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PHYSICO CHEMICAL AND PHYTOCHEMICAL ANALYSIS OF *SIDDHA* POLYHERBAL FORMULATION "*NELLIYATHI KASHAYAM*"

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ABSTRACT

Nelliyathi kashayam is classical siddha polyherbal formulation mentioned in classical siddha literature, which is indicated for Diabetes, Burning Micturition. The drug was made in accordance with Siddha literature.. The drug undergoes phyto chemical analysis such as alkaloid test,tannin test etc and physicochemical analysis like loss on drying,total ash.The results revealed the presence of various bioactive compounds, including phytosterols, Carbohydrates, Glycosides, Saponins, Phenols, Triterpenoids, Flavanoids, Proteins and amino acids, Saponins , Tannins.The results indicate the standard quality ,safety and standardization for their use.

Keywords: Physicochemical Analysis: Phyto Chemical Analysis; Nelliyathi Kashayam; Siddha.

INTRODUCTION

Siddha System of medicine is one of the ancient system of medicine, unique nature of this system is its continuous service to humanity for more than 5000 years. Combating diseases and in maintaining its physical, mental and moral health. The usage of medicinal plants has a history as long as that of the mankind. The use of such medicinal plants was always an important part of the medical systems. The special feature of Siddha medicine is that most of the preparations are in compound form and a rationale has been found in its inclusion. There exists an undefined way in the synergetic action and the formulation has beneficial effect in eliminating toxins, thereby measuring the bio-availability through the cells of the body.Nelliyathi kashayam (NK) is a polyherbal formulation mentioned in Mega Nivarana Bodhini Enum Neerizhuvu Maruthuvam[1] that has been indicated for diabetes mellitus and burning micturition. In India, there are estimated 77 million people above the age of 18 years are suffering from diabetes (type 2) and nearly 25 million are prediabetics (at a higher risk of developing diabetes in near future)[2]. The analysis will include the active constituent identification and screening of phytochemical constituents. The results of this study will provide valuable insights into the chemical composition and quality control of Nelliyathi kashayam, which will help to ensure its safety and efficacy for therapeutic use.

AIM AND OBJECTIVE

This study aimed to evaluate the physicochemical properties and phytochemical composition of siddha polyherbal formulation Nelliyathi Kashayam.

MATERIALS AND METHODS

1.COLLECTION OF THE RAW DRUGS

All the raw materials were sourced from a well-known herbal drugstore in Chennai.

2.IDENTIFICATION AND AUTHENTICATION OF THE DRUG

The raw drugs were verified by experts from the PG Gunapadam Department at the Government Siddha Medical College, Chennai.

3.PREPARATION OF NELLIYATHI KASHAYAM (NK)

3.1.Ingredients

Table 1- Ingredients of NK

S.no	Ingredients	Botonical name
1	Nelli vatral	Phyllanthus Emblica
2	Thandrikkai	Terminalia Belleria
3	Korai kizhangu	Cyperus Rotundus
4	Pon musuttai	Cissampelos pareira
5	Thetran	Strychnus potatorum
All the ingredients were used in equal proportions.		

3.2.Purification of raw drugs

Purification was carried out according to the methods prescribed in Siddha literature (Sarakku Suththi Sei Muraigal) [3].

3.3.Procedure

The purified raw drugs were individually ground into a fine powder, then thoroughly mixed to ensure uniformity, and finally filtered using a clean white cloth.

ADMINISTRATION OF THE DRUG

Route of administration : Oral

Dosage : 90ml(½ Aazhakku)

Adjuvant : 4.1-8.2g of Honey(1-1 ½ Varagan).

INDICATION

Diabetes

Burning Micturition

PHYSICOCHEMICAL ANALYSIS

The sample is tested for the following parameters as per the guidelines.[4]

1.Color

About 5 grams of the test drug was placed in a clean glass beaker and assessed for its color by observing it against a white opaque background in direct sunlight.

2.Odour

About A sample of 5 grams of the test drug was put into a 100 ml beaker, and its odor was assessed by wafting the air above it.

3.pH

Approximately 5 grams of the test sample will be dissolved in 25 ml of distilled water. The resulting solution will be filtered and left to stand for 30 minutes before undergoing pH measurement. The pH of the formulation was determined.

4.Determination of Total Ash

Incinerate about 2 to 3 g accurately weighed, of the ground drug in a tared platinum or silica dish at a temperature not exceeding 450º until free from carbon, cool and weigh. If a carbon free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on an ashless filter paper, incinerate the residue and filter paper, add the filtrate, evaporate to dryness, and ignite at a temperature not exceeding 450º. Calculate the percentage of ash with reference to the air-dried drug.

