



A Comparative Physicochemical and Phytochemical studies of Kashaya's (Aqueous extract) Prepared from Leaves, Roots and Stem Barks of *Bruhatpanchamoola* (A Group of Five Perennial Plants)

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Abstract

Bruhatpanchmoola is a ayurvedic formulation of five perennial plants roots i.e. Bilva {*Aegle marmelos* (L.) Corr.}, Gambhari (*Gmelina arborea*(L.)), Agnimanth (*Clerodendrum phlomoidis* L.f.), Shyonaka {*Oroxylum indicum* (L.) Vent.} and Patla {*Stereospermum suaveolens*(Roxb.) DC.}. Bruhatpanchmoola is also known as Mahatpanchmoola.² Extensive usages of Bruhatpanchmoola plants single or in formulation led to scarcity of the plants, amongst them Shyonaka {*Oroxylum indicum*(L.) Vent.} and Patla {*Stereospermum suaveolens* (Roxb.) DC.} Listed under endangered plants^{4,5}. Bruhat panchmoola taken in Kashaya form (Aqueous Extract). The study reveals that roots of Bruhatpanchmoola can be substituted by stem bark or leaves.

Keywords

Bruhatpanchmoola, ayurved, Bilva {*Aegle marmelos* (L.) Corr.}, Gambhari (*Gmelina arborea* (L.)), Agnimanth (*Clerodendrum phlomoidis* L.f.), Shyonaka {*Oroxylum indicum*(L.) Vent.} and Patla {*Stereospermum suaveolens* (Roxb.) DC.}. physicochemical, phytochemical, roots, leaves, stem barks, Kashaya (Aqueous Extract).

INTRODUCTION

Dashmoola is common ingredient in most of the ayurvedic formulation. The Ayurvedic Patent Medicines mentioned in the Ayurvedic formulary contains Dashmoola drugs about 20 % of total

formulations. In the Ayurvedic formulations of India Part - I & II, the Dashmoola drugs contains minimum 48 & maximum 82 formulations out of 635 total formulations some of the formulae are in kashaya form¹.

Dashmoola includes Bruhatpanchmoola i.e. five perennials and Laghupanchmoola i.e. five herbs. Bruhatpanchmoola is a formulation of five perennial plants roots i.e. Bilva {*Aegle marmelos* (L.) Corr.}, Gambhari (*Gmelina arborea* (L.)), Agnimanth (*Clerodendrum phlomoides* L.f.), Shyonaka {*Oroxylum indicum* (L.) Vent.} and Patla {*Stereospermum suaveolens* (Roxb.) DC.}. Bruhatpanchmoola is also known as Mahatpanchmoola². The Bruhatpanchmoola again mentioned in Bhav Prakash, said to be used as Kapha-vatashamaka (which diminishes Kapha-vata related ailments means Anti-inflammatory and Analgesic activity)³. Bruhatpanchmoola and its components are generally used in Kashaya (Aqueous Extract) form. Extensive usage of Bruhatpanchmoola plants single or in formulation led to scarcity of the plants, amongst them Shyonaka {*Oroxylum indicum* (L.) Vent.} and Patla {*Stereospermum suaveolens* (Roxb.) DC.} Listed under endangered plants^{4,5}. Further other three plants are facing same situations. To meet the increased demand of Bruhatpanchmoola and conservation of plants requirement of substitute the roots by arial parts. With this intention this study was planned to evaluate the physicochemical & phytochemical properties of Roots, Leaves & stembarks of Bruhatpanchmoola.

MATERIAL & METHODS

- Collection of Roots, Leaves & stem barks from natural Habitat.
- Preparation of Kashaya single & Combinations:
- Analytical study of Kashayas
 - Physico-Chemical Analysis of
 - Preliminary phytochemical Studies of Kashayas.

a) Collection of Study Samples:

Roots, Leaves & Stem Barks of Bilwa, Agnimanth & Gambhari were collected from Narsingpur Belagavi Karnataka and Patala & shyonak collected from Rahuri Maharashtra. Collected plant materials were Identified & authenticated from Central Research facility KAHER's Shri. B.M.K. Ayurved College Belagavi.

b) Preparation of kashayas (Aqueous Extract)⁵:

Kashayas were prepared by mixing plant drug (coarse powder) and water in 1:16 ratio, boiled and reducing to 1/8th portion.

