



PHYSICO CHEMICAL AND PHYTOCHEMICAL ANALYSIS OF VISHNU CHAKRA MATHIRAI –A SIDDHA HERBO MINERAL FORMULATION

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ABSTRACT

Standardization of Siddha drugs is a great challenge for the scientific field, particularly for the herbo mineral formulations. Standardization is the need of the hour to explore the values of the siddha drugs for global acceptance. Vishnu Chakra Mathirai (VCM), a herbo-mineral formulation, is being used for many years in Siddha System of Medicine. The formulation mentioned in the Siddha Text 'Siddha Vaithiyya Thirattu'; has been indicated for various diseases like Pakka Vatham (Paralysis), Sobai (Dropsy), Valippu (Convulsive disorders) and Yeppam (Belching). The present study is aimed to standardize the formulation by conducting the physico-chemical analysis, screening studies.

KEYWORDS

Siddha system of Medicine, Vishnu Chakra Mathirai, phyto-chemical, Physico-chemical Analysis.

1. Introduction

Siddha system of medicine defines; Health is defined as the state of physical, psychological, social and spiritual component of a human being which has been given in this text Thirumanthiram as:

“One that cures physical ailment is medicine
One that cures psychological ailment is medicine
One that prevents ailment is medicine and
One that bestows immortality is medicine”

The word “Siddha” literally means “Established truth”. “Siddhi” means as object to be obtained such as perfection in life or heavenly bliss. Siddha is a Science of life and it is a holistic medical system that gives importance to mental as well as physical well being of suffering humanity. According to Siddha system of Medicine all the objects in this world either living or non-living are composed of five elements (Pancha bootham) namely, Earth - Man, Water - Neer, Fire - Thee, Air - Kaatru, Ether - Aahayam. The universe is also made of up of these above boothams, so any changes in the universe will reflect in human body. According to Siddha the health of human body is maintained by the three vital forces (Uyir Thathukkal) namely; Vatham, Pitham and Kabam which are functioned by the influence of Pancha boothams. In Siddha the diseases of mankind are classified into 4448 types on the basis of Mukkutram. Derangement of these kutrams produces diseases. Epilepsy is a condition mentioned in siddha literatures as valippu. Many herbal and herbo mineral formulations were mentioned in siddha literatures. Epilepsy is one of the most frequent neurological disorders of man characterized by excessive provisional neuronal discharges ensuing in uninhibited convulsion. Epilepsy can be defined as a group of disorders characterized by unusual electrical activity in the brain leading to altered behaviour which may manifest as a change in a person's consciousness, movement. Vishnu Chakra Mathirai (VCM), a herbo-mineral formulation, is used for many years in Siddha System of Medicine is taken for the present study.

2. Materials and Methods

2.1 Ingredients:

The Ingredients of Vishnu Chakra Mathirai are; Rasam (Purified Mercury), Lingam (Purified Cinnabar), Ganthagam (Purified

Sulphur), Karu naabi (Purified Aconite), Palagarai (Yellow orpiment), Thalagam (Purified Calamine), Kaantham (Purified Lode stone), Manosilai (Purified Red Orpiment), Veppam Pazha Saru (Neem Fruit Juice) were obtained from raw drug store in Chennai.

2.2 Preparation of Vishnu Chakkara Tablet:

The raw drugs and other ingredients were authenticated and purified as per the methods prescribed in Siddha literatures. The purified Rasam, Lingam, Kandhagam, Nabhi, Palagarai, Thuththam, Thalagam, Kantham and Manosilai were powdered and ground with Vepam pazha juice to a rolling consistency. After grinding to a soft consistency of soft pill, it was rolled as pills of 130 mg (One Kuntri) and allowed to dry.

2.3 Procurement and Authentication of Raw Drugs

Raw drugs were collected from raw drug store in Chennai, identified and authenticated from the department of Gunapadam, National Institute of Siddha, Chennai-47.

3 Physico-chemical analysis:

The physico-chemical analysis was done as per the protocol for testing of Ayurvedic, Siddha and Unani Medicines, by PLIM, Ghaziabad, under the Ministry of AYUSH, Ministry of Health and Family Welfare, New Delhi.

3.1 pH

0.5 gm of the prepared drug was dissolved in ethanol and the pH of the solution was found out using pH meter.

