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Biochemical Analysis Of Siddha Polyherbal Formulation Thoothuvalai Nei

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Abstract

Thoothuvalai Nei is one of the traditional Siddha formulations predominantly used in Tamilnadu and it is known to be very effective in treating respiratory disorders, especially asthma. The attempt is made to rationalize the therapeutic claim of this drug with the help of a detailed biochemical analysis of its chemical components. Formulation with the combination of herbs like Thoothuvalai (Solanum trilobatum) and Mulli (Solanum anguivi) is analyzed for both acid and basic radicals. Results show the presence of carbonates and sulfates as principal acid radicals. Amongst the basic radicals tested, toxic elements like lead, arsenic, mercury, copper, ferric, ferrous, zinc, silver and magnesium were not found. These observations indicate that Thoothuvalai Nei does not contain any harmful contaminants and thus supports its traditional use in Siddha medicine. The study not only corroborates the traditional claim but also paves the way for future research on its therapeutic potential and safety.

Keywords: Biochemical analysis, Respiratory disorder, Siddha medicine, Thoothuvalai Nei

Introduction

Siddha is an ancient system of traditional healing from southern parts of India, entirely based on a rich pharmacopeia of herbal formulations. One such formulation is Thoothuvalai Nei, a classical remedy considered effective for asthma and other respiratory disorders[1]. This formulation is a botanical and natural substance array in terms of ingredients, and incorporates Thoothuvalai (Solanum trilobatum Linn), Mulli (Solanum anguivi Lam), Kandangkattari (Solanum surattense Burm.f.), etc[2,3]. The complexity lies in its intricately blended components, which combine in a synergistic therapeutic effect with other ingredients like Cow's Ghee, Cow's Milk and the incorporation of a host of medicinal herbs. In the present research, we attempt a detailed biochemical analysis of Thoothuvalai Nei with a view to explain the presence and concentrations of some of the key chemical components. In the present study, an attempt is made to identify certain radicals and composition of the formulation more specifically, the presence of carbonates and sulfates among other basic and specific radicals. Knowledge of these biochemical properties is thus incumbent if one is to validate traditional claims associated with Thoothuvalai Nei and provide a scientific basis for its therapeutic use. We offer a valuable contribution to literature by providing insight into the chemical profile of this formulation, which shall bring credibility to the same and guide further research and clinical applications pertaining to respiratory health.

Materials And Methods:

Ingredients of Thoothuvalai Nei[2,4]

Thoothuvalai (Solanum trilobatum.Linn), Mulli (Solanum anguivi Lam), Kandangkattari (Solanum surattense, Burm.f), Kanchori (Tragia involucrata.Linn), Adathodai (Justicia adhatoda Clarke.), Milagu (Piper nigrum.Linn), Thippili (Piper longum), Kadukkai (Terminalia chebula.Retz), Chirukanchori (Tragia cannabina.Linn), Cow's Ghee, Cow's Milk, Chukku (Zingiber officinale,Rosc), Thantrikkai (Terminalia bellerica (Gaertn.)Roxb.), Nellikkai (Phyllanthus emblica Linn.), Thalisam (Taxus baccata Linn.), Kottam (Costus speciosus (Koenig ex Retz) J.E.Smith), Akkarakaaram (Anacyclus pyrethrum DC), Vaivilangam (Embelia ribes.Burm.f), Chirakam (Cuminum cyminum.Linn), Omam (Carum copticum Benth&Hook.f), Valmilagu (Piper cubeba.Linn f), Chittaratai (Alpinia officinarum Linn.), Perarattai (Alpinia galanga Linn.), Elam (Elletaria cardamomum, Maton.), Kirambu (Syzygium aromaticum (Linn) Merrill & Perry), Sathikkai (Myristica fragrans Houtt), Sathipathiri (Myristica fragrans Houtt).

Collection of raw drugs

The roots of Thoothuvalai, Mulli, Kandangkattari, Kanchori, Chirukanchori, Adathodai were collected from Villages in Salem district, Tamilnadu, India. Other raw drugs were bought from well-known reputed country drug shops in the Chennai district.

Source of sample

After getting authentication from Medicinal Botanist at National Institute of Siddha, Chennai, the trial drug Thoothuvalai Nei was prepared in the Gunapadam laboratory of National Institute of Siddha after proper purification under the supervision of the guide.

Preparation of Thoothuvalai Nei[2,4]

Part I.

