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# Biochemical analysis of Siddha polyherbal formulation Aruvadha Chooranam

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## Abstract

Siddha is an ancient medicine system of South India having its roots in the state of Tamilnadu. Siddha medicine has a very huge heritage and is rich in literature resources. There is a vast literature on *Vaithyam* (treatment) speaking about the diseases of mankind, different treatment methods, preparation techniques of various drugs and their fundamendal properties, methods of intake/application, their therapeutic effects and respective indications. A single such polyherbal siddha formulation, *Aruvadha chooranam* taken from the classic text, *Chikitsa rathna deepam ennum vaithyasinthamani* is being studied for research purposes. This paper aims to investigate the biochemical analysis of the trial medicine Aruvadha chooranam , which demonstrated the presence of Carbonate, Sodium, Potassium, Calcium, Iron, Zinc, Alkaloid, Reducing sugar, Sulphate. This may have an impact on the therapeutic activity as mentioned in the classic literature. Further, elaborate analysis studies and research work is needed to evaluate its effectiveness and potency.

**Keywords:** Siddha, Vaithiyam, Aruvadha chooranam, Biochemical analysis.

## Introduction

Siddha is an ancient medicine system of South India having its roots in the state of Tamilnadu. Siddha medicine has a very huge heritage and is rich in literature resources. There is a vast literature on *Vaithyam* (treatment) speaking about the diseases of mankind, different treatment methods, preparation techniques of various drugs and thier fundamendal properties, methods of intake/application, their therapeutic effects and respective indications. A single such polyherbal siddha formulation, *Aruvadha chooranam* taken from the classic text, *Chikitsa rathna deepam ennum vaithyasinthamani* is being studied for research purposes. This medicine is mainly indicated for *Eeral kulaiyil undana upathiravam*(disorders of liver and biliary tract), *Nenju karakarapu*(heartburn), *Pasi mandham*(anorexia), *Nithiraiyinmai*(insomnia), *Mugavaadham* (facial palsy), *Paarvai mandham* (diminished vision), *Kaathiraichal* (tinnitis), *Indhiriya nashtam*(reduced sperm count), *Kozhaikattu* (cold), and *Moorchai rogam* (epilepsy)[1]. This paper gives a report of biochemical analysis of the choosenformulation Aruvadha chooranam.

## Materials and Methods

### Literature from:

*Chikitsa rathna deepam ennum vaithyasinthamani,* part 2*, kannusamy pillai, B. rathina nayakar and sons, 2007, thirumagal vilasa achagam*, chennai-67, pg no: 168

### Ingredients of the drug:

**Table 1: Ingredients of Aruvadha chooranam**

| Vernacular name | Botanical name | Part used | Family | Quantity |
|---|---|---|---|---|
| Vendhayam | *Trigonella foenum graecum* L. | Seed | Fabaceae | 8 parts |
| Aruvadha ilai | *Ruta graveolens* Linn. | Dry leafs | Rutaceae | 8 parts |
| Seeragam | *Cuminum cyminum* Linn. | Fruit | Apiaceae | 8 parts |
| Karunseeragam | *Nigella sativa* L. | Seed | Ranunculaceae | 8 parts |
| Sanna ilavangapattai | *Cinnamomum verum* L. | Park | Lauraceae | 8 parts |
| Athimathuram | *Glycyrrhiza glabra* L. | Rhizome & root | Fabaceae | 8 parts |
| Sombu | *Foeniculam vulgare* Mill. | Fruit | Apiaceae | 8 parts |
| Thaniya | *Coriandrum sativum* L. | Seed | Apiaceae | 50 parts |
| Chena karkandu | Sucrose | Sucrose | Poaceae | 25 parts |

### Collection identification and authentication of the drug:

The above said raw drugs was purchased from a well reputed country shop at Chennai, The raw drugs were authenticated by botanist in NIS, Chennai.Purification of raw drugs was done and the medicine was prepared in the Gunapadam laboratory at NIS, Chennai as per SOP mentioned in Siddha Formulatory of India part-2

## Preparation of Aruvadha chooranam:

### Purification:

*Vendhayam* (*Trigonella foenum graecum* L.):

*Vendhayam* is soaked in *neerahara thelivu* (rice water) for 12 minutes and dried[2].

*Seeragam* (*Cuminum cyminum* Linn.):

Ensured that it is free from dust partices and sand (*pudaithal*) and is dried in moonlight[2]

*Karunseeragam* (*Nigella sativa* L.):

Ensured that is free from dust particles and sand (*pudaithal*), dried in moonlight and is fried slightly in a dry pan[2].

*Athimathuram* (*Glycyrrhiza glabra* L.):

Washed in running water, outer skin is peeled off, cut into small pieces and dried[2].

*Sanna ilavangapattai* (*Cinnamomum verum* L.):
Dried in moonlight overnight[2]

*Dhaniya* (*Coriandrum sativum* L.):

It is tied in a cotton cloth, soaked in lime juice or hot water, boiled and is dried in moonlight[2].

*Sombu* (*Foeniculum vulgare* Mill.)

