

## PHARMACEUTICO-ANALYTICAL STUDY ON TRIVIDHA SNEHA PAAKA OF FENUGREEK OIL

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### ABSTRACT

*Sneha Paaka Kalpana* is prepared by using oil with some decoctions or other liquids and paste of the drugs by heating method. There are several types of *Sneha Paaka* stages mentioned in Ayurveda. Among them, *Mridu Paaka*, *Madhyama Paaka* and *Khara Paaka* are recommended for therapeutic use. Furthermore, features and uses of these stages were mentioned in Ayurveda. But, features of relevant oil samples were not mentioned in Ayurveda. Fenugreek oil is one of the medicated oil which was mentioned in *Sneha Shatakaya* and it was recommended for both internal and external purposes. Purpose of this study was aimed to identify and study the organoleptic characters and physicochemical properties of *Trividha Sneha Paaka* of Fenugreek oil separately and comparatively. In this study prepared Fenugreek oil was studied morphologically to identify color, odor and taste. Then analyse the each sample in laboratory to find out pH, loss on drying, density, conductivity, acidity, peroxide value, saponification value and TLC. Morphological study revealed the taste and smell of all three samples are similar and color of all three samples is gradually darkened from *Mridu Paaka* to *Khara Paaka* oil sample. According to the analytical data; pH value of all *Sneha Paakas* is same. Moisture content, conductivity and saponification value of *Mridu Paaka* are higher than *Khara Paaka*. Density, free fatty acid value and peroxide value of *Khara Paaka* are higher than *Mridu Paaka*. Therefore, it can be concluded that; there are major differences between three *Paaka* stages of Fenugreek oil and knowledge of these differences are most important in clinical practice.

**Keywords:** Medicated oil, *Sneha Shatakaya*, Fenugreek oil, clinical practice.

### INTRODUCTION

Standardization of herbal formulations is essential to assess quality of drug. It is based on the concentration of their active ingredients, physical, chemical, phytochemical parameters. The quality assessment of herbal

formulations is important to justify their acceptability and safety. One of the major problems faced by the Ayurveda physicians is the unavailability of unique quality control parameters for herbal medicines and their formulations. Ayurveda practitioners

need to explore the medicinally important plants. This can be achieved only if the herbal products are evaluated and analysed using sophisticated modern techniques of standardization. Therefore, in this situation a practical approach was taken to do an analytical study of the *Paaka* stages of selected medicinal oil in terms of standardization.

Fenugreek oil is an important traditional drug widely used for specially *Bala roga* in Sri Lankan traditional medical system. It is an herbo-mineral preparation was mentioned in one of Sri Lankan indigenous medical book '*Sneha Shatakaya* or *Beheth Tel Pota*'.<sup>1</sup> It contains ten herbs and one mineral as ingredients of *Kalka Dravya* (paste). Sesame oil is the base oil of the Fenugreek oil and *Trigonella foenum graecum* Linn. (Fenugreek seeds) is used to prepare the *Kwatha* for *Sneha Paaka*.<sup>2</sup> According to the *Sneha Shatakaya* it can use for the various kind of disorders like Malnutrition, Anthelmintic diseases, Skin diseases, *Jwara* and *Ajeerna* in mainly infants and children.<sup>3</sup>

## OBJECTIVE

To identify and study the organoleptic characters and physicochemical properties of *Trividha Sneha Paaka* of Fenugreek oil.

## MATERIALS AND METHODS

### Pharmaceutical Preparation of Fenugreek Oil

#### Collection of ingredients

Dried plants of materials were purchased from a local Ayurveda pharmacy and their authenticity was confirmed by comparing them with the herbarium specimen at the museum of *Dravyaguna Vignana* at Gampaha Wickramarachchi Ayurveda Institute, University of Kelaniya, Sri Lanka.

#### Preparation of Sesame Oil

The oil needed for the preparation of Sesame oil was obtained from black sesame seeds by using an oil speller.

