuttha*) were obtained from local market of Tirupati. Litharge (*Mriddarashringa*) was procured from TTD'S S. S. Ayurveda Pharmacy, Tirupati. Good quality of *Kampillaka* was procured from Ram Mohana Ayurveda pharmacy, Vijayawada. Ghee was procured from the village Pedda Tippa Samudram, Chittor district. Analytical tests were done at Bangalore Test House, Bengaluru.

Refractive Index at 40⁰ c:

Definition:

The refractive index of a substance is the ratio of the sine of the angle of incidence to the sine of the angle of refraction. In other words, it is the ratio of the velocity of the light in vacuum to the velocity in the substance or a chosen media.

The refractive index of a substance with reference to air is the ratio of the sine of angle of incidence to the sine of angle of refraction of a beam of light passing from air into the substance. It varies with the wavelength of the light used in its measurement. Refractive Index (n) of a substance is the ratio of the velocity of light in vacuum to its velocity in the substance. Unless otherwise prescribed the refractive index is measured at 25⁰C with reference to the wavelength of the D line of Sodium (=589.3 nm). The temperature should be carefully adjusted and maintained since the refractive index varies significantly with temperature. The R.I of oil is usually determined at 40⁰C. The Abbs Refractometer is convenient for most mea-

surement of refractive index but other Refractometer of equal or greater accuracy may be used. Commercial Refractometers are normally constructed for use with light but are calibrated to give the refractive index in terms of the D line of Sodium light.

Procedure:

The proper calibration of a certain Refractometer is made by means of a suitable standard. Glass prisms of known refractive indices are available for instrument suppliers. Liquid standards are also provided after making sure that the prisms are clean. Place a few drops of the dry sample on the lower prism of the Refractometer. Close the prisms tightly and allow a short time for the sample to reach the temperature of the instrument and then read the refractive index. The fat should be removed after each examination with a small swab of cotton saturated with a suitable solution such as toluene etc.

Acid value:

The acid value of an oil or fat is defined as the number of milligrams of Potassium Hydroxide required to neutralize the free acid in one gram of the sample.

Procedure:

Mix 25ml of ether with 25ml of alcohol (95%) and 1 ml of 1% Phenolphthalein solution and neutralize with N/10 alkali (few drops). Dissolve about 5 gm of the fat or oil accurately weighed in the mixed neutral solvent and titrate with N/10 Potassium (or Sodium) Hydroxide, shaking constantly until a pink color which persists for fifteen seconds is obtained.

$$\text{Acid value} = \frac{\text{No. of ml of N/10 alkali used} \times 5.61}{\text{weight of sample in grams}}$$

Titration should preferably not exceed about 10 ml. The free fatty acid calcu-

lated as oleic acid % (1ml N/10) alkali = 0.028 g. oleic acid).

Saponification value:

The saponification value of an oil or fat is defined as the number of milligrams of Potassium hydroxide required to neutralize the fatty acids resulting from the complete hydrolysis of 1gram of the sample.

Procedure:

Weigh 2grm of the oil or fat into a conical flask and add exactly 25 ml of the alcoholic Potassium hydroxide solution. Attach a reflex condenser and heat the flask in boiling water for 1hr, shaking frequently. Add 1 ml of Phenolphthalein (1%) solution and titrate excess alkali with N/2 Hydrochloric acid (titration=a ml) and carry out a blank at the same time (titration=b ml).

$$\text{Saponification value} = \frac{(b-a) \times 56.1}{\text{weight of sample in grams}}$$

Iodine value:

The iodine value of an oil or fat is the weight of iodine absorbed by 100 parts by weight of the sample; it is determined by the following method.

Iodine monochloride method (Wij's method):

Place the sample accurately weighed in a dry iodine flask of 250 ml capacity, add 10 ml of carbon tetrachloride and dissolve. (The approximate weight in grams of the sample to be taken may be calculated by dividing 20 by the highest expected Iodine value). Add 10 ml of Chloroform and 20 ml of Iodine mono-chloride solution, insert the stopper previously moistened with Potassium iodide solution and allow standing in a dark place at a temperature of about 17°C for 30 minutes. Add 15 ml of Potassium iodide solution and 100 ml of water shake and titrate with N/10 Sodium thio-sulphate

using starch mucilage as indicator. Note the number of ml required (a). At the same time carry out the operation in exactly the same manner, but without the sample being tested, and note the number of ml. N/10 Sodium thio – sulphate required (b).

$$\text{Iodine value} = \frac{(b-a) \times 0.01269 \times 100}{\text{weight of sample in grams}}$$

Method 2:

Iodine Monochloride method – Place the substance accurately weighed, in a dry iodine flask, add 10 ml of carbon tetrachloride and dissolve. Add 20 ml of Iodine monochloride solution insert the stopper previously moistened with solution of potassium iodide and allow it stand in a dark place at temperature about 17°C for thirty minutes. Add 15 ml of solution potassium iodine and 100ml water. Shake and titrate with 0.1 N sodium thio sulphate, using solution of starch as indicator. Note number of ml 0.1 N sodium thio sulphate ml required. (a)

At the same time carry out the operation in exactly the same manner, but without the substance being tested and note the number of ml (b)

$$\text{Iodine value} = \frac{(b-a) \times 0.01269 \times 100}{W}$$

Where " W " is the weight in gram of the substance taken.

