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Evaluation of Quality Control Standards of *Vachadi Ghrita*

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Abstract:

In the present, there is a need to carefully review the methods of systematic study and to present true findings as the basis for further research on traditional herbal remedies, which are effective for treating a variety of ailments. To standardize *Vachadi Ghrita* according to several criteria in order to guarantee its effectiveness and safety in a variety of contexts, the *Ghrita* was examined for its physico-chemical and organoleptic characteristics, as well as its phyto-constituents.. The physicochemical standards would act as an initial evaluation for the standardization of the formulation, laying the groundwork for future use as a benchmark for the quality control/quality assurance laboratory of a pharmaceutical business. The development of analytical techniques can provide a specialized framework for research.

Keywords: Vachadi, Ghrita, Standardization, Parameters, Herbal ghee, Ayurvedic medicine.

1. INTRODUCTION

Ayurvedic herbal-based dosage forms for treating various diseases include *vati* (tablets), *churna* (powder), *asava* and *arishta* (self-generated alcohol-based elixir), *snehakalpa* (medicated oil), *Ghrita* (medicated ghee), etc. These dosage forms are properly referred to in texts as Ayurvedic Pharmacopoeia and Formulary**.[1]** The three essential forces are *Vata*, *Pitta*, and *Kapha* that control the physical and emotional operations of our bodies are collectively known as the *tridosha*. For the mind and soul to be in good health, they should be in balance. *Pitta* imbalance is to blame for 40 different diseases, but *Vata* dosh, when disturbed, causes 80 different disorders.**[2]** *Ghee* is cooked with the decoction or the paste of the crude medication to create medicated *ghritas*, which are lipid-based ayurvedic formulations. *Vachadi ghrita* is known for its antipsychotic, anti-stress, antidepressant, memory-enhancing, and nootropic actions, with eight herbs**.[3]** It demonstrates that the lipid-soluble extractives of these medications may have an ever-increasingly beneficial effect on cognition when extracted in *Goghrita* or Cow Ghee. The chemical components of Vachadi ghrita A- asarone and B- asarone, two of the Vacha's active

ingredients, showed antioxidant activity. **[4]** The constituents of ghrita as *Vacha, Apamarga, Haritaki*, and *Guduchi* all contain phenolic compounds, flavonoids, and tannins. Antioxidant properties of medications have been verified. There is an increasing need to adopt research methodologies and to give scientific support for the traditional plant-based medicines that are considered to be useful in treating a variety of illnesses in light of the numerous negative effects of chemical-based medications**.[5,6]** The present article deals with the evaluation of *Vachadi ghrita* on various parameters.

2. COLLECTION OF RAW DRUG

Kanpur Dehat's rural farms provided the raw materials for the production of the medications. All of these were located and verified by NBRI, Lucknow. Ghrita (cow's ghee) was purchased from Khadi Gramodyoga Bhandar in Kanpur. The Pharmacognosy lab at PSIT, Kanpur, created the ghrita. The herbal medicines were cleaned of any physical contaminants, dried, and ground into a coarse powder for the Pharmacognostical investigation. Ghrita was made in accordance with the traditional model. The Pharmaceutical Chemistry Laboratory of the Institute performed a physicochemical analysis of the finished product.

3. METHOD OF PREPARATION OF *VACHADI GHRITA*

Ingredients used for preparation of *Vachadi ghrita* According to accepted Ayurvedic principles, Vachadi Ghrita was made using the ingredients as Vacha (Acorus calamus), Guduchi (Tinospora cordifolia), Haritaki (Terminalia chebula), Shankhpushpi (Convolvulus pluricaulis), Vidang (Embelia ribes), Shunthi (Zingiber officinale), Shati (Hedychium spicatum), Apamarg (Achyranthes aspera), and Goghrita (Cow ghee), as mentioned in Table 1.

Table 1: Ingredients of *Vachadi ghrita.*

S.No	Name	Botanical name	Quantity
1.	*Vacha*	*Acorus calamus*	1 part
2.	*Guduchi*	*Tinospora cordifolia*	1 part
3.	*Haritaki*	*Terminalia chebula*	1 part
4.	*Shankhpushpi*	*Convolvulus pluricaulis*	1 part
5.	*Vidang*	*Embelia ribes*	1 part
6.	*Shunthi*	*Zingiber officinale*	1 part

7.	*Shati*	*Hedychium spicatum*	1 part
8.	*Apamarg*	*Achyranthes aspera*	1 part
9.	*Cow ghee*	*Go ghrita*	4 part
10.	*Water*	-	16 part

Procedure for preparation: It was made using the method described in a classical Ayurvedic treatise for making medicated ghee mixtures. Powders of eight potent herbal drugs material viz. Vacha (Acorus calamus), Guduchi (Tinospora cordifolia), Shati (Hedychium spicatum), Haritaki (Terminalia chebula), Shankhpushpi (Convolvulus pluricaulis), Vidanga (Embelia ribes), Shunti (Zingiber officinale), and Apamarga (Achyranthes aspera) were mixed constantly with water and changed into paste form. Four parts of Go Ghrita (Cow Ghee) and one part of the paste were combined, and 16 parts of water were then added. Additionally, the mixture was cooked over a low flame until all of the water was removed and Cow Ghee was used to extract the active ingredients of the herbal medicines**.[7,8]**

