



Analytical study of Sarivadi decoction - An Ayurveda remedy for management of ADHD children

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Introduction: Sarivadi decoction is a polyherbal formulation, it is used by Piththaja Unmada Chikithsa in Sri Lankan Traditional Medical system mention on Deshiya Chikithsa Sangraha (page no. 633) six herbs included decoction of Sarivadi ingredients are Sariva (*Hemidesmus indicus*), Shatavari (*Asparagus racemosus* Willd), Yashtimadu (*Glycyrrhiza glabra*), Draksha (*Vitis vinifera*), Shwetha Chandana (*Santalum album*), Musthaka, (*Cyperus rotundus*).

Aim of the study: Importance of standardization and quality check of herbal drugs can be passed through the various analytical studies. Such as physico-chemical, Phyto chemical, microbial analysis, heavy metals etc.

Materials and Methods: Pre-authenticated raw drugs were procured, Sarivadi decoction was prepared at the pharmacy, National Ayurveda Teaching Hospital in Borella. Organoleptic parameters, Heavy metals analysis, Thin Layer Chromatography (TLC) of Sarivadi decoction were done at industrial of Technical Institute, Sri Lanka and Physico Chemical Analysis and Microbial Analysis of Sarivadi Decoction were done at botany laboratory in Science Faculty University of Colombo.

Results: In pharmaceutical parameters, the pH value was 5.52, sugar concentration was 10.89 mg/ml, Titratable acidity value was 4.7×10^{-3} moldm⁻³, TLC values of the standard mixture of raw materials of Sarivadi decoction at 254 nm and at 366 nm showed 14 and 14 spots respectively; and TLC values of sample of Sarivadi decoction at 254 nm and at 366 nm showed 10 spots each. In microbial analysis of Sarivadi Decoction showed no any contamination upto 14 days.

Conclusion: This study has generated preliminary data on physicochemical parameters, TLC, heavy metal analysis and microscopic analysis of Sarivadi Decoction. This fingerprinting can be useful for future researchers to reproduce this formulation and to establish the QC parameter of Sarivadi Decoction.

Keywords: Sarivadi decoction, Polyherbal formulation, Piththaja Unmada Chikithsa, Ayurveda, *Hemidesmus indicus* (Sariva), Standardization of herbal drugs, Herbal drug authentication

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Introduction

The Sri Lankan Traditional Medical System is a rich heritage of herbal practices with therapeutic uses of over thousands medicinal plants. Traditional medical system pharmacology uses herbal remedies in many forms like fresh juice (*Svarasa*), herbal paste (*Kalka*), herbal powder (*Churna*), decoction (*Kwatha*), distilled waters (*Arka*), hot infusion (*Phanta*), cold infusion (*Hima*), herbal jams and jellies (*Paka*, *Leha*, *Avaleha*), medicated wines (*Arishta*, *Asava*), tinctures, *Gugguls* (resin extract of Commiphora), alkaline extracts (*Ksara*), medicated ghee (*Siddha Ghrita*), medicated oil (*Siddha Taila*), minerals (*Rasasastra*). *Kwatha* (decoction) is one amongst the major form of the formulations used in Ayurveda to treat various ailments and diseases.

Sarivadi decoction is a polyherbal formulation, which contains six herbs i.e., *Sariva*[1] (*Hemidesmus indicus* L), *Shathavari*[1] (*Asparagus racemosus* willd) *Draksha*[2] (*Vitis vinifera* L), *Yashtimadu*[1] (*Glycyrrhiza glabra* L), *Musthaka*3 (*Cyperus rotundus* L) and *Shwetha Chandana*[2] (*Santalum album* L). This decoction is used by Ayurveda and Traditional medical practitioners for *Pitthaja Unmada* and other diseases in Sri Lanka mentioned in *Deshiya Chikithsa Sangraha*. [5] Quantitative and qualitative analysis of this formation is important for the development of traditional medicine but it is not available till date.

Aim and Objective

The main objective of this study is to developed standard parameters for *Sarivadi* decoction.

Materials and Methods

The Ingredients of *Sarivadi* Decoction (plants materials) were collected from the Gaboss Lane (Petah) and Suppliers in National Ayurveda Hospital, Sri Lanka. Collected raw drugs was authenticated and identified by Bandaranayake Memorial Research Institute in Sri Lanka.