#### Preparation of Fenugreek Oil<sup>4,5</sup>

The reference samples of *paaka* stages of Fenugreek Oil was prepared at the primary pharmaceutical manufacturing pharmacy according to the classical text *Sneha Shatakaya*.

Table 1: List of Ingredients of Fenugreek oil

S. N.	Sanskrit Name	Botanical (Scientific) Name	Quantity
01	<i>Methi / Uluwa Seeds</i>	<i>Trigonella foenum - graecum</i> Linn.	750g
02	<i>Ajamoda</i>	<i>Trachyspermum roxburghianum</i>	17g
03	<i>Madhuka</i>	<i>Glycyrrhiza glabra</i> Linn.	17g
04	<i>Lavanga</i>	<i>Eugenia caryophyllata</i> Thumb.	17g
05	<i>Jaatiphala</i>	<i>Myristica fragrans</i> Houttuyn	17g
06	<i>Vidanga</i>	<i>Embelica ribes</i> burm	17g
07	<i>Tutthaka / Palmanikkam</i>	<i>Purified Copper sulphate</i>	17g
08	<i>Lashuna</i>	<i>Allium sativum</i> Linn.	17g
09	<i>Jaatiphala (Vasavasi)</i>	<i>Myristica fragrans</i> Houtt.	17g

10	<i>Dhaanyaka</i>	<i>Coriandrum sativum</i> Linn.	17g
11	<i>Pippali</i>	<i>Piper longum</i> Linn.	17g
12	<i>Jeeraka</i>	<i>Cuminum cyminum</i> Linn.	17g
13	<i>Tila</i>	<i>Sesamum indicum</i> Linn.(oil)	750ml

- The formulation composition was provided as mentioned in table no.1. Sesame Oil was taken in vessel heated over low flame till complete evaporation of moisture, *Kalka* was added and followed by addition of *Kwatha* (Decoction).
- Heating was continued maintain the temperature with continuous stirring and it was continued till *Sneha Siddhi Lakshanas* (Characteristic end points of medicated oil preparations) observed pertaining to the *Khara paaka*, *Madhya paaka* and *Mridu paaka*.
- The contents were removed from observation of *Sneha Siddhi Lakshana* and filtered through clean cotton cloth while hot. The processed oil samples were stored in glass jar after cooling.

#### Pharmacognostic Study of Fenugreek Oil<sup>6</sup>

The Pharmacognostic study was done according to the guidelines of analytical methods of Palm Oil Research Institute of Malaysia (PORIM) and guidelines and

#### Determination of Organoleptic Properties

Table 2: Organoleptic Characters of Three *Paaka* Stages of Fenugreek Oil

Test	<i>Mridu Paaka</i>	<i>Madhya Paaka</i>	<i>Khara Paaka</i>
Taste	<i>Katu</i>	<i>Katu</i>	<i>Katu</i>
Color	Green	Brown	Black (Dark Brown)
Odor	Strong Peculiar	Strong Peculiar	Strong Peculiar

This table denotes organoleptic properties of three samples of Fenugreek Oil. According to that taste and smell of all three samples

recommendations of Central Council for Research in Ayurveda and Siddha (CCRAS). According to that, following analysis was done in the laboratory.

#### Determination Organoleptic Characters

Organoleptic characters were determined as subjective parameters such as color, odor, taste and consistency of the formulation was noted under these.

#### Determination Physiochemical Parameters

As objective parameters pH value, Moisture contents, Conductivity, Density, Acidity (Free Fatty Acid value), Peroxide value and Thin Layer Chromatography (TLC) were studied in the Science laboratory of University of Kelaniya in Sri Lanka.

#### RESULTS

According to the standardization point of view, the analytical values of three stages of Fenugreek Oil given in tables, it can be used as preliminary reference standards for market samples of these oils.

are similar. But Color of all three samples is gradually darkened from *Mridu Paaka* to *Khara Paaka* oil sample.

