

## VARIATION OF ORGANOLEPTIC AND PHYSICO-CHEMICAL PARAMETERS OF TRIPHALA KWATHA (TK) KEPT UNDER 03 STORAGE METHODS – A PRELIMINARY STUDY

Liyanage R. P.\*<sup>1</sup> and Weerasekara S.<sup>2</sup>

<sup>1</sup>Lecturer (Temporary), Gampaha Wickramarachchi Ayurveda Institute, University of Kelaniya, Yakkala, Sri Lanka.

<sup>2</sup>Lecturer (Probationary), Department of Allied Sciences, Institute of Indigenous Medicine, University of Colombo, Rajagiriya, Sri Lanka.

Received date: 09 August 2019

Revised date: 30 August 2019

Accepted date: 20 September 2019

\*Corresponding author: Liyanage R. P.

Lecturer (Temporary), Gampaha Wickramarachchi Ayurveda Institute, University of Kelaniya, Yakkala, Sri Lanka.

### ABSTRACT

*Triphala kwatha* (TK) is one of the most popular poly herbal formulations (A collection of *Embelica officinalis*, *Terminalia bellerica* and *Terminalia chebula*) prescribed by the Ayurveda practitioners in Sri Lanka due to its precious medicinal properties, high effectiveness and convenience of administration. But *kwatha* preparations are advised to use when it is freshly prepared due to its short shelf life. As per the text *Yogaratanakara*, the shelf life/ stability period of *kwatha* is 03 hours. But due to the inconvenience of preparing *kwatha*, specially the TK at every time before consumption, various storage methods are advised to the patients by the practitioners at least to maintain the quality parameters i.e. appearances, taste, smell etc of the drug. The study was conducted to reveal the variations in both organoleptic and physico-chemical parameters including color, odor, taste, pH, viscosity, specific gravity, total solid content, refractive index, and optic rotation of TK according to the time from its manufactured date. The drug was studied in triplicates by keeping them under the room temperature (TK- RT), refrigerating temperature (TK - Ref) and adding sugar up to the syrup form (TK - Sug). Organoleptic parameters tested in the sample TK - RT i.e colour, taste and odor has shown remarkable variances when comparing them with the samples of TK - Ref and TK - Sug according to the time from date of manufacture. In physico-chemical parameters, TK-RT depicted remarkable variances in; pH by becoming more acidic, a gradual increment of specific gravity and moderate increment of viscosity; as well, changes in refractive index, total solid content and optic rotation in each sample was comparatively less.

**KEYWORDS:** *Thriphala Kwatha*, Physico-chemical parameters, Organoleptic parameters.

### INTRODUCTION

Literature of Ayurveda pharmaceuticals has mentioned five fundamental dosage forms namely *Swarasa kalpana* (Fresh juice), *Kalka kalpana* (Herbal paste), *Kwatha kalpana* (Herbal decoction), *Hima kalpana* (Cold water infusion) and *Phanta kalpana* (Hot water infusion).<sup>[1]</sup> Out of the named fundamentals *Kwatha kalpana* can be recognized as one of the extensively used and most accepted liquid dosage forms among the Ayurveda practitioners in Sri Lanka. *Acharyas* have indicated this particular dosage form in almost all sort of disease.<sup>[2,3]</sup>

Among the various *kwatha* preparations, *Triphala kwatha* (TK) is one of the trendiest and widely used poly herbal formulations (A collection of *Embelica officinalis*, *Terminalia bellerica* and *Terminalia chebula*) prescribed by the Ayurveda practitioners in Sri Lanka due to its

precious medicinal properties,<sup>[4]</sup> high effectiveness and convenience of administration.<sup>[5]</sup>

According to Ayurveda pharmaceuticals, *kwatha* preparations are advised to prepare freshly and use due to its short shelf life. As per the text *Yogaratanakara*, the shelf life/ stability period of *kwatha* is 03 hours.<sup>[2]</sup> But due to the inconvenience of preparing *kwatha* at every time before consumption, various storage methods are advised to the patients by the practitioners at least in order to maintain the quality parameters i.e. appearances, taste, smell etc of the drug.

As TK has more vulnerability to become defective, patients should be advised thoroughly regarding the method of storage. The easiest way to store the drug is keeping it under the room temperature. But the most

frequent complaint of the patients regards to TK kept under room temperature is, that it is difficult to preserve till the next clinic in 7 days as the *kwatha* tend to change in the appearance, taste, smell etc. after some time. Therefore, the practitioners get used to advise them to keep the drug under the refrigerating temperature or add sugar up to the syrup form and boil.