Peroxide value:

The peroxide value is the number of milli equivalents of active oxygen that expresses the amount of peroxide contained in 1000 g of the substance.

Method: Unless otherwise specified in the individual monograph ,weigh 5g of the substance being examined, Put into a 250-ml of glass – stoppered conical flask ,add 30 ml of a mixture of 3 volumes of glacial acetic acid and 2 volumes of chloroform ,swirl until dissolved and add 0.5 ml vo-

lumes of saturated potassium iodide solution. Allow to stand for exactly 1 minute, with occasional shaking, add 30 ml of water and tritrate gradually, with continuous and vigorous shaking, with 0.01M sodium thiosulphate until the yellow colour almost disappears. Add 0.5 ml of starch solution and continue the titration, shaking vigorously until the blue colour disappears (a ml). Re-

peat the operation omitting the substance being examined (b ml). The volume of 0.001M sodium thiosulphate in the blank determination must not exceed 0.1 ml.

Calculate the peroxide value from the expression:

$$\text{Peroxide value} = 10(a-b)/w$$

Where w = weight in grams of the substance.

RESULTS OF ANALYTICAL STUDY ON PARADADI MALHARAM:-

S.NO	NAME OF THE TEST	RESULT OBTAINED
1.	Refractive index	1.46965
2.	Acid value	5.42
3.	Saponification value	209.89
4.	Iodine value	51.4
5.	Peroxide value	Null

DISCUSSION

Refractive index:

The refractive index of a medium is a measure for how much the speed of light (or other waves such as sound waves) is reduced inside the medium. It is the ratio of the velocity of light in a vacuum to its velocity in the substance. Refractive index is a fundamental physical property of a substance often used to identify a particular substance, Confirm its purity or measure its concentration. Refractive index is used to measure solids, liquids and gases. Most commonly it is used to measure the concentration of a solute in an aqueous solution. A refractometer is the instrument used to measure refractive index. More will be the Refractive index; there will be more concentration of light which facilitates rancidification of *ghrita* i.e decomposition of *ghrita*. Refractive index of *paradadi Malharam* was 1.46965. This indicates the stability of *Paradadi Malharam*.

Acid Value:

The Acid number is a measure of the amount of carboxylic acid groups in a chemical compound, such as fatty acids or in a mixture of compounds. The Acid number is used to quantify the amount of acid present. In this study the results of determination of Acid Value indicate that Acid value of *Paradadi Malahara* was 5.42.

Saponification value:

The amount of alkali needed to saponify a given quantity of fat will depend up on the number of -COOH group present. The long chain fatty acids found in fats have low saponification value because they have relatively less number of Carboxylic functional groups per unit mass of the fat as compared to short chain fatty acids. Saponification value is directly proportional to the fatty matter content. More the fatty matter content there will be the more chances of rancidity factor and less will be the shelf life and therapeutic value. In this study, *Paradadi Malharam* Saponification value was 209.89.

Iodine value:

The determination of Iodine number is useful to the chemist in determining the quality of oil or whether it is free from adulteration. Iodine number is also a measure of the degree of unsaturation of fat. The more Iodine number, more are unsaturated fatty acid bonds present. This indicates that more number of double bonds in the *ghrita*. The more iodine is attached, the higher is the value of its being more reactive, less stable, softer and more susceptible to oxidation and rancidification with *ghrita*. The result reported by this study for *Paradadi Malharam* is 51.4.

Peroxide value:

The peroxide value is defined as the amount of peroxide oxygen per 1 Kilogram of fat or oil. The peroxide value of an oil or fat is used as a measurement of the extent to which rancidity reactions have occurred during storage. The double bonds found in fats and oils play a role in autoxidation. Oils with high degree of unsaturation are most susceptible to autoxidation. The best test for autoxidation (oxidative rancidity) is determination of the peroxide value. Peroxides are intermediates in autoxidation reaction. Autoxidation is a free radical reaction involving oxygen that leads to deterioration of fats and oils which form off-flavors and off-odours. Peroxide value, concentration of peroxide in an oil or fat, is useful for assessing the extent to which spoilage has advanced. Peroxide value of *Paradadi Malharam* was nill. Due to presence of *Kaj-*

jali shelf life may be increased as per our *Ayurvedic classics*. Peroxide value of *Paradadi Malharam* is showing the scientific evidence for shelf life.

CONCLUSION

Paradadi Malharam was subjected to standardization methods of *ghrita* as *ghrita* is base of *malhara* to check its shelf life, rate of decomposition, Adulteration and stability of drug. Refractive index of *Paradadi Malharam* is 1.46965, Acid value is 5.42, Saponification value is 209.89, Iodine value is 51.42, Peroxide value is nill. We can conclude that *paradadi Malharam* is safe and efficacious drug with good shelf life.

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