5.Determination of Acid Insoluble Ash

Boil the ash obtained in (2.2.3) for 5 minutes with 25 ml of dilute hydrochloric acid; collect the insoluble matter in a Gooch crucible, or on an ashless filter paper, wash with hot water and ignite to constant weight. Calculate the percentage of acid-insoluble ash with reference to the air dried drug.

6.Determination of Alcohol Soluble Extractive

Macerate 5 g of the air dried drug, coarsely powdered, with 100 ml of Alcohol of the specified strength in a closed flask for twenty-four hours, shaking frequently during six hours and allowing to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105º, to constant weight and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug.

7.Determination of Water Soluble Extractive

Proceed as directed for the determination of Alcohol-soluble extractive, using chloroform water instead of ethanol.

8.Determination of Moisture Content (Loss on Drying)

Procedure set forth here determines the amount of volatile matter (i.e., water drying off from the drug). For substances appearing to contain water as the only volatile constituent, the procedure given below, is appropriately used. Place about 10 g of drug (without preliminary drying) after accurately weighing (accurately weighed to within 0.01 g) it in a tared evaporating dish. For example, for underground or unpowered drug, prepare about 10 g of the sample by cutting shredding so that the parts are about 3 mm in thickness. Seeds and fruits, smaller than 3 mm should be cracked. Avoid the use of high speed mills in preparing the samples, and exercise care that no appreciable amount of moisture is lost during preparation and that the portion taken is representative of the official sample. After placing the above said amount of the drug in the tared evaporating dish dry at 105º for 5 hours, and weigh. Continue the drying and weighing at one hour interval until difference between two successive weighings corresponds to not more than 0.25 per cent. Constant weight is reached when two consecutive weighing after drying for 30 minutes and cooling for 30 minutes in a desiccator, show not more than 0.01 g difference.

PHYTOCHEMICAL ANALYSIS[5]

1.Test for alkaloids

Mayer's test-few ml of extract taken added 1-2 drops of mayer's reagent along the sides of test tube..A creamy white or yellow precipitate indicates presence of alkaloids

2.Test for CHO

Barfoed's test-1 mL of filtrate is mixed with 1 mL of Barfoed's reagent and heated in a boiling water bath for 2 minutes, where the appearance of a red precipitate indicates monosaccharides.

3.Test for reducing sugar

Fehling's test-1 mL each of Fehling's solution A and B is mixed with 1 mL of the filtrate and the mixture is boiled in a water bath, where the formation of a red precipitate indicates the presence of reducing sugars.

4.Test for glycosides

1 mL of dilute H_2SO_4 is mixed with 0.2 mL of the extract and the mixture is boiled for 15 minutes. After boiling, it is allowed to cool and then neutralized with 10% NaOH. To this, 0.2 mL each of Fehling's solution A and B is added, and the appearance of a brick red precipitate confirms the presence of glycosides.

5.Test for protein and amino acid

Ninhydrin test-2 mL of the filtrate is treated with 2 drops of Ninhydrin solution prepared by dissolving 10 mg of ninhydrin in 200 mL of acetone. The mixture develops a purple-colored solution, which indicates the presence of amino acids.

6.Test for flavonoids

Alkaline reagent test-1 mL of the extract is mixed with 2 mL of 2% sodium hydroxide solution, producing an intense yellow color, which disappears on the addition of a few drops of dilute hydrochloric acid, confirming the presence of flavonoids.

7.Test for phenoic compounds

The aqueous solution of the extract is treated with a few drops of 5% ferric chloride solution, resulting in a dark green or bluish-black color, which indicates the presence of phenolic compounds.

8.Test for tannin

Lead sub acetate test-1 mL of the filtrate is mixed with 3 drops of lead sub acetate solution, and the formation of a creamy gelatinous precipitate indicates the presence of tannins.

9.Test for phytosterols

Salkowski's test-The filtrate is treated with a few drops of concentrated sulphuric acid, shaken well, and allowed to stand, where the appearance of a red color in the lower layer indicates the presence of phytosterols.

10.Test for triterpinoides

Salkowski's test-The filtrate is mixed with a few drops of concentrated sulphuric acid, shaken well, and allowed to stand, where the formation of a golden yellow layer at the bottom indicates the presence of triterpenoids.