There is no any significant storage method identified to preserve TK at least for a period of 7 days without getting defective and no any scientifically proven data found regards to the variations of its organoleptic and physico-chemical parameters in each storage method from the date of manufacture.

Therefore, this study was mainly conducted to reveal the variations of organoleptic and physicochemical parameters of TK kept under the mostly used 03 storage methods.

### Objectives

To determine and compare the variances of Organoleptic parameters i.e. is colour, odor and taste of TK kept under room temperature, refrigerating temperature and adding sugar up to the syrup form from the date of manufacture

To determine and compare the variances of Physicochemical parameters i.e. is PH, Specific Gravity, Total Solid Content, Viscosity, Refractive Index and Optic rotation of TK kept under room temperature, refrigerating temperature and adding sugar up to the syrup form from the date of manufacture

### METHODOLOGY

Preparation of Samples: Three different samples were used in triplicates.

Sample 1 was named as TK - RT (*Kwatha* kept in Room Temperature)

Sample 2 was named as Tk - Ref (*Kwatha* kept in Refrigerator)

Sample 3 was named as TK - Sug (*Kwatha* with added sugar)

TK - RT: kept at normal room temperature for five consecutive days continuously. In each day the sample was run through the physico-chemical assay.

TK - Ref: Decoction was kept at 8 °C in the refrigerator for five consecutive days continuously. In each day the sample was run through the physico-chemical assay

TK - Sug: For the sample, 1200 ml in TPL decoction was mixed with 600 ml of melted sugar and boiled until reached to 600 ml of final product with continuous stirring. 7 The preparation was studied for five consecutive days continuously for physico-chemical assay.

### Color Examination

5 ml of each sample were taken into watch glasses and placed against white background in white tube light. The observation was done by naked eye.<sup>[6]</sup>

### Odor Examination

02 ml of each sample was smelled individually. The time interval among two smelling was kept 2 minutes to nullify the effect of previous smelling.<sup>[6]</sup>

### Taste Examination

A pinch of each sample were taken and examined separately for taste on taste buds of the tongue. The time interval among each sample was kept about 15 min., so as to make the taste buds available fresh every time.<sup>[6]</sup>

### Determination of pH

Placed an accurately measured 10 ml of each sample in a 100 ml volumetric flask and made up the volume up to 100 ml with distilled water. The solution was sonicated for about 10 minutes. pH was measured with the help of digital pH meter in homogeneously; considering on temperature.<sup>[6]</sup>

### Specific gravity at 25°C

A thoroughly clean and dry Pycnometer was selected and calibrated by filling it with recently boiled and cooled water at 25°C and weighing the contents. Assuming that the weight of 01 ml of water at 25°C; weighed in air of density 0.0012 g/ml was 0.99602 g. The capacity of the Pycnometer was calculated. Adjusting the temperature of the samples to about 20°C and the Pycnometer was filled with it. Then the temperature of the filled Pycnometer was adjusted to 25°C, any excess sample was removed and weight was taken. The tare weight of the Pycnometer was subtracted from the filled weight. The weight per milliliter was determined by dividing the weight in air, expressed in g, of the quantity of decoction which fills the Pycnometer at the specified temperature, by the capacity expressed in ml, of the Pycnometer at the same temperature. Specific gravity of the sample was obtained by dividing the weight of the decoction contained in the Pycnometer by the weight of water contained, both determined at 25°C.<sup>[7]</sup>

### Total Solid Content

Taken an evaporating dish and dried it using hot air oven at 105 °C till constant weight and noted down the weight of evaporating dish. The samples with 5 ml of TPL decoctions were inoculated to the evaporating dishes homogeneously. All the evaporating dishes were reweighed with samples. The samples were evaporated using a water bath at 99 °C. After the sample getting solidified, the dishes were transferred to the hot air oven at 105 °C. After four hours, evaporating dishes were transferred in a desiccator with Silica Gel for cooling for one hour and reweighed. The hot air oven steps were repeated to have a constant weight. All the weights were normally measured at capable of 0.0001g accuracy, using digital chemical balance. The final weights of

evaporating dishes with solids were measured and total dissolved solids were calculated using a formula.<sup>[5]</sup>

$$\text{Total Solid Content (g/L)} = 1000 \text{ ml} \times 0.1L (W_f - W_e)/5$$

$W_f$  = Final weight (at the constant weight)

$W_e$  = Empty weight of evaporating dish

#### Determination of Refractive Index

Placed an accurately measure amount 01 ml of samples on the cleaned and dried testing platform. The refractive index was measured with the help of digital refractometer in homogenously; considering on temperature.<sup>[8]</sup>