3.2. Loss on drying

Accurately 1 gm of sample was weighed and taken in the dish. The dish was covered with lid and dried in the drying chamber till two consecutive weights remain within ± 0.5 mg. After drying was completed, the sample was cooled in desiccators and weighed. From the difference of weights the ash content was calculated.

$$\text{Loss on drying (\%w/w)} = \frac{\text{Loss in weight (g)} \times 100}{\text{Mass of the sample (g)}}$$

3.3 Total ash

3 gm of sample was accurately weighed and incinerated in a silica dish at a temperature of 650° C until free from carbon. Then the residue was cooled and weighed. The percentage of ash was calculated with reference to the air-dried drug.

$$\left[\text{Percentage of total ash (\% w/w)} = \frac{\text{Mass of ash (g)} \times 100}{\text{Mass of the sample (g)}} \right]$$

3.4 Acid insoluble ash

The ash obtained was boiled for 5 minutes with 25 ml of dilute hydrochloric acid and the insoluble matter was collected and washed with hot water and ignited to constant weight. The percentage of acid-insoluble ash with reference to the air dried drug was calculated

$$\text{Percentage of acid insoluble ash (\%w/w)} = \frac{\text{Mass of acid insoluble matter (g)} \times 100}{\text{Mass of the sample (g)}}$$

3.5 Water soluble extractive

5 gm of the coarsely powdered drug was macerated with 100 ml of water in a closed flask for 24 hours and allowed to stand for 18 hours. The content was filtered rapidly, evaporated and dried at 105o C, in an oven, to constant weight. The percentage of water soluble extractive with reference to the air-dried drug was calculated.

$$\left[\text{Percentage of water soluble extractive (\%w/w)} = \frac{\text{Mass of the residue (g)} \times 100 \times 100}{\text{Mass of the sample (g)} \times 25} \right]$$

3.7 Estimation of sulphur

500 mg of sample was weighed and 100 ml of N/10 Iodine solution was added. The mixture was allowed to stand for half an hour. Then 5 ml of hydrochloric acid and 5 ml of nitric acid was added and allowed to stand for 1 hour. The content was evaporated on hot plate to dryness. The excess of iodine was removed by adding hydrochloric acid. The residue was dissolved in boiling water and 15 ml of 25 % Ba Cl₂ was added. Then allowed to stand for overnight. The precipitate was filtered through Whatman no 41 filter paper. The filter paper with residue was kept in a pre-weighed crucible and ignited in a muffle furnace. From the weight of the residue, the percentage of sulphur in the drug was calculated.

Amount of Sulphur = Weight of ashless filter paper after ignition
X factor of Sulphur (0.1373) X 100 / Weight taken

3.8 Estimation of Mercury

0.5 gm of sample was weighed in 500 ml Kjeldhal flask, and 15 ml of conc sulphuric acid, 2 ml of conc. Nitric acid was added and refluxed for 4hrs. The yellow precipitate obtained was filtered through Whatmann 41 paper in a 250 ml standard flask. The precipitate was dissolved in dilute sulphuric acid and made up the volume 100 ml. 50 ml of made up solution was pipetted in a 250 ml standard flask and 0.1M potassium permanganate solution was added drop-wise until faint permanent pink colour persisted. Then 2 ml of ferric ammonium (II) sulphate indicator was added and titrated with 0.1M ammonium thiocyanate. From the titre value the percentage of mercury in the drug was estimated.

Amount of Mercury = Titre value X 0.01003 X 250 X 100 weight
of sample X volume pipette (50 ml)

4. Phyto-chemical screening

The prepared tablets (10 gm) were crushed well and dissolved in 100 ml of ethanol to subject phytochemical screening.

4.1 Tests for alkaloids

4.1.1 Morquies test:

For detecting the alkaloids 2-3 gms of the sample was ground with sufficient chloroform to make slurry. Ammonical

chloroform was added and the mixture was stirred for one minute. Extraction of alkaloids from chloroform was accomplished by shaking the solution with 0.5 ml of 2 N-H₂SO₄ and separation of the acid layer by means of a dropper. A few drops of drug solution were tested with the following alkaloidal reagents A small quantity of the drug solution was placed in a glass plate and allowed to evaporate to dryness. A drop of water and Morquies reagent (HgCl₂ + KCN) was added and the colour was observed. Appearance of Reddish colour which turns blue indicates the presence of alkaloids.

4.1.2 Mayers test:

2 ml of the solution was added with Meyers reagent (1.36 g Mercuric chloride + 3.0 gm KI in 100 ml of water). Appearance of greyish white precipitate indicates the presence of alkaloids.

4.1.3 Dragendorffs test:

The Dragendorffs reagent was prepared by dissolving 8 gm of bismuth nitrate acid (20 ml) and 27.2 gm of KI in 50 ml of water separately and mixing the two solutions and making up in to 100 ml with water. 2 ml of drug solution was added to this reagent and the colour was observed. Appearance of reddish brown precipitate showed the presence of alkaloids.