Procedure of Kashaya preparation of Single Drugs & Combinations:

i. Soaking of Coarse Powder:

- 20 gm Coarse Powder of Bilva root was taken in stainless steel vessel.
- Added with 320 ml potable water.
- Kept for soaking for overnight.

ii. Boiling

- Vessel containing soaked mixture was kept on gas burner for boiling.
- Boiling was done on moderate fire with intermittent stirring.
- Boiling was done till water reduced to 1/8th portion (40 ml).

iii. Filtering & Storage

- Kashaya was filtered after self-cooling.
- Stored in a sterilized vessel.

Similarly, kashayas of single drugs & combinations were prepared and used for further research studies.

c) Analytical study of Kashayas (Aqueous extracts)^{6,7}

a. Physicochemical study of kashaya:

Parameters selected:

- Organoleptic Evaluation
- Total solids
- Specific gravity
- pH

1) Organoleptic evaluation:

Qualitative evaluation based on sensory profiles refers to observation by colour, odour, taste & Touch were done.

2) Total Solids:

Transferred 5 gm of the clear Kashayain to a pre-weighed evaporable dish, and evaporated to dryness on a water bath, then kept for drying dry at 105°C for 3 hours in oven. After cooling the dish containing the residue kept in a desiccator for 30 min, then weighed it immediately.

$$\text{Total Solids: } \frac{\text{Weight of residue}}{\text{Weight of Kashaya taken}} \times 100$$

3) Specific Gravity:

The specific gravity of a kashaya was the weight of a given volume of the kashaya at 25° (unless otherwise

specified) compared with the weight of an equal volume of water at the same temperature.

$$\text{Specific gravity: } \frac{\text{Weight of Sample}}{\text{Weight of Kashaya water}}$$

4) pH Value:

Operate the pH meter and electrode system according to manufacturer's instructions. Standardize the meter & electrodes with 0.05 M Potassium hydrogen phthalate (pH 4.00) when measuring an acid solution or with 0.05 m sodium borate when measuring an alkaline solution. At the end of a set of measurements take & reading of the solution used to standardize the meter & electrodes. This reading should not differ by more than 0.02 from original value at which the apparatus was standardized.

b. Phytochemical study of kashaya⁵:

Kashayas prepared from each plants parts & their combinations were subjected for following phytochemical analysis

Test for Carbohydrates: *Molisch's Test (General Test)*: 2 – 3 ml aq. Extract + few drops of alpha naphthol solution in alcohol shake and add concentrated H₂SO₄ from sides of test tube - Violet ring is formed at the junction of two liquids.

Test for Reducing Sugars: *Benedict's test*: Mix equal volume of Benedict's reagent and test solution in the test tube. Heat in boiling water bat for 5 minutes. Solution appears green, yellow or red depending on amount of reducing sugar present in test solution.

Test for Monosaccharaides: *Barfoed's Test*: Mix equal volume of Barfoed's reagent and test solution. Heat for 1 –2 minutes in boiling water bath and cool. Red precipitate is observed

Tests for Hexose Sugars: *Selwinoff's Test (for Ketohexose like fructose)*: Heat 3 ml Selwinoff's reagent and 1 ml test solution in boiling water bath for 1 to 2 minutes. Red colour is found.

Test for Proteins: *Million's Test for Proteins*: Mix 3 ml. T. S. with 5 ml. Millions Reagent gives white precipitate. Warm precipitate turns brick red or the precipitate dissolves giving red coloured solution.

Tests for Amino Acids: *Test for Tyrosine*: Heat 3 ml T. S. and 3 drops Million's reagent solution. Solution shows dark red colour.

Tests for Tannins & Phenolic Compounds: To 2–3 ml of aqueous or alcoholic extracts, add few drops Lead acetate solution White Precipitate.

Tests for Steroids: *Salkowski reaction*: To 2 ml of extract, add 2 ml of chloroform and 2 ml concentrated H₂SO₄. Shake well. Chloroform layer appears. Red and acid layer shows greenish yellow fluorescence.