#### Determination of Optic Rotation

The sample cell of the polarimeter was filled with sample TPL decoctions homogenously and the optical rotation was carried out using Digital polarimeter with considering the temperature and  $\lambda = 589 \text{ nm}$ .<sup>[8]</sup>

#### Determination of Viscosity

Placed an accurately measure amount 600 ml of samples in a 1000 ml Viscometer utensil. Viscosity was measured with the help of digital Viscometer in homogenously; considering on temperature at  $27.5 \pm 0.5 \text{ }^\circ\text{C}$ , 60 rpm, m Pa's as  $2.0 \pm 0.2$  and spindle size as L.<sup>[8]</sup>

#### Data Collection

Data were collected homogenously in triplicates in each test. The mean values of each result were evaluated as the final result.

#### RESULTS

Table 01: depicts the mean qualitative value of organoleptic variances occurred in each sample according to the time. Mean quantitative value of physico-chemical properties are shown in Table 02.

**Table 01: Stability studies through organoleptic parameters.**

Parameter	Time duration	TK-RT	TK-Ref	TK-Sug
Color	Day - 01	Brownish	Brownish	Dark Brownish
	Day - 02	NC	NC	NC
	Day - 03	SC	NC	NC
	Day - 04	C	NC	NC
	Day - 05	C	NC	NC
Odor	Day - 01	Herbal Decoction	Herbal Decoction	Less than Herbal Decoction
	Day - 02	NC	NC	NC
	Day - 03	SC	NC	NC
	Day - 04	C	NC	NC
	Day - 05	C	NC	NC
Taste	Day - 01	Acrid	Acrid	Sweetish Acrid
	Day - 02	NC	NC	NC
	Day - 03	SC	NC	NC
	Day - 04	C	SC	NC
	Day - 05	C	SC	SC

NC = No Changed, SC = Slight Changed, C = Changed

**Table 02: Stability studies through Physico-chemical parameters.**

Parameter	Time Duration	TK-RT	TK-Ref	TK-Sug
pH ( $27.5 \pm 0.5 \text{ }^\circ\text{C}$ )	Day - 01	$3.1 \pm 0.2$	$2.94 \pm 0.1$	$3.2 \pm 0.2$
	Day - 02	$3.0 \pm 0.2$	$2.92 \pm 0.1$	$3.2 \pm 0.2$
	Day - 03	$3.0 \pm 0.4$	$2.92 \pm 0.1$	$3.2 \pm 0.2$
	Day - 04	$2.8 \pm 0.1$	$2.92 \pm 0.1$	$3.2 \pm 0.2$
	Day - 05	$2.6 \pm 0.2$	$2.90 \pm 0.1$	$3.1 \pm 0.2$
Specific Gravity	Day - 01	$1014.6281 \pm 0.0185$	$1014.7816 \pm 0.0225$	$3035.2569 \pm 0.0225$
	Day - 02	$1016.7534 \pm 0.0110$	$1015.1116 \pm 0.0215$	$3035.3562 \pm 0.0218$
	Day - 03	$1017.3311 \pm 0.0285$	$1015.7816 \pm 0.0183$	$3035.3865 \pm 0.0112$
	Day - 04	$1021.1865 \pm 0.0334$	$1015.9222 \pm 0.0382$	$3035.3896 \pm 0.0225$
	Day - 05	$1024.6361 \pm 0.0471$	$1016.7411 \pm 0.0450$	$3035.4101 \pm 0.0223$
Viscosity ( $27.5 \pm 0.5 \text{ }^\circ\text{C}$ )	Day - 01	$2.0 \pm 0.2$	$1.7 \pm 0.1$	$4.1 \pm 0.2$
	Day - 02	$2.2 \pm 0.2$	$1.7 \pm 0.1$	$4.1 \pm 0.2$
	Day - 03	$2.2 \pm 0.3$	$1.7 \pm 0.1$	$4.2 \pm 0.1$
	Day - 04	$2.4 \pm 0.2$	$1.8 \pm 0.2$	$4.2 \pm 0.2$
	Day - 05	$2.4 \pm 0.1$	$1.9 \pm 0.1$	$4.2 \pm 0.2$
Refractive Index ( $27.5 \pm 0.5 \text{ }^\circ\text{C}$ )	Day - 01	$1.33800 \pm 0.01$	$1.33795 \pm 0.02$	$1.41235 \pm 0.02$
	Day - 02	$1.33800 \pm 0.01$	$1.33795 \pm 0.02$	$1.41245 \pm 0.02$

