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PREPARATION AND PHYSICOCHEMICAL EVALUATION OF MUSTADI SYRUP

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ABSTRACT

The selection of drugs plays an important role in treatment. Good quality drugs administered appropriately after analyzing the condition of both disease and patient will act as nectar. The concept regarding standardization and quality control of Ayurvedic drugs can be traced back to ancient times. *Kashaya Kalpana* is a pharmaceutically viable and therapeutically effective formulation but has a shorter shelf life. *Kashaya Kalpana* can be easily modified into syrup form which is widely acceptable due to palatability, longer shelf life, and easy administration. *Mustadi Yoga*, a *Kashaya* preparation from *Yogaratnakara* mentioned in *Krimi Roga Chikitsa* is made into syrup form. The present work aims at reporting the physicochemical evaluation of *Mustadi* syrup and is standardized as per the physicochemical parameters of API, which will help for further research.

Keywords: *Krimi*, *Mustadi yoga*, physicochemical parameters

INTRODUCTION

Basic principles of treatment include the physician, the drug, the attendant, and the patient. The basic character of drugs told in the classics are *Bahukalpam* (used is many formulations), *Bahugunam* (possess many good qualities), *Sampannam* (endowed with virtues), *and Yogyam* (suitable & appropriate for specific diseases) [1]. The efficiency & excellence of these helps in successful treatment. Complete knowledge

of drugs is essential to treat any disease. Most of the Ayurvedic formulations need to be standardized based on newer techniques for their worldwide acceptance.

Standardization means adjusting the herbal drug preparation to a defined content of a constituent or group of substances with known therapeutic activity[2]. Specific standards are set to carryout experimentation. Hence standardization is a tool in the quality control process.

Mustadi Yoga [3] has nine drugs such as *Mustha* [4], *Aakhuparni* [5], *Haritaki* [6], *Vibhitaki* [7], *Amalaki* [8], *Devadaru* [9], *Shigru* [10], *Krishna* [11] and *Krimishatru* [12]. *Kashaya Yoga* of this formulation is been modified to *Sharkara Kalpana* [13]. Palatability of medicine is of most concern in the pediatric age group, in the present study the form of the drug has been modified from *Kashaya* to syrup without altering the number of ingredients and subjected to physicochemical and organoleptic studies.

MATERIALS AND METHOD

Collection, Identification & Authentication of raw drugs

All raw materials used for the study were procured from Udupi, Karnataka. Identification and authentication of raw drugs were done at HINDUSTAN DRUGS, Palimar, Karnataka

MUSTADI SYRUP

Table no. 1 shows the ingredients of *Mustadi* syrup

Sl. No.	Name of drug	Botanical Name	Family	Part used	Quantity
1.	*Mustha*	Cyperus rotundus	Cyperaceae	Rhizome	280g
2.	*Akhuparni*	Merremia emarginata	Convolvulaceae	Root	280g
3.	*Haritaki*	Terminalia chebula	Combretaceae	Fruit	280g
4.	*Vibhitaki*	Terminalia belerica	Combretaceae	Fruit	280g
5.	*Amalaki*	Emblica officinalis	Euphorbiaceae	Fruit	280g
6.	*Devadaru*	Cedrus deodara	Pinaceae	Bark, resin	280g
7.	*Shigru*	Moringa pterygosperma	Moringaceae	Root bark	280g
8.	*Krishna*	Piper longum	Piperaceae	Fruit	280g
9.	*Krimishatru*	Embelia ribes	Myrsinaceae	Seed	280g

Table no 2: Rasa panchaka of ingredients of *Mustadi syrup*

Sl. No	Drug	Rasa	Guna	Virya	Vipaka	Karma
1.	*Mustha*	*Tikta, Katu, Kashaya*	*Laghu, Ruksha*	*Sheeta*	*Katu*	*Kapha-Pittahara, Dipana-Pacana, Grahi, Lekhana*
2.	*Akhuparni*	*Katu, Tikta, Kashaya*	*Laghu, Ruksha, Teekshna*	*Sheeta*	*Katu*	*Kapha-Pittahara, Rechana*
3.	*Haritaki*	*Kashaya Pradhana Lavana Varjita Shadrasa*	*Laghu, Ruksha,*	*Ushna*	*Madhura*	*Tridosha Shamaka*
4.	*Vibhitaki*	*Kashaya*	*Laghu, Ruksha,*	*Ushna*	*Madhura*	*Tridoshahara*
5.	*Amalaki*	*Amla Pradhana Lavana Varjita Shadrasa*	*Laghu, Ruksha*	*Sheeta*	*Madhura*	*Tridosha Shamaka*
6.	*Devadaru*	*Tikta*	*Laghu, Snigdha*	*Ushna*	*Katu*	*Kaphavata Shamaka*
7.	*Shigru*	*Katu, Tikta*	*Laghu, Ruksha, Tikshna*	*Ushna*	*Katu*	*Kapha-vatahara, , Grahi, Deepana, Hrudya, Krimighna, Chakshushya*

8.	*Krishna*	*Katu*	*Laghu, snigdha, Tikshna*	*Ushna*	*Madhura*	*Vata-slesmahara, Deepana, Rasayana*
9.	*Krimishatru*	*Katu, Kashaya*	*Laghu, Ruksha, Tikshna*	*Ushna*	*Katu*	*Krimighna, Dipana*

Method of preparation of *Mustadi* syrup:

Coarse powder of drugs was taken in equal quantities.16 times of fresh water was added to these drugs and heated on low flame till it was reduced to 1/8th quantity to prepare a decoction. The decoction was filtered & 66.6 % sugar (1,680 g) was added and again heated on low flame with constant stirring. When the mixture attained one-thread consistency, the steel container was removed from the heat & the mixture (Syrup) was allowed to cool. Finally, the syrup was packed in airtight bottles of 200 ml each. Then bottles are labelled & made ready for distribution.