4. ORGANOLEPTIC STUDY

As shown in Table 2, organoleptic qualities for various sensory aspects, such as color , taste, scent, etc., were meticulously noted down. Organoleptic and morphological characteristics such as Rupa (Colour), Rasa (Taste), Gandha (Odour), Sparsha (Touch), and others were used to analyse the formulation.**[9,10,11]**

Table 2: Organoleptic parameters of *Vachadi Ghrita*

S.No.	Parameter	Observation
1.	Colour	Yellow
2.	Taste	Bitter
3.	Touch	Oily
4.	Odour	Pleasant
5.	Appearance	Sticky

5. PHYSICOCHEMICAL ANALYSIS

Ghrita was tested for various physic-chemical parameters as in Table 2

5.1. Loss on Drying

1. Taken the weighed crucible with 5 grams *Ghrita* at 105°C for at least two hours.

2. Using tongs or gloves, placed the crucible in the desiccator, and cooled for at least 30 minutes.

3. It was removed and weighed repeatedly at regular intervals until the desired weight was obtained. The difference in % was taken into account while calculating the drying loss at that specific temperature.

The amount of water present in plant material affects how quickly it deteriorates. The plant may quickly decline from fungus if the water content is high**.[12,13]**

5.2. Refractive Index

The refractive index of the specified *Ghrita* was determined using Abbe's refractometer. The equipment was calibrated using a specific monochromatic light source and water as the liquid. The cross wire of the telescope is precisely positioned on the border between the bright and dark regions using the refractometer scale after the micrometer screw has been adjusted to focus the boundary between the bright and dark regions**.[10]** The procedure was repeated after the apparatus has been calibrated. A water drop was placed on the prism, the drive knob was turned so that the boundary line precisely contacts the separatrix in the center, and the reading was recorded.At 25 degrees Celsius, distilled water was determined to have a refractive index of 1.3325.**[11]**

5.3. Specific Gravity

Specific gravity bottle was cleaned with acetone and then shaken with ether. Dried the bottle and recorded the weight. The *Ghrita* was added to the specific gravity bottle, and the weight was recorded. Repeated the process with distilled water in place of *Ghrita*. The empty bottle's weight with the stopper on was measured.. The bottle was then filled with the 10 grams *Ghrita*. Then it was reported how much *Ghrita* and the bottle weighed. 10 ml of distilled water were added to the bottle until it was fully filled. The bottle was sealed with a stopper and kept at a steady temperature. Afterward, the bottle was weighed**.[12,13,14]**

5.4. Rancidity Test

The fat acid combination was thoroughly mixed with 1 ml of melted *Ghrita*, 1 ml of concentrated HCl, and 1 ml of a 1% solution of phloroglucinol in diethyl ether was taken. A pink colour denotes a little degree of oxidation, whereas a red colour denotes a complete degree of oxidation**.[15,16]**

5.5. Acid Value

10 grams *Ghrita* was consumed in a conical flask. It was added 50 ml of acid-free alcohol-ether mixture (25 + 25 ml), which had been titrated against 0.1N potassium hydroxide solution and earlier neutralized by the addition of 1 ml of phenolphthalein solution. With the development of a light pink tint that lasts for 15 seconds, the end point is identified. The oxidation process, which occurs as triglycerides are transformed into fatty acids and glycerol, has an impact on the acidity. Fatty acid is released as a result of hydrolysis, heat reactions, and lipolytic enzymes like lipase. As a result, acid value and rancidity vary linearly. The acid value of *Ghrita* in the current experiment was discovered to be less than 2, which indicated improved quality.**[17,18]**

5.6. Saponification Value

1. Weighed and dissolved 2 grams of fat in 3ml of the ethanol/ether mixture used as the fat solvent.

2. Used an additional 7ml of the solvent, the beaker's contents were quantitatively transferred three times.

3. A reflux condenser was connected to the 25ml of 0.5N alcoholic KOH that had been added and thoroughly mixed.

4. A second reflux condenser was used as the blank, which had all the other chemicals present but no fat.

5. For 30 minutes, the two flasks were submerged in a pot of boiling water.

6. Room temperature cooling was applied to the flask.

7. Titrated with 0.5N HCl after adding phenolphthalein indicator to both flasks**.[19,20]**

5.7. Iodine Value

A sample of 10ml fat was pipetted into a "TEST"-labeled iodination flask and then dissolved in chloroform. The flask received 20ml of Iodine Monochloride reagent. The flask's contents were evenly blended. After that, the flask is left to stand in the dark for 30 minutes. In another iodination flask, created a BLANK by adding 10 ml of chloroform to the flask. 20ml of Iodine Monochloride reagent was added to the BLANK, and the mixture was

thoroughly stirred in the flask. For 30 minutes, the BLANK was incubated in the dark. After 30 minutes of incubation, the TEST was removed from the incubator, and 10 ml of potassium iodide solution was added to the flask.The flask's sides and stopper were washed.**[20,21,22,23]**