	Day - 03	1.33812±0.01	1.33808±0.02	1.41259±0.02
	Day - 04	1.33849±0.01	1.33835±0.02	1.41265±0.02
	Day - 05	1.33908±0.01	1.337895±0.02	1.41272±0.02
Total Solid	Day - 01	5.62±0.2 g/L	5.75±0.1 g/L	21.28±0.02 g/L
	Day - 02	5.62±0.1 g/L	5.75±0.1 g/L	21.27±0.02 g/L
	Day - 03	5.63±0.1 g/L	5.74±0.1 g/L	21.27±0.01 g/L
	Day - 04	5.61±0.1 g/L	5.72±0.2 g/L	21.28±0.01 g/L
	Day - 05	5.62±0.2 g/L	5.74±0.2 g/L	21.29±0.02 g/L
Optic Rotation (27.5±0.5°C)	Day - 01	Not in Range	Not in Range	+66.5±0.1°
	Day - 02	Not in Range	Not in Range	+66.5±0.1°
	Day - 03	Not in Range	Not in Range	+66.4±0.1°
	Day - 04	Not in Range	Not in Range	+66.4±0.1°
	Day - 05	Not in Range	Not in Range	+66.4±0.1°

## DISCUSSION

Time is the most vulnerable factor has been evaluated in shelf life assays. With considering the variances of pH value, TK-RT has shown specific variance becoming more acidic due to microbiological reactions. Specific gravity and viscosity of TK-Sug was very high and the variation was less due to containing high concentration of Sugar. In TK-Ref and TK-Sug variances were begun from Day 4 and 3 respectively while TK-RT varied in day by day. TK-Sug has reported in remarkable value of refractive index and total solid content due to the increment of the density by adding sugar though the variance according to the time was mildly reported. TK-Sug has indicated remarkable value in optic rotation. While the assay, the optic rotation was stable in first two days. Up to the fifth day from third day the optic rotation was differ due to deformation of sugar by microbiological action. Other than of the physico-chemical parameters, organoleptic parameters were shown significant variances. Taste, color and odor of TK-RT were rapidly varied according to the time due to rotten affect. Reduction of the temperature in sample of TK-Ref it has indicated mild variances in both of physico-chemical and organoleptic parameters. Incretion of Sugar consistency in TK-Sug has shown limited variances in both of organoleptic and physico-chemical parameters. While the assay. A special foreign body growth was reported on both of TK-RT and TK-Sug samples. In TK-Sug and TK-RT samples, a floating foreign matter was displayed in little whitish ash color like as microbial colony which converted to brownish color in the 3<sup>rd</sup> day. As well as in TK-Ref has reported in whitish ash color floating foreign matter and Brownish color floating foreign matter from day four.

## CONCLUSION

All the samples (TK-RT, TK-Ref & TK-Sug) have indicated variances in both of organoleptic and physico-chemical parameters according to the time. With referring to the variations both of TK-Ref and TK-Sug has shown mild variances due to the preservation methods. TK-RT has not kept through any of preservation other than normal room temperature. TK-RT was the most vulnerable sample to indicate both of organoleptic and physico-chemical variations.

## Suggestions

A micro-biological assessment according to the time will be reveal microbial contaminations.

## REFERENCES

1. Shastri, P. *Sharangadhara Samhita with Commentary*. Chaukhambha Orientalia Publication, Varanasi, 2002; 13.
2. Shastri, L. P. *Yogarathnakara*. Chaukhambha Sanskrit Sansthan, Varanasi, 2005; 203.
3. Vaishya, S. G. *Vangasen*. Khemraj Shrikandass Publication, Mumbai, 2003; 73.
4. Anonymous. *Indian Pharmacopoeia*. Govt. of India; Ministry of Health & Family Welfare; Vol-II. New Delhi: Controller of Publications, 1986.
5. Anonymous. *The Ayurvedic Pharmacopoeia of India.*, Government of India, Ministry of health and family welfare, Department of Indian Systems of Medicine and Homeopathy, New Delhi: Controller of Publications, 2001; 2(2): 47-221.
6. Ahirwar, B. Stability study of Ayurvedic formulation Kanakasava. *Asian Journal of Pharmacological Technology*, 2013; 3(1): 01-04.
7. Narayana, D. B. A. Stability Studies of Ayurvedic Formulations. *Pharma Times*, 2005; 37(6): 45-50.
8. Rajesh, J., Mohana Lakshmi, S., Thamizhvanan, K., Viswasanthi, T. Formulation, Characterization and Evaluation of Methanolic extract of *Abutilon indicum* loaded Solid lipid nanoparticles against Microorganisms causing Diabetic foot and Urinary tract infection. *Journal of Global Trends in Pharmaceutical Sciences*, 2014; 5(4): 2093-2102.