## Determination of Physicochemical Parameters<sup>7</sup>

### 1. Determination of pH, Loss on Drying and Conductivity

Table 3: pH, Loss on Drying and Conductivity of Three Paaka Stages of Fenugreek oil

Test	<i>Mridu Pāka</i>	<i>Madhya Paaka</i>	<i>Khara Paaka</i>
Determination of pH	6.0	6.0	6.0
Determination of Loss on Drying	5.8%	1.39%	0.40%
Determination of Conductivity <sup>(8)</sup> (at 25 <sup>0</sup> C)	0.04μs	0.04μs	0.03μs

This table denotes Loss on drying and pH values of three oil samples. According to that pH value of all three samples are

similar. But Loss on drying values of all three samples is gradually decreased from *Mridu Paaka* to *Khara Paaka* oil sample.

### 2. Determination of the Density (Weight/ml)

Table 4: Determination of the Density of Three Pāka Stages of Fenugreek oil

Stage of Pāka	Density			Mean Value
	Sample 1	Sample 2	Sample 3	
<i>Mridu Paaka</i>	0.9206	0.9342	0.9249	0.9265Kgm <sup>-3</sup>
<i>Madhya Paaka</i>	0.9362	0.9397	0.9384	0.9381Kgm <sup>-3</sup>
<i>Khara Paaka</i>	0.9429	0.9506	0.9594	0.9509Kgm <sup>-3</sup>

This table denotes Density of three oil samples. According to that density of all three samples are gradually increased from *Mridu Paaka* to *Khara Paaka* oil sample. It explained as the weight of water and volatile

parts are less than medicated oil. When heat it further water and volatile parts of Fenugreek Oil are vaporized. So, therefore density is increased.

### 3. Determination of Free Fatty Acid (Acidity)

Table 5: Free Fatty Acid Values of Three Paaka Stages of Fenugreek Oil

Stage of Paaka	Free Fatty Acid (Acidity)			Mean Value
	Sample 1	Sample 2	Sample 3	
<i>Mridu Paaka</i>	1.41	1.523	1.34	1.424mg KOH/g oil
<i>Madhya Paaka</i>	2.605	2.23	2.869	2.568mg KOH/g oil
<i>Khara Paaka</i>	3.652	3.102	3.359	3.371mg KOH/g oil

This table denotes acid number of three Paaka stages of Fenugreek oil. According to that acid number of *Khara Paaka* oil sample

is higher than others. So, Therefore, *Khara Paaka* oil sample contains high level of free fatty acid than other samples.

#### 4. Determination of Peroxide Value

Table 6: Peroxide Values of Three Paaka Stages of Fenugreek Oil

Stage of Paaka	Peroxide Value			Mean Value
	Sample 1	Sample 2	Sample 3	
<i>Mridu Paaka</i>	0.4	0.2	0.2	0.2666mEq/Kg
<i>Madhya Paaka</i>	1.012	0.8	1.2	1.004mEq/Kg
<i>Khara Paaka</i>	2	2.6	2	2.2mEq/Kg

This table denotes peroxide values of three oil samples. According to that peroxide values of all three samples are gradually increased from *Mridu Paaka* to *Khara*

*Paaka* oil sample. And also peroxide value of *Khara Paaka* oil sample is 10 times higher than *Mridu Paaka* oil sample. But all are not in rancid taste.

#### 5. Determination of Saponification Value

Table 7: Saponification Values of Three Paaka Stages of Fenugreek Oil

Test	<i>Mridu Paaka</i>	<i>Madhya Paaka</i>	<i>Khara Paaka</i>
Determination of Saponification Value	231.5923	178.5	156.6243

This table denotes saponification value of three *Paaka* stages of Fenugreek Oil. According to that the Saponification value of *Mridu Paaka* is higher than *Khara Paaka*. So, therefore, *Mridu Paaka* oil sample contains high level of fat than other samples.

#### Thin Layer Chromatography (TLC)<sup>9,10</sup>

Percolated normal phase TLC plates. (7 × 3 cm) were used and oil portions of three *Paaka* stages were separately dissolved in n – Hexane. Dissolved oil was then spotted into the TLC plates separately using capillary tubes. The plates were run in the mixture of solvent MeOH/ CH<sub>2</sub>Cl<sub>2</sub> (1: 9) as mobile phase with normal saturation. The developed TLC plates were then observed by dipping in an iodine bath. According to the TLC results, clear spots were not obtained for all the 3 oil *Paaka* stages. It was due to some impurities dissolved in the oil.