Tests for Cardiac Glycosides: *Test for Deoxysugars (Keller – Killani Test)*: To 2 ml extract, add glacial acetic acid, one drop 5% FeCl₃ and concentrated H₂SO₄. Reddish brown colour appears at junction of the two liquid layers and upper layer appears bluish green.

Tests for Anthraquinone Glycoside: *Borntrager's test*: to 3ml extract add dil. H₂SO₄ Boil and filter. To cold filtrate add equal volume of benzene or chloroform. Shake well separate the organic solvent. Add ammonia. Ammonical layer turns pink or red.

Tests for Flavonoids: Take a small quantity of residue. Add lead acetate solution. Yellow coloured precipitate formed.

Test for Pentose Sugar: *Bial's Orcinol test*: to boiling Bial's reagent add few drops of test solution. Green or purple coloration appears.

Test for Alkaloid Hager's test: 2-3 ml extract add Hager's reagent yellow coloured precipitate formed.

RESULTS

Table No.1 showing organoleptic characters of kashays

Plants	Colour	Odour	Taste	Colour	Odour	Taste	Colour	Odour	Taste
Root kashaya			Stem bark Kashaya			Leaf Kashaya			
Bilwa	Brown	Odourless	Astringent	Brown	Odourless	Astringent	Dark Brown	Astringent	Characteristic
Aagnimanth	Brown	Odourless	Astringent	Brown	Odourless	Astringent	Brown	Odourless	Bitter
Patala	Brown	Odourless	Astringent	Brown	Odourless	Bitter	Light Brown	Odourless	Astringent
Sshyonak	Brown	Odourless	Bitter	Brown	Odourless	Astringent	Brown	Odourless	Bitter
Gambhari	Brown	Odourless	Bitter	Brown	Odourless	Astringent	Brown	Odourless	Bitter
Combinations	Brown	Odourless	Bitter	Brown	Odourless	Astringent	Dark Brown	Chataristic	Astringent

Table No.2 showing Physicochemical analysis of kashayas

Plants	Total Solids	pH	Specific Gravity	Total Solids	pH	Specific Gravity	Total Solids	pH	Specific Gravity
	Root Kashaya			Stem Bark kashaya			Leaf kashaya		
Bilwa	9.632 %	6.07	1.038	9.029%	6.05	1.041	10.231%	5.71	1.043
Aagnimanth	5.982%	6.05	1.033	6.076%	6.01	1.042	13.94%	5.81	1.047
Patala	15.231%	5.89	1.048	19.310%	6.01	1.064	17.06%	5.58	1.053
Shyonak	18.172%	5.75	1.042	9.127%	6.03	1.039	13.606%	5.41	1.045
Gambhari	18.409%	5.80	1.061	18.623%	6.05	1.061	8.135%	5.53	1.035
Combinations	18.370%	5.82	1.040	11.120%	5.72	1.037	15.076%	6.03	1.049