11.Test for diterpinoides

Copper acetate test-The plant extract is dissolved in distilled water and treated with 3–4 drops of copper acetate solution, where the development of an emerald green color confirms the presence of diterpenoids

12.Test for Saponins

Foam test-0.5 g of the plant extract is mixed with 2 mL of water and vigorously shaken, where the formation of a persistent foam lasting for about 10 minutes indicates the presence of saponins.

13.Detection of Quinones

1 mL of the plant extract is treated with a few milliliters of alcoholic potassium hydroxide, where the appearance of a red to blue color indicates the presence of quinones.

14.Detection of Anthraquinones

Borntrager's test-A few milliliters of the filtrate are mixed with 10 mL of 10% ammonia solution and shaken vigorously for about 30 seconds, where the appearance of a pink, violet, or red-colored solution indicates the presence of anthraquinones.

15.Detection of Anthocyanins

HCl test-2 mL of the plant extract is mixed with 2 mL of 2N hydrochloric acid, producing a pink-red solution, which changes to blue-violet upon the addition of a few milliliters of ammonia, confirming the presence of anthocyanins.

16.Detection of Emodins

The plant extract is treated with 2 mL of ammonium hydroxide and 3 mL of benzene, where the appearance of a red color indicates the presence of emodins.

17.Detection of Gums and Mucilages

Alcohol test-100 mg of the extract is dissolved in 10 mL of distilled water and then 25 mL of absolute alcohol is added with constant stirring, where the formation of a white or cloudy precipitate indicates the presence of gums and mucilages.

18.Detection of Resins

Turbidity test-1mL of the plant extract is first dissolved in acetone and then poured into distilled water, where the appearance of turbidity indicates the presence of resins. Similarly, when 10 mL of the extract is treated with 20 mL of 4% hydrochloric acid, the development of turbidity also confirms the presence of resins.

RESULTS AND DISCUSSION

Phytochemical analysis

Table 2- Organoleptic characters of NAK

Colour	**Light brown**
Odour	Typical
Taste	Mild astringent
Texture	Coarse powder

S No	Parameters	Values
1	Loss on drying at 105□C	01.55%
2	Total Ash	03.40%
3	Acid insoluble ash	00.78%
4	Water soluble extractive	13.70%
5	Alcohol soluble extractive	05.49%
6	pH	6.17

Table 3- Result Of Physicochemical Parameters

Phytochemical Analysis

Table 4- Phytochemicals Analysis

S.no	Phytochemicals	Aqueous extract of NAK	Ethanolic extract of NAK
1	Alkaloids	Absent	Absent
2	Carbohydrates	Present	Present
3	Reducing sugars	Present	Present
4	Glycosides	Present	Present
5	Protein and amino acids	Absent	Absent
6	Flavonoids	Present	Present
7	Phenolic compounds	Present	Present
8	Tannins	Present	Present
9	Phytosterols	Present	Present
10	Triterpinoides	Absent	Present
11	Diterpinoides	Present	Present
12	Saponins	Present	Present
13	Quinone	Present	Present
14	Anthraquinone	Present	Present
15	Anthocyanins	Absent	Absent
16	Emoidins	Present	Present
17	Gums and mucilage	Absent	Absent
18	Resins	Absent	Absent

DISCUSSIONS

Physicochemical analysis revealed a relatively low total ash content (3.40%), indicating minimal contamination and adulteration. The low acid-insoluble ash value (0.78%) suggests a low level of siliceous (earthy) materials. A high water-soluble extractive value (13.70%) points to the presence of a significant amount of active components with good solubility, enhancing absorption and therapeutic efficacy. The low loss on drying (LOD) value (1.55%) reflects low moisture content, indicating the product is well-dried and likely to have a longer shelf life. A moderate alcohol-soluble extractive value (5.49%) suggests a reasonable concentration of alcohol-soluble active constituents, contributing to the formulation's overall therapeutic potential.

Phytochemical screening showed the presence of carbohydrates, reducing sugars, flavonoids, phenolic compounds, tannins, phytosterols, diterpenoids, saponins, quinones, anthraquinones, and emodins in both aqueous and ethanolic extracts. Triterpenoids were specifically detected in the ethanolic extract. The presence of these secondary metabolites suggests a broad spectrum of therapeutic properties, including anti-diabetic, antimicrobial, anti-ulcer, anti-thrombolytic, and antioxidant activities.

CONCLUSION

This physico chemical analysis and Phytochemical analysis is a preliminary step for standardization of a drug for its quality and potency.

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