#### DISCUSSION

The pH value of the *Mridu Paaka*, *Madhya Paaka* and *Khara Paaka* of Fenugreek oil is same. They were in the acidic range. pH value was determined by using Litmus papers, but one can get more accurate results by using pH meter. The acidic pH gives a protective acid mantle on the skin that provides natural defense against the environment by using the *Khara Paaka*.

Drying is basically defined as the decreasing of moisture content, aimed at preventing enzymatic and microbial activity, and consequently preserving the product for extend shelf life. The results of the moisture content of *Mridu Paaka* > *Madhya Paaka* > *Khara Paaka* stated as follows. According to the results shelf life is long in *Khara Paaka* and short in *Mridu Paaka*.

Conductivity depends on the concentration of movable charge ions. Oils are normally

only slightly conductive and therefore can work as insulators. However, oils can also conduct electric current. Their conductivity is dependent on several different factors, including the base oil, additives and polarity. The values of conductivity of the three stages are more similar to each other.

The mean value of density is *Khara Paaka* > *Madhya Paaka* > *Mridu Paaka*. Herbal oil which is used for external application should have certain properties which make it suitable to be used during a massage.

The Saponification value of *Mridu Paaka* > *Madhya Paaka* > *Khara Paaka*. The long chain fatty acids found in fats have a low saponification value because they have a relatively fewer number of carboxylic functional groups per unit mass of the fat as compared to short chain fatty acids.

The free fatty acid (Acidity) values of three *Paaka* stages of Fenugreek oil are *Khara Paaka* > *Madhya Paaka* > *Mridu Paaka*. The acid value is a common parameter in the specification of oils. An increment in the amount of FFA in a sample of oil indicates hydrolysis of triglycerides. According to the above results *Mridu Paaka* of Fenugreek oil shows the lowest value of free fatty acid. It is used as an internal pharmaceutical in the treatment in the *Pandu Roga*. But it cannot be harmful because of the lower free fatty acid level.

The peroxide values of three *Paaka* stages of Fenugreek oil are *Khara Paaka* > *Madhya Paaka* > *Mridu Paaka*. If Peroxide value is high, the skin irritation coefficient will consequently increase. According to the results *Khara Paaka* has the highest value of the peroxide. It is mostly used for the external application. So it is very important

to set a standard peroxide value to this and minimize the side effects arising from that.

The three *Paaka* stages of Fenugreek oil were analysed for their physicochemical properties and some parameters required by WHO. The observations were as shown in table.

Thin Layer Chromatography (TLC) studies of the oils were considered more useful to find the presence of the various chemical compounds of the plants used in the oils, either in their native form or as artifacts. None of the oil types were purified before run a TLC. Therefore clear spots were not obtained and they were observed as a narrow strip. However the results indicated the polarity of the compounds of 3 stages of *Paaka*.

From the standardization point of view, the analytical values of three stages of Fenugreek oil given in the table, it can be used as a preliminary reference standards for market samples of these oils. Since these values are mostly related to the purity of these oils.

## **CONCLUSION**

According to the results, there is a difference between colors of three oil samples. Moisture content of all three samples is gradually decreased from *Mridu Paaka* to *Khara Paaka*. Density of all three samples are gradually increased from *Mridu Paaka* to *Khara Paaka*. Acid number of *Khara Paaka* oil sample is higher than others. Peroxide values of all three samples are gradually increased from *Mridu Paaka* to *Khara Paaka*. Saponification value of *Mridu Paaka* is higher than *Khara Paaka*. Other parameters of all three oil samples are similar. Therefore, it can be concluded that;

there are major differences between three samples of *Paaka* stages of Fenugreek oil and knowledge of these differences are most important in clinical practice.

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