Fig. 1- Preparation of *Kashaya*

Fig. 2- Filtration

Fig. 3-Bottled & labelled syrup

Instruments and techniques

Specific gravity[14]

A clean and dry pycnometer is selected, it is calibrated by filling water at 25° and weighing the content. Assuming that the weight of 1 ml of water at 25° when weighed in the air of density 0.0012 g per ml, is 0.99602, the capacity of the pycnometer is calculated. By dividing the weight of liquid contained in the pycnometer by the weight of water contained, the specific gravity of the liquid is obtained.

pH value[14]

By means of a glass electrode and a pH meter, the pH value of the syrup was determined

Total solids[15]

50 ml of the sample was transferred to an evaporable dish and evaporated to a thick extract on a water bath. 4 quantities of residue were extracted, each of 10 ml of dehydrated ethanol with stirring and filtered. Combining filters to another evaporating dish which has been dried to a constant weight and evaporated nearly to dryness on a water bath. Approximately 1 g of diatomite is added, stirred thoroughly, dried at 105° for 3 hours, cooled dish in a desiccator for 30 min, and weighed immediately. The weight of diatomite is deducted.

Reducing sugars[16]

500 mg of sample is dissolved in 100 ml of double distilled water and made up the volume to 100 ml in a volumetric flask.

Reagent I: 25g of anhydrous sodium carbonate, 20 g of sodium bicarbonate, and 200 g of anhydrous sodium sulfate are dissolved in about 800 ml of water and diluted to 1 L.

Reagent II: 15 percent copper sulphate containing concentrated sulphuric acid per 100 ml is added to the tube, mixed, and heated for 20 min in a boiling water bath. Then after the tubes cool, 1 ml of arsenomolybdic acid reagent is added to the solution. Diluted the contents in a test tube of 10 ml by adding purified water, mixed well, and then colour intensity at 520 nm is identified using a UV visible spectrometer.

Non reducing sugars[16]

25 ml of solution from 100 ml stock solution prepared for reducing sugars is taken in a 100 ml beaker. To this 5 ml hydrochloric acid: purified water (1:1) is added, mixed well, and allowed to stand at room temperature for 24 hours for inversion. Neutralize the sample with 5 N sodium hydroxide and made up to 50 ml with purified water. From this diluted sample, 1 ml of aliquot is used for the estimation of total soluble sugar. Non-reducing sugars are determined by subtracting the content of reducing sugars from the amount of total sugar.

ORGANOLEPTIC PARAMETERS OF FINISHED PRODUCT

Table no 3: Organoleptic parameters of *Mustadi* syrup

Sl. No.	Description	*Mustadi* syrup
1.	Physical state	Viscous liquid
2.	Colour	Dark brown
3.	Odour	Pleasant
4.	Taste	Sweet
5.	Clarity	Opaque

PHYSICOCHEMICAL PARAMETERS OF FINISHED PRODUCT

Table no 4: Physicochemical parameters of *Mustadi* syrup

Sl no	Parameter	Value
1.	Specific gravity	1.30
2.	pH (10% solution)	4.3
3.	Total solids	71.6%
4.	Reducing sugars	32.58%
5.	Non reducing sugars	2.99%

DISCUSSION

Drugs of *Mustadi* yoga possess *Katu, Tiktha* and *Kashaya Rasa*, and *Ushna Veerya*. Due to this, it is difficult to use in clinical practice, especially in children. So the formulation is prepared based on *Sharkara Kalpana.* Modification into syrup was attempted with the aim of enhancing palatability, and shelf life and reducing dosage.

Drugs are similar to the formulation mentioned in *Yogaratnakara* except for the addition of sugar into syrup. The syrup is prepared in low flame until one thread consistency hence providing viscous liquid with a pleasant smell. The taste changed to sweet due to the presence of sugar. The influence of sugar was significant in all organoleptic characters of syrup such as colour, viscosity, taste, smell, etc.

The pH of the liquid provides a quantitative indication of the acidity or alkalinity of the solution[14]. pH of syrup is found to be 4.3 which is slightly acidic. Absorption & efficacy of medicine will depend on pH value also. Medicated syrup requires a pH range of 3 to 6 [15]. This is because general medicaments are stable in acidic pH. This ensures the stability of drugs in syrup [15]. The presence of sugar contributes to reducing the acidity of syrup.

Specific gravity is defined as the weight of a given volume of liquid at a stated temperature as compared with the weight of an equal volume of water at the same temperature [14]. The specific gravity of syrup is 1.33 [16]. Specific gravity is an important property to identify its concentration [17]. Here specific gravity of *Mustadi* syrup is equal to the referred value which suggests the quality of the syrup is within normal limits.

Total solid substances are a measure of the combined content of all inorganic and organic substances contained in a liquid [18]. The presence of sugar particles in syrup causes a significant increase in total solid substance.

The reducing sugar of syrup is found to be 32.58. Non-reducing sugar of syrup is 2.99. Sugars that un-

dergo reduction reaction or oxidizes is called reducing sugar [19]. Sugars that do not undergo reduction reaction i.e. sugars which do not contain aldehyde and ketone group. The level of reduced sugar is indicative of the quality and nutritional value of the product [20].

CONCLUSION

The raw materials of the formulation are easily and abundantly available, which adds to the preparation of syrup in bulk. Modification into syrup helps in overcoming the bitter and astringent taste of formulation and low shelf life, contributing to the easy administration and storage of the preparation. The physicochemical evaluation of *Mustadi* syrup implies that the formulation is within the limit of standard parameters.

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