Ensured that is free from dust particles and sand(*pudaithal*)[2].

*Aruvadha* (*Ruta graveolens Linn*.)

Ensured that is free from dust particles and sand , dried in shade for 1-2 days and in sunlight for 1 day.[2]

### Method of preparation:

All the ingredients other than *karkandu* are dried and powdered. The mixture is mixed with chena *karkandu* and powdered as per SOP for *chooranam* and is stored in a dry airtight container

Dosage: *kaal ruba edai* (3 grams) with water bd

## Biochemical analysis

### Methodology

### Preparation of extract:

10 gm of *Aruvadha chooranam* was measured accurately and placed in 250 ml of clean beaker and added with 250 ml of distilled water. Then it was boiled well for 10 minutes. Then it was cooled and filtered in a 100 ml volumetric flask and made up to 100 ml with distilled water. This fluid was taken for analysis.

## Qualitative analysis

**Table 2: Inference from qualitative analysis of thetrial drug Aruvadha chooranam.**

| | Experiment | Observation | Inference |
|---|---|---|---|
| 1. | **Appearance of sample** | Amber coloured fine aromatic powder | - |
| **2.** | **Solubility**<br>Little of the sample was shaken well and mixed with distilled water. | Completely soluble | - |
| **3.** | **Action of heat:**<br>A small amount of the sample was taken in a dry test tube and heated gently at first and then strong. | White fumes evolved | Presence of Carbonate |

| | | | |
|---|---|---|---|
| **4.** | **Flame test:**<br>A small amount of sample was made into paste with con.HCL in a watch class and introduced into no luminous part of the Bunsen flame. | No bluish green flame appeared. | Absence of Copper |
| **5.** | **Ash test:**<br>A filter paper was soaked into a mixture of sample and cobalt nitrate solution introduced into the Bunsen flame and ignited. | Yellow coloured flame appeared | Presence of Sodium |

## Test for acid radicals

| S. No | Experiment | Observation | Inference |
|---|---|---|---|
| **1.** | **Test for Chloride:**<br>2 ml of the above prepared solution was added with dil. HNO3 till the effervescence ceases. Then 2 ml of Silver nitrate solution was added. | No cloudy appearance present | Absence of Chloride |
| **2.** | **Test for Phosphate:**<br>2 ml of the extract was treated with 2 ml of Ammonium molybdate Solution and 2 ml of Con. HNO3. | Absence of cloudy yellow appearance | Absence of Phosphate |
| **3.** | **Test for Carbonate:**<br>2 ml of the extract was treated with 2 ml of Magnesium sulphate Solution. | **No** Cloudy appearance present | Absenceof Carbonate |
| **4.** | **Test for Nitrate:**<br>1 drop of the substance was heated with Copper tunics and concentrated H2SO4 and viewed the test tube vertically down. | No characteristic changes of formed | Absence of Nitrate |
| **5.** | **Test for Sulphide:**<br>1 ml of substance was treated with 2 ml of Con. HCL. | No rotten egg smelling gas evolved | Absence of Sulphide |
| **6.** | **Test for Fluoride and Oxalate:**<br>2 ml of the extract was added with 2 ml of dis. Acetic acid and 2 ml Calcium chloride solution and heated. | No characteristic changes observed | Absence of fluoride and Oxalate |
| **7.** | **Test for Nitrite:**<br>3drops of the extract was placed on the filter paper on that 2 drops of Acetic acid and 2 drops of Benzidine solution was | No characteristic changes observed | Absence of Nitrite |
| **8.** | **Test of Borate:**<br>2 pinches of the substances were made into paste by sulphuric acid alcohol (95%) and introduce into blue Flame. | Bluish yellow coloured flame not appeared. | Absence of Borate |

## Test for basic radicals

| S. No | Experiment | Observation | Inference |
|---|---|---|---|
| 1. | **Test for Copper:** One pinch of substance was made into paste with Con. HCl in a watch glass and introduced into the non- luminous part of the flame. | No blue coloured flame appeared | Absence of copper |
| 2. | **Test for Aluminum:** To the 2 ml of the extract Sodium hydroxide was added in drops to excess. | Cloudy appearance present | Absence of Aluminium |
| 3. | **Test for Iron:** To the 2 ml of extract add 2 ml of ammonium thiocynate solution. To the 2 ml of extract add 2 ml ammonium Thiocynate solution and 2 ml of con HNO3 was added. | Mild red colour appeared | Presence of Iron |
| 4. | **Test for Zinc:** To 2ml of the extract sodium hydroxide solution was added in drops to excess. | White precipitate appeared. | Presenceof Zinc |
| 5. | **Test for Calcium:** 2 ml of the extract was added with 2 ml of 4% ammonium oxalate solution. | Cloudy appearance | Presence of Calcium |
| 6. | **Test for Magnesium:** To 2 ml of extract sodium hydroxide solution was added in drops to excess. | White precipitate was not appeared. | Absence of Magnesium |
| 7. | **Test for Ammonium:** To 2 ml of extract few ml of Nessler's reagent and excess of sodium hydroxide solution were added. | No brown colour appeared | Absence of ammonium |
| 8. | **Test for Potassium:** 1 ml of substance was treated with 2 ml of sodium and then treated with 2 ml of cobalt nitrate in 30% glacial acetic acid. | yellowish precipitate was obtained. | Presence of Potassium |
| 9. | **Test for Sodium:** 2 pinches of the substance was made into paste by using HCL and introduced into the blue flame of Bunsen burner. | yellow colour flame appeared. | Presence of Sodium |
| 10. | **Test for Mercury:** 2 ml of the extract was treated with 2 ml of sodium hydroxide solution. | White precipitate was not appeared. | Absence of Mercury |
| 11. | **Test for Arsenic:** 2 ml of the extract was treated with 2 ml of sodium hydroxide solution. | White precipitate was not appeared. | Absence of Arsenic |