Table 1: Ingredients of *Sarivadi* Decoction

Ingredients	Botanical names	Part of plant	Quantity
Sariva	<i>Hemidesmus indicus</i> (L.)	Root	Part 1
Shathavari	<i>Asparagus racemosus</i> (L.)	Rhizome	Part 1
Draksha	<i>Vitex vinifera</i> (L)	Fruit	Part 1
Musthaka	<i>Cyperus rotundos</i> (L.)	Rhizome	Part 1
Yashtimadu	<i>Glycyrrhiza glabra</i> (L.)	Stem	Part 1
Shwetha Chandana	<i>Santalum album</i>	bark	Part 1

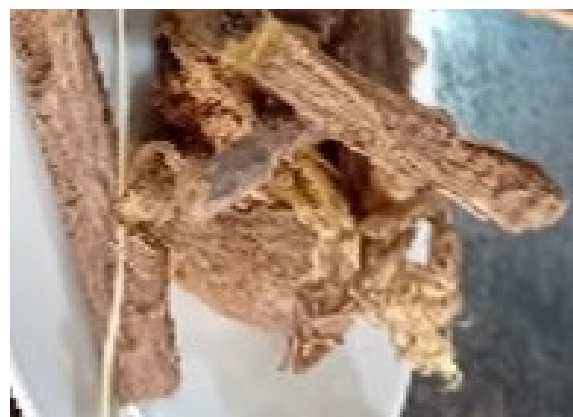
Figures 1: Preparation of *Sarivadi* decoction



a. Sariva



b. Draksha



c. Yashtimadu



d. Shathavari



e. Shwetha chandana



f. Musthaka



g. Decoction of Sarivadi

Preparation of *Sarivadi* decoction

Sarivadi decoction were prepared at Ayurveda pharmacy in National Ayurveda Teaching Hospital in Colombo. Decoction was produced according to *Sarangadhara Samhitha*. [5]

One part of coarsely ground drug (dry herb) by weight is taken and 16 parts water by volume is added to it. It is then reduced to 4 parts of the original volume of water.

Table 2: Physico-chemical Analysis of decoction of *Sarivadi*

Average concentration in original sample	0.1089 mg/ml
Sugar concentration of 100 times diluted	10.89 mg/ml.
<i>Sarivadi</i> decoction	Dark brown liquid.
pH value	5.52
Titrate acidity average titre	0.47 cm ³
Concentration of NaOH used	0.1M

Microorganisms' analysis was done at botany lab in science faculty, university of Colombo. To prepare decimal dilutions of 10⁻², 10⁻³, 10⁻⁴, and others as needed, separate sterile pipets were used to transfer 10 mL of the previous dilution into 90 mL of sterile diluent. Care was taken to mix thoroughly while avoiding foam formation. Each dilution was shaken properly, and if left standing for more than three minutes before pipetting into Petri dishes, it was re-shaken to ensure homogeneity. [6]

Next, 1 ml of each dilution was pipetted into separate, duplicate, and appropriately labelled Petri dishes. Within 15 minutes of the original dilution, 12–15 mL of agar, cooled to 45±1°C, was added to each plate. A dilution water control was also prepared. The sample dilution and agar medium were immediately mixed thoroughly and uniformly by rotating and moving the plates back and forth on a flat, level surface. The agar was allowed to solidify before inverting the Petri dishes and incubating them promptly at 35°C for 48±2 2 hours.

The average sample volume used was 0.20 cm³. The concentration of NaOH used in the process was 0.1 M, with the dissociation reaction represented as $H^{+} + OH^{-} \rightarrow H_2O$. The sample was diluted ten times, with a total volume of 10 cm³ used. The hydrogen ion concentration ([H⁺]) was determined to be $2.0 \times 10^{-3} \text{ moldm}^{-3}$.

Pharmaceutical study

Physico-chemical analysis done at botany lab in science faculty university of Colombo. TLC and Heavy Metals analysis was done at Industrial of Technical Institute Sri Lanka. TLC fingerprint profile of the sample was compared with the TLC fingerprint profile of the standard mixture of raw materials in a ratio of 1:1(w/w) provided by the manufacturer: result of physico chemicals *sarivadi* decoction pH value 5.52, titratable acidity for *Sarivadi* decoction average titter =0.47 cm³ concentration of NaOH used=0.1M, $H^{+} + OH^{-} \rightarrow H_2O$ sample volumes diluted 10 times.

VOLUME of the sample used = 10cm³ H + concentration = 4.7*10⁻³mol dm⁻³. Total sugar content by phenol sulphuric acid method. Absorbance of 490nm with different concentration of working standard of glucose solution.