Table no. 3 Showing Preliminary Phytochemical Analysis of Kashayas

Parts	CH	RS	MONO	PS	HS	PR	AA	ST	GL	AG	FL	AL	TP
Root													
Bilwa	+ ve	+ ve	+ ve	+ve		+ve	+ ve		-ve	+ve	+ ve		+ve
Agnimanth	+ ve	+ ve	+ ve	-ve		+ve	+ ve		-ve	-ve	+ ve		+ve
Patala	+ ve	+ ve	+ ve	+ve	Absent	+ve	+ ve	Absent	+ve	-ve	+ ve	Absent	+ve
Shyonak	+ ve	+ ve	+ ve	-ve		+ve	+ ve		+ve	-ve	+ ve		+ve
Gambhari	+ ve	+ ve	+ ve	+ve		+ve	+ ve		-ve	-ve	+ ve		+ve
BPR	+ ve	+ ve	+ ve	+ve		+ve	+ ve		+ve	-ve	+ ve		+ve
Stem Bark													
Bilwa	+ ve	+ ve	+ ve	+ve		+ve	+ ve		+ve		+ ve		+ve
Agnimanth	+ ve	+ ve	+ ve	+ve		+ve	+ ve		-ve		+ ve		+ve
Patala	+ ve	+ ve	+ ve	+ve	Absent	+ve	+ ve	Absent	-ve	Absent	+ ve	Absent	+ve
Shyonak	+ ve	+ ve	+ ve	-ve		+ve	+ ve		-ve		+ ve		+ve
Gambhari	+ ve	+ ve	+ ve	+ve		+ve	+ ve		+ve		+ ve		+ve
BPS	+ ve	+ ve	+ ve	+ve		+ve	+ ve		+ve		+ ve		+ve
Leaf													
Bilwa	+ ve	+ ve	+ ve	-ve		+ve	+ ve		+ve		+ ve		+ve
Agnimanth	+ ve	+ ve	+ ve	-ve		+ve	+ ve		-ve		+ ve		+ve
Patala	+ ve	+ ve	+ ve	-ve	Absent	+ve	+ ve	Absent	+ve	Absent	+ ve	Absent	+ve
Shyonak	+ ve	+ ve	+ ve	-ve		+ve	+ ve		-ve		+ ve		+ve
Gambhari	+ ve	+ ve	+ ve	-ve		+ve	+ ve		+ve		+ ve		+ve
BPL	+ ve	+ ve	+ ve	-ve		+ve	+ ve		+ve		+ ve		+ve

Abbreviations: BPR (Bruhatpanchmoola Root) BPS (Bruhatpanchmoola Stem Bark) BPL (Bruhatpanchmoola Stem Bark)

DISCUSSION

Physicochemical studies reveals that Bilwa root kashya contains 9.632% of total solids content and pH was 6.07, stem bark kashya contains 9.029% & pH 6.05 while in Bilwa leaf kashya contains 10.21% of Total solid & pH 5.71.

Agnimath root kashya contains 5.982% of total solids content and pH is 6.05, stem bark kashya contains 6.076% & pH 6.01 while leaf kashya contains 13.94% of Total solid & pH 5.81.

Patala root kashya contains 15.231% of total solids content and pH is 5.89, stem bark kashya contains 19.310% & pH 6.01 while leaf kashya contains 17.06% of Total solid & pH 5.58.

Shyonak root kashya contains 18.172% of total solids and pH was 5.75, stem bark kashya contains 9.127%

& pH 6.03 while leaf kashya contains 13.606% & pH 5.41

Gambhari roots kashya contains 18.409% of total solids & pH was 5.80, stem bark kashya contains 18.623% & pH 6.05 while leaf kashya contains 8.135% & pH 5.53

Specific gravity of all kashyas were not showed much difference when compared to respective plants parts kashayas.

Phytochemical study kashayas showed that Bilwa, Agnimanth, Patala & Shyonak root, Stem bark & Leaf kashya showed presence of Carbohydrate, reducing sugar, Monosaccharides, Protein, Amino acids, Flavonoids & Tannins.

In Bilwa pentose sugar showed presence in Bilwa root & stem bark kashaya not in leaf kashaya &

Cardiac glycoside showed presence in Bilwa stembark & leaf Kashaya not in root kashya. Anthraquinone glycosides showed presence in root kashya not in stem bark & leaf kashayas.

In Agnimath kashaya pentose sugar showed presence in stembark kashaya not in root & leaf kashya. Cardiac glycosides not showed presence in all agnimath kashaya.

In Patala pentose sugar showed presence in root & stem bark kashya not in leaf kashaya. Cardiac glycosides showed presence in root & leaf kashaya not in stem bark.

In shyonak pentose showed presence in stem bark kashya not root & leaf kashayas, cardiac glycosides showed presence in root kashaya not stem bark & leaf kashaya.

In Gambhari pentose sugar showed presence root & stembark kashaya not in leaf kashaya, Cardiac glycoside showed presence in Gambhari stembark & leaf kashaya not root kashaya.

Hexose sugar, steroids & Alkaloids not showed presence in Bilwa, Agnimanth, Patala, Shyonak & Gambhari any kashaya.

CONCLUSION

Study reveals all the plants root can be substituted by stem bark or leaves that helps to conserve the

plants. To bring in to therapeutic practice further experimental & clinical studies are required.

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