Thoothuvalai - 25 palam (875 gm), Mulli– 4 palam (140 gm), Kandangkathiri– 4 palam (140 gm), Kanchori – 4 palam (140 gm), Adathodai – 4 palam (140 gm), Milagu – 4 palam (140 gm), Thippili – 4 palam (140 gm), Kadukkai– 4 palam (140 gm), Chirukanchori - 4 palam (140 gm), Water- 2 thooni (43 litres).

Part II.

Cow's Ghee - 2 padi (2.68 litres), Cow's Milk - 2 padi (2.68 litres)

Part III.

Thirikadugu - 3¾ varagan (15.6 gm), Thiriphala - 3¾ varagan (15.6 gm), Thalisam - 3¾ varagan (15.6 gm), Kottam - 3¾varagan (15.6 gm), Akkarakaram - 3¾varagan (15.6 gm), Vaivilangam - 3 ¾ varagan (15.6 gm), Chirakam - 3 ¾ varagan (15.6 gm), Omam - 3¾ varagan (15.6 gm),Valmilagu - 3¾ varagan (15.6 gm), Chittaratta - 3 ¾ varagan (15.6 gm), Peraratta - 3¾ varagan (15.6 gm), Elam - 3¾ varagan (15.6 gm), Kirambu - 3¾ varagan (15.6 gm), Sathikkai - 3¾ varagan (15.6 gm), Sathipathiri - 3¾ varagan (15.6 gm).

The decoction was made from the ingredients from part I. The ingredients of part II were added to the decoction. Part III ingredients were made as a paste by using cow's milk. After adding the grounded paste to the above decoction, the mixture was brought allowed to boil and reached its consistency. Then it was kept in an airtight container.

Analytical Investigation on Test for Acid Radicals[5]

S.No	Test for Specific Acid Radical	Indication / Observation	Inference	Results
1.	**Test for Carbonates** To 1 ml of the test solution about 1 ml of concentration (conc.) HCL was added.	Formation of brisk effervescence indicates the presence of carbonates	Presence of brisk effervescence Absence of brisk effervescence	Positive Negative

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2.	**Test for chlorides** To 2 ml of test solution, about 1 ml of silver nitrate solution was added.	Appearance of White precipitate indicates the presence of chlorides.	Presence of White precipitate Absence of White precipitate	Positive Negative
3.	**Test for sulphates** To 1 ml of the test sample add diluted H_2SO_4 till effervescence ceases followed by this about 1 ml of barium chloride solution was added.	Appearance of white precipitate indicates the presence of sulfates.	Presence of white precipitate Absence of white precipitate	Positive Negative
4.	**Test for sulphides** To 1 ml of the test sample about 2 ml of HCL was added with slight warming the mixture.	Formation of colorless gas with the smell of rotten egg indicates the presence of sulfides.	Presence of rotten egg smell Absence of rotten egg smell	Positive Negative
5.	**Test for phosphates** To 2 ml of test solution treated with 2ml of ammonium molybdate solution followed by addition of 2ml of concentrated nitric acid	Formation of yellow precipitate indicates the presence of phosphates	Presence of yellow precipitate Absence of yellow precipitate	Positive Negative
6.	**Test for Fluoride and Oxalate** To 2 ml of the test solution about 2 ml of diluted acetic acid and 2ml of calcium chloride solution was added	Formation of white precipitate indicates the presence of Fluoride/ Oxalate	Presence of white precipitate Absence of white precipitate	Positive Negative
7.	**Test for Borates** 2ml of the test solution was added with sulphuric acid and 95% alcohol followed by exposure to flame	Appearance of green flame indicates the presence of Borates	Presence of green flame Absence of green flame	Positive Negative
8.	**Test for Nitrates** 0.5 ml of test solution heated with copper turning followed by addition of sulphuric acid	Appearance of reddish brown gas indicates the presence of Nitrates	Presence of reddish brown colour Absence of reddish brown colour	Positive Negative