Table 2: PHYSICO CHEMICAL ANALYSIS OF *VACHADI GHRITA*

S.No.	Parameter	Result
1.	Specific gravity	0.928
2.	Saponification value	296.02
3.	Acid value	1.52
4.	Refractive index	1.2120
5.	Rancidification	Nil
6.	Iodine value	60
7.	LOD	0.12

6. PHYTOCHEMICAL SCREENING: QUALITATIVE TESTS

6.1. The following accepted techniques were used to examine the plant extracts in ethanolic solutions for the presence of phytochemical examinations of several active principles To identify the various Phytoconstituents, such as carbohydrates, lipids, alkaloids, terpenoids, tannins, and proteins, *Vachadi Ghrita* was put through a series of qualitative testing. Separate components were dissolved in alcohol, filtered, and the tests were performed.**[24,25,26]**

6.2 Benedict's Test

After filterate was treated with Benedict reagent and heated on a water bath, the presence of reducing sugar was determined by the production of an orange-red precipitate.**[27]**

6.3. Millon's Test-was applied to confirm the presence of proteins and amino acids. The alcohol extract was diluted in 2 ml of Millon's reagent were applied to the alcoholic extracts. **[28]**

6.4. Alkaloids test

Each extract was separately dissolved in diluted HCL before being filtered. Alkaloid reagent was applied to the filtrates.

6.4.1 Hagers Test

Hagers reagent (solution of picric acid) was used to treat filtrates; the appearance of a yellow precipitate indicates the presence of alkaloids**.[29]**

6.5 Saponin glycosides

6.5.1 Test of Foam

Water was added to the 5 grams formulation in the test tube, which was then agitated for 5 minutes. The presence of saponin glycosides is confirmed by the formation of persistent foam**.[30,31]**

6.6 Phenol and tannin detection (ferric chloride test)

A few drops of a neutral ferric chloride solution were added to the alcoholic extract for treatment. A positive test is indicated by the presence of either the colours green, orange, blue, or purple-red**.[32,33]**

7. RESULTS AND DISCUSSIONS

The organoleptic examination of coarse powders and crude medicines was done. Before processing, raw herbs were examined and verified as real since genuine raw materials are the foundation of high-quality goods. Due to the inclusion of ingredients like *vacha, haritaki, shunthi, Ghrita* has a yellowish tint. The aroma is ghee-like since the base is *go-ghrita*. It is thick and sticky because it is a semi-solid mixture created with ghee. Due to the use of coarsely powdered crude medicines, it has a gritty and sticky appearance. Physical-chemical evaluation displays the likelihood of photo-oxidation and rancidity increases with increasing acid value. In *Vachadi Ghrita*, the test results were determined to be within normal bounds, which denote a high level of product quality. No rancidity was also discovered in the completed product. The sample's specific gravity which is not too dense and was closer to that of plain *Ghrita* (0.9). The amount of free fatty acids present in the *Ghrita* was indicated by the acid value. The saponification value provided a rough estimate of oil's molecular weight and revealed that the oil included a lengthy chain of fatty acids.

CONCLUSION: From the research above, it is clear that the importance of employing *Ghrita* as a media aids is combining lipid-soluble active ingredients, which are quickly dispersed throughout the intracellular and

extracellular spaces and easily diffuse into CSF and other bodily cavities. Drugs administered in the form of ghee are quickly dispersed throughout the body's target organs, such as the neurological system. Various *Ghrita* preparations are used to treat a variety of brain illnesses. The advantages of *Ghrita* includes its yogavahi, inherent rasayana qualities, etc. Drugs like Media and Rasayana that are used with Ghrita work better in these circumstances. In-depth clinical trials and pharmaceutical studies are required to establish these formulations**.** Despite the standardization of Ayurvedic formulations through the use of contemporary technologies, only a limited number of them have data available. We obtain significant information for accurate identification of the Phytoconstituents and their types using the aforementioned standardization techniques, strictly adhering to the standard norms. In order to obtain regulatory authorities' marketing approval for the therapeutic efficacy, safety, and shelf-life of herbal drugs, manufacturers must set quality standards and specifications. The development of analytical techniques can be used as a specific tool in this process. Clearly, the goal of standardizing medicinal plants is to guarantee their therapeutic effectiveness. Thus, it is crucial to maintain the quality of these plant-based goods. Results of Pharmacognostical studies support the *Vachadi Ghrita's* constituent list. On the basis of the observations and results, obtained from the above methods adopted, this study may be used as standard in the further quality control researches.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

No animals/humans were used for the studies that are bases of this research.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest, financial or otherwise.

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