Observations and Results

Table 3: Heavy metals of *Sarivadi* Decoction

Lead (Pb)-	Not detected
Cadmium (Cd)-	Not detected
Arsenic (As)-	not detected
Mercury (Hg)-	not detected

Table 4: Thin layer chromatography result of *Sarivadi* decoction

Rf values and colors of the standard mixture of raw materials provided by the manufacturer		Rf values and colors of the sample decoction provided by the manufacturer	
Before spraying	After spraying	Before spraying	After spraying
λ 254nm & λ 366nm		λ 254nm & λ 366nm	
0.05	0.02 (Brown)	0.05	0.02 (brown)
0.09	0.03 (blue)	0.16	0.03 (blue)
0.11	0.05 (pink)	0.24	0.05 (pink)
0.16	0.09 (salmon pink)	0.30	0.09 (salmon pink)
0.24	0.13 (pink)	0.77	0.38 (light blue)
0.30	0.24 (light purple)	0.84	0.48 (pink)
0.77	0.38 (light blue)	0.90	0.57 (light purple)
0.84	0.48 (pink)		0.86 (purple)
0.90	0.57 (light purple)		0.94 (purple)
	0.65 (light purple)		0.99 (purple)
	0.81 (light purple)		
	0.86 (purple)		
	0.94 (purple)		
	0.99 (purple)		

Table 5: Testing sugar content of *Sarivadi* decoction by using Phenol Sulphuric acid method

Concentration mg/ml	Absorbance
0.02	0.259
0.04	0.958
0.06	1.154
0.08	3.115
0.1	3.259

It has identified that average concentration sugar in the original sample of *Sarivadi* decoction *Kasaya* 0.1089mg/ml.

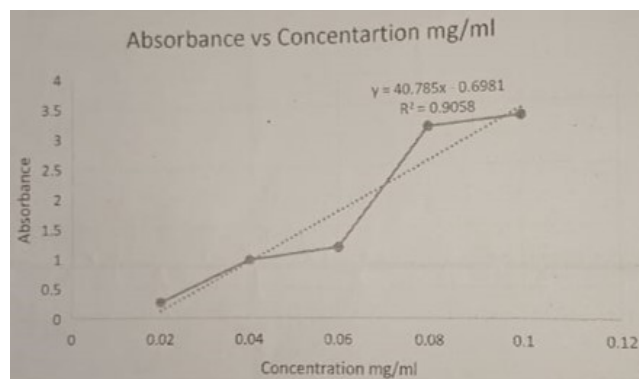


Figure 2: Shows absorption vs concentration of sugar of *Sarivadi* decoction

Table 6: Microbiological quality of sample

Aerobic plate count (CFU/ml)		Yeast and mould count (CFU/ml)		Coliform count (MPN/100ml)		PH	
Days 07	Days 14	Days 07	Days 14	Days 07	Days 14	Days 07	Days 14
0	0	0	0	0	0	5.61	5.65

Discussion

In this Analytical study, Heavy metal test for *Sarivadi* Decoction (Table no. 03) have not detected Lead (Pb), Cadmium (Cd), Arsenic (As) and Mercury (Hg). Thin Layer Chromatography (TLC) Method 28 TLC fingerprint profile of the sample decoction was compared with the TLC fingerprint profile of the standard mixture of raw materials in a ratio of 1:1 (w/w) provided by the manufacturer. Sample was extracted into dichloromethane, concentrated and spotted on pre-coated TLC plate. TLC parameters: Plate Silica gel GF254 pre coated Solvent System- Dichloromethane: Cyclohexane 4.8 0.2 Direct evaluation - λ 254 nm & 366nm Spray reagent - vanillin sulphate and heated at 105°C for 5min. Identification TLC analysis 29 30 Identification of Rf values and colors of the standard mixture of raw materials and provided by the manufacturer and identification of Rf values and colors of the sample decoction was provided by the manufacturer were approximately similar according to the Table no. 04. TLC fingerprint profile of the sample has similarities in terms of Rf values and colors to the TLC fingerprint profile of the standard mixture of raw materials made out of, provided by the manufacturer claiming to contain in the products

Also, this reveals that sugar absorption level of the *Sarivadi* decoction is very low which was presenting it as 0.1089mg/ml in figure 2. Microbial analytical results of the *Sarivadi* decoction.

According to test of microbial quality of sample of *Sarivadi* decoction, it has proved that Aerobic plate count, Yeast and Mould Count and Coliform count is zero and pH value in day 7 and day 14 were 5.61 5.65 respectively. pH value suggests decoction acidity nature in starting phase. According to results, it has proved that *Sarivadi* decoction is safe to use as internal medication in children.

Conclusion

This study has generated preliminary data on physicochemical parameters, TLC, heavy metal analysis and microscopic analysis of *Sarivadi* Decoction. This fingerprinting can be useful for future researchers to reproduce this formulation and to establish the QC parameter of *Sarivadi* Decoction.

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