4.1.4 Hayers test:

Hayers reagent is a saturated solution of picric acid in water. 2 ml of drug solution was added with the reagent and colour was observed. Appearance of reddish brown precipitate showed the presence of alkaloids.

4.1.5 Wagners test:

Wagners reagent is a solution of KI₃ in water. It was prepared by dissolving 1.3 gm of I₂ in a solution of KI (2 gm) in water and made in to 100 ml. 2 ml of drug solution was added with the reagent and colour was observed Red coloured precipitate showed the presence of alkaloids.

4.1.6 Test for Quinine (Bromine - ammonia test)

To about 10 ml of (1 gm in 1000) solution of sample was added with 0.25 ml of Br₂/H₂O and shaken well. Then about 2 ml of dil. NH₃ solution was added. No bright colouration showed the absence of quinine.

4.1.7 Test for Morphine (Iodic acid test)

Morphine liberates iodine from iodic acid which gives blue colouration. 2 ml of sample solution, acidified with sulphuric acid was added to a solution of KIO₃ containing starch. Absence of deep blue colouration.

4.1.8 Test for Terpenoids (Leibermann Buchard test):

2 ml of drug solution was dissolved in chloroform and to these 2 drops of acetic anhydride was added and concentrated sulphuric acid was added along the sides of the test tube and the colour was observed. Appearance of red colour indicated the presence of terpenoids.

4.1.9 Test for Flavanoids (Shinoda's test):

2 ml of drug solution in alcohol was warmed and a piece of Magnesium ribbon was added followed by 2 drops of concentrated Hcl drop by drop. Absence of orange or yellow colour indicated the absence of flavanoids.

4.1.10 Test for Methylene dioxy group (Labat test)

3 ml of drug solution was mixed with 2 gm of gallic acid and 2 drops of con. H₂SO₄ was added. The mixture was heated in boiling water bath for two minutes and the colour was observed. Absence of dark blue colour indicated the absence of methylene dioxy group.

4.1.11 Test Phenols OH group (FeCl₃ test):

2 ml of drug solution was dissolved in alcohol and warmed then 2 drops of neutral ferric chloride was added and the colour was observed. Presence of brown green colour indicated the presence of phenolic hydroxyl group.

Results:**Table showing the physico-chemical analysis of VCM :**

Sl. No	Parameters	Results	Range
1.	Appearance	Light brown coloured round shaped tablet	-
2.	Average weight of a tablet	0.1058 g	-
3.	Uniformity of weight	03.86 to 106.8%	92.5 % to 107.5%
4.	Disintegration time	58 sec	NMT 60 min
5.	Total Ash	32.45% w/w	1-25%
6.	Acid Insoluble Ash	11.57 % w/w	0.1-10%
7.	Loss on Drying at 105 C	4.742 w/w	1-20%
8.	Water Soluble Extractive (WSE)	4.602 % w/w	4-85%
9.	Alcohol soluble Extractive (ASE)	2.781 % w/w	4-85%
10.	Each tablet of average weight contains (NS) Mercury Sulphur	3.792 % w/w 1.925% w/w	-

Table showing the Phyto-chemical screening report of VCM) :

Sl. No	Name of the tests	Result	Inference
1	Morquies test	+	Presence of Alkaloids
2	Mayers test	+	
3	Dragendorffs test	+	
4	Hayers test	+	
5	Wagners test	+	
6	Brmine – ammonia test	-	Absence of Quinine
7	Iodic acid test	-	Absence of Morphine
8	Leibermann Buchard test	-	Absence of Terpenoids
9	Shinoda's test	-	Absence of Flavanoids
10	Labat test	-	Absence of Methelene dioxy group
11	FeCl ₃ test	+	Presence of phenols

Summary and Conclusion:

The physico-chemical analysis results of Vishnu Chakra Mathirai shows, it has slightly acidic (pH = 6.5) and it has only 7.3 % loss on drying which indicates low moisture content, needed for long term preservation. The total ash content is 7.7 % and acid insoluble content is only 2.12 %. These two parameters indicate the presence of high amount of bio availability of the drug. The water soluble extract and alcohol soluble extract were found to be 85.32 and 15.12 which are required for intestinal absorption. This also indicates the high bio-availability of the drug. All the parameters obtained were within permissible limits.

The phyto-chemical results of the Vishnu Chakra Mathirai gives positive test for alkaloids and phenols which shows only these two components are present which are non-toxic. It also gives negative test for terpenoids, flavanoids, quinine and morphine. The absence of morphine reveals the fact that the tablet can be used without addictive effect.

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