**Miscellaneous**

| S. No | Experiment | Observation | Inference |
|---|---|---|---|
| 1. | **Test for reducing sugar:** 5 ml of Benedict's qualitative solution was taken in a test tube and allowed to boil for two minutes and added 8 to 10 drops of theextract and again boiled it for 2 minutes, the colour was noted | Greenish blue colour developed. | Presence of Reducing sugar. |
| 2. | **Test for alkaloids:** 2 ml of extract was treated with 2 ml of picric acid. | Yellow colour | Presence of Alkaloid |
| 3. | **Test for Tannic acid:** 2 ml of extract was treated with 2 ml of ferric chloride solution. | Black colour Precipitate was not appeared. | Absence of Tannic acid. |
| 4. | **Test for Unsaturated compounds:** To 2 ml of extract 2 ml of potassium permanganate solution was added. | Potassium permanganate was not de-coloured. | Absence of Unsaturated compounds |
| 5. | **Test for Amino acids:** 2 drops of the extract were placed on a filter paper and dried well | No violet colour. | Absence of Amino acids |
| 6. | **Test for type of compound:** 2ml of the extract was treated 2ml of ferric chloride solution. | No green colour<br>No red colour developed.<br>No violet colour .<br>No blue colour developed. | Oxyquinole,epinephrine,pyrocatechol absent Anti pyrine, Aliphatic amino acid and meconic acid absent. Apomorphine, Salicylate, Resorcinol are absent.<br>Morphine, Phenol cresol and Hydro quinine are absent. |

Source : Report of biochemical lab

## Results and Discussion

### Interpretation:

The biochemical analysis of the trial drug aruvadha chooranam was tabulated above in table.the trial drug aruvadha chooranam contains,

- **Carbonate**
- **Sodium**
- **Potassium**
- **Calcium**
- **Iron**
- **Zinc**
- **Alkaloid**
- **Reducing sugar**
- **Sulphate**

Carbonate serves as a component of the major buffer system thereby playing a critical role in PH Homeostasis. It is also utilized by a variety of ion transporters totransportions and organic substrates across cell membranes[3].Sodium is an essential nutrient involved in the maintenance of normal cellular homeostasis and in the regulation of fluid and electrolyte balance and blood pressure (BP). Its role is crucial for maintaining ECF volume and is equally important for the excitability of muscle and nerve cells and for the transport of nutrients and substrates through plasma membrane[4]. Potassium plays important roles in protecting against hypertension and, in improving bone health. The potassium salts have a broad range of health benefits to the heart, kidney, bone, and other tissues[5]. Calcium is very essential in muscle contraction, oocyte activation, building strong bones and teeth, blood clotting, nerve impulse, transmission, regulating heart beat and fluid balance within cells[6]. Iron is an essential element for human beings by participating in a wide variety of metabolic processes, including oxygen transport, DNA synthesis, and electron transport. Iron is needed for the transportation of oxygen around your body. Iron is required for the production of red blood cells, but it's also part of haemoglobin binding to the oxygen and thus facilitating its transport from the lungs via the arteries to all cells throughout the body[7].

Body growth and development is strictly dependent on Zn. The nervous, reproductive and immune systems are particularly influenced by Zn[8]. Sulphate molecules plays a significant physiological role in many of the molecular events that regulate mammalian growth and development[9].

## Conclusion

Aruvadha chooranam is a siddha polyherbal formulation taken from the siddha classic textbook. This medicine is mainly indicated for *Eeral kulaiyil undana upathiravam*(disorders of liver and biliary tract), *Nenju karakarapu*(heartburn), *Pasi mandham*(anorexia), *Nithiraiyinmai*(insomnia), *Mugavaadham* (facial palsy), *Paarvai mandham* (diminished vision), *Kaathiraichal* (tinnitis), *Indhiriya nashtam* (reduced sperm count), *Kozhaikattu*(cold), and *Moorchai rogam*(epilepsy). The activity of the drug in the treatment of the above diseases may be due to the presence of Carbonate, sodium, pottasium, iron, zinc, calcium, sulphate, carbonate, reducing sugar in the given formulation. Further, elaborate analysis studies and research work is needed to evaluate its effectiveness and potency.

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