Analytical Investigation on Test for Basic Radicals5

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S.No	Test for Specific Basic Radical	Indication / Observation	Inference	Results
1.	**Test for Lead** 1 ml of the test solution added with 2 ml of potassium chromate solution.	Formation of yellow precipitate indicates the presence of lead.	Presence of yellow precipitate Absence of yellow precipitate	Positive Negative
2.	**Test for Arsenic** 1 ml of the test solution added with 2 ml of 10% (2N) sodium hydroxide (NaOH) solution.	Formation of brownish red precipitate indicates the presence of Arsenic	Presence of brownish red precipitate Absence of brownish red precipitate	Positive Negative
3.	**Test for Mercury** 1 ml of the test solution added with 2 ml of 10% (2N) sodium hydroxide (NaOH) solution.	Formation of yellow precipitate indicates the presence of mercury.	Presence of yellow precipitate Absence of yellow precipitate	Positive Negative
4.	**Test for Copper** 1 ml of the test solution added with 1 ml of Ammonium hydroxide (NH_4OH) solution	Formation of blue precipitate indicates the presence of copper.	Presence of blue precipitate Absence of blue precipitate	Positive Negative
5.	**Test for Ferric** To 1 ml of test solution, about 2 ml of potassium ferrocyanide was added.	Formation of blue precipitate indicates the presence of ferric.	Presence of blue precipitate Absence of blue precipitate	Positive Negative
6.	**Test for Ferrous** To 1 ml of test solution, about 1 ml of potassium ferric cyanide solution was added.	Formation of blue precipitate indicates the presence of ferrous.	Presence of blue precipitate Absence of blue precipitate	Positive Negative
7.	**Test for Zinc** 1 ml of the test solution added with 2 ml of sodium hydroxide (NaOH) drop wise until indication appears.	Formation of white precipitate indicates the presence of Zinc.	Presence of white precipitate Absence of white precipitate	Positive Negative
8.	**Test for Silver** 1 ml of the test solution was added with 1 ml of conc. HCL followed by appearance of curdy white precipitate.	Formation of curdy white precipitate indicates the presence of silver.	Presence of curdy white precipitate Absence of curdy white precipitate	Positive Negative

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	Boil the precipitate with water. It does not dissolve. Add NH_4OH solution in it and add 1 ml dilute HNO_3.			
9.	**Test for Magnesium** 1 ml of the test solution added with 2 ml of sodium hydroxide (NaOH) drop wise until indication appears.	Formation of white precipitate indicates the presence of Magnesium.	Presence of white precipitate Absence of white precipitate	Positive Negative

Results:

The biochemical analysis of the Siddha formulation *Thoothuvalai Nei* includes tests for both acid and basic radicals. The results indicate that *Thoothuvalai Nei* contains carbonates and sulfates as the primary acid radicals. No chloride, sulphides, phosphates, Fluoride, Oxalate, Borates and nitrates were detected. Among the basic radicals, lead, Arsenic, Mercury, Copper, Ferric, Ferrous, Zinc, Silver, Magnesium were absent.

Discussion:

The biochemical analysis of *Thoothuvalai Nei* reveals important insights into its chemical composition, which supports its traditional use in treating respiratory disorders like asthma. The formulation, a complex blend of herbal and natural ingredients, demonstrates a distinctive biochemical profile that could underpin its therapeutic efficacy[2,3].

The presence of carbonates and sulfates in *Thoothuvalai Nei* suggests that these compounds might play a role in its pharmacological activities. Carbonates are often linked to buffering capacity and could contribute to maintaining the formulation's stability and pH balance. Sulfates, on the other hand, have been associated with various biological activities, including anti-inflammatory effects, which may support the formulation’s efficacy in managing respiratory conditions.

The absence of chlorides, sulfides, phosphates, fluorides, oxalates, borates, and nitrates indicates that these radicals are not involved in the formulation. This specificity may also suggest a focused therapeutic action derived from the remaining detected radicals.

The absence of heavy metals such as lead, arsenic, and mercury is a crucial finding, highlighting that the formulation is free from potentially harmful contaminants that could undermine safety. The absence of copper, ferric, ferrous, zinc, and silver also implies that these elements are not present in concentrations that might affect the formulation's safety or efficacy. The presence of magnesium, though in a small quantity, may contribute to the overall bioactivity of the formulation.

The analysis confirms that *Thoothuvalai Nei* is free from many toxic elements and radical contaminants, reinforcing its traditional safety profile. This clean chemical profile supports the notion that *Thoothuvalai Nei* is a safe and potentially effective therapeutic agent for respiratory issues, aligning with its historical use in Siddha medicine.

Conclusion*:*

The study provides a scientific foundation for understanding the chemical constituents of *Thoothuvalai Nei*, validating traditional claims and supporting further research into its therapeutic applications. This data not only enhances the credibility of the formulation but also paves the way for more comprehensive studies into its clinical efficacy and safety.

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