

Phytochemical screening and standardization of Chiruvilwadi Kashayam: An Ayurvedic polyherbal formulation

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Abstract

Chiruvilwadi Kashayam is a polyherbal Classical formulation mentioned in the text book 'Sahasrayoga', commonly used for the management of piles, it also cures the associated symptoms like constipation, indigestion, flatulence and anorexia. It is prepared out of six medicinal plants namely *Chiruvilwa* (*Holoptelea integrifolia* (Roxb.) Planch.) *Punarnava* (*Boerhavia diffusa* L.) *Pippali* (*Piper longum* L.) *Sunti* (*Zingiber officinale* Roscoe) *Citraka* (*Plumbago zeylanica* L.) and *Haritaki* (*Terminalia chebula* Retz.). Inadequate standardization of polyherbal formulations causes difficulty in validation of the efficacy and maintaining quality of the product. Hence an attempt has been made to standardize the quality parameters of Chiruvilwadi Kashayam by determining the primary qualitative phytochemical, physiochemical parameters and to develop TLC fingerprints. The primary phytochemicals like carbohydrates, sugar, reducing sugar, glycoside, flavonoid, phenol, saponin, alkaloid, tannin and coumarin were found in the kashayam. The data obtained in the present study will help as a reference document to maintain the quality standards of the formulation.

Keywords: Chiruvilwadi kashayam; Polyherbal; Phytochemical; Chromatography

1. Introduction

Ayurveda is one of the ancient medicine systems in India being practiced for thousands of years. History of medicine dates back practically to the existence of human civilization [1]. From the 4th century B.C. onwards, up to 12th Century A.D., the research process in Ayurveda was continuous and it was at its glory during the Golden era of Guptas [2].

The modern pharmaceuticals also realised the importance of Ayurveda and they derived number of compounds from herbal drugs for making effective drugs against many diseases. Proper mode of action, pharmacology, pharmacokinetics, and pharmacovigilance of many important Ayurvedic drugs and ayurvedic products are still not fully explored [3]. Due to lack of evidence action, these basic ideologies of Ayurveda is poorly acceptable scientifically. Validated research and advanced techniques are available in modern medicine hence it is almost the top in global health. Hence here is an urgent need to validate basic principles as well as drugs used in the ayurvedic system of medicine with the help of advanced research.

Herbs are enriched with biologically active phytochemicals and most of these are water soluble and are used in the manufacturing of *Kashaya* (decoctions) [4]. Chiruvilwadi Kashayam is an ayurvedic medicine mainly used for the treatment of piles, fistula, constipation, and indigestion [5]. It is also reported to treat varicocele [6]. It improves digestion and regulates metabolism. It gives relief from abdominal distension, improves appetite and relieves constipation. It is beneficial in hemorrhoids. It is used in the treatment of fissures and fistula.

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The fundamental research in Ayurveda is one of the most indeed part for the global acceptance. For the authentication of herbal/polyherbal Ayurvedic formulations, standardisation protocols using non-conventional analytical practices are therefore required [7]. Due to the lack of strong phytochemical analysis and mode of action of specific compounds studies are always pull back Ayurvedic system from modern concept. Hence an attempt has been made to study the primary phytochemical and TLC fingerprint studies of Chiruvilwadi Kashayam an Ayurvedic polyherbal formulation.

2. Material and methods

2.1. Collection of Raw Material

The raw materials were collected from raw material store of Sitaram Ayurveda Pvt. Ltd., Thrissur., identified and authenticated at pharmacognosy Division of Sitaram Ayurveda Pvt. Ltd. and the specimen samples were stored at Quality Control Division of Sitaram Ayurveda Pvt. Ltd. The ingredients and parts used in the preparation of Kashaya are listed in (Table 1).

2.2. Preparation of Kashaya (Decoction)

Chiruvilwadi Kashayam was prepared with the ratio mentioned in Table-1 at R&D Division of Sitaram Ayurveda Pvt. Ltd., Thrissur, Kerala.

Drugs were washed, dried properly and disintegrated. 48 gm (one pala) of disintegrated drugs were mixed with 768 ml of water (16 parts) and boiled in an earthen pot over a mild fire and reduced to 96 ml (1/8th) of the original quantity.

Table 1 List of herbal raw materials: Chiruvilwadi Kashayam

Sl.	Sanskrit Name	Botanical Name	Part used	Ratio
1.	<i>Chiruvilwa</i>	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Stem bark	1 part
2.	<i>Punarnava</i>	<i>Boerhaavia diffusa</i> L.	Root	1 part
3.	<i>Pippali</i>	<i>Piper longum</i> L.	Fruit	1 part
4.	<i>Sunti</i>	<i>Zingiber officinale</i> Roscoe	Rhizome	1 part
5.	<i>Citraka</i>	<i>Plumbago zeylanica</i> L.	Root	1 part
6.	<i>Haritaki</i>	<i>Terminalia chebula</i> Retz.	Fruit rind	1 part

2.3. Physicochemical Analysis of Raw Materials

Physicochemical analysis like Total Ash, Acid Insoluble Ash, Water Soluble Extractive and Alcohol Soluble Extractives of raw materials were carried out as per standard procedure mentioned in Ayurvedic Pharmacopeia of India [8].

2.4. Organoleptic and Physicochemical Assessment

The Organoleptic characters gives a general idea regarding the genuinity of the sample and it is very important feature in Ayurveda. Organoleptic parameters like colour odour and taste, primary physicochemical parameters like pH, Specific Gravity and Total Soluble Solids were analysed.

2.5. Preliminary Phytochemical Analysis

The presence or absence of preliminary phytochemical constituents like carbohydrate, sugar, reducing sugar, ketose, amino acid, protein, starch, quinone, glycoside, flavonoid, phenol, saponin, alkaloid, tannin and coumarin of Chiruvilwadi Kashaya was determined [9].

2.6. Thin Layer Chromatography (TLC) Fingerprint Analysis

Thin Layer Chromatographic fingerprint analysis were carried out for the separation of bands [10]. 20 ml sample refluxed with 40 ml chloroform for 1 hour; filtered and evaporated completely by water bath and the residue was dissolved in 1 ml chloroform. TLC was carried out with a slurry of the adsorbent silica gel G is coated uniformly on clean glass plates (10 x 5cm) using commercial spreader. The Chloroform extract of sample drug was applied (same sample as T-1 and T-2) in to the silica gel surface with a fine capillary tube at 2 cm above the lower end of the plate and allowed

to evaporate. The sample plate was carefully placed at an angle of 45° in the development chamber with the developing solvent keeping the capillary spotted area above the level of the solvent.

The plate was developed in Toluene: Ethyl acetate: Formic acid (5:4:1) as mobile phase, the developed plate was visualized under UV 254 and 366 nm and derivatized with Anisaldehyde- Sulphuric acid reagent and the images were captured.

3. Results and discussion

3.1. Physicochemical Analysis of Raw Materials

The physicochemical parameter is important in determination of adulterants and improper handling of drugs. Ash values are important quantitative standards and criterion to analyse the identity and purity of crude drugs especially in the powder form. Moreover, the total ash of a crude drug also reflects the care taken in drug preservation, and the purity of crude and the prepared drug. Acid insoluble ash is a part of total ash and measures the amount of silica present, especially as sand and siliceous earth. Water soluble ash is the water-soluble portion of the total ash. The physicochemical analysis of the raw materials is listed in the Table -2.

Table 2 Physicochemical analysis of raw materials - Chiruvilwadi kashayam

Sl.	Raw Material	Total Ash	Acid Insoluble Ash	Water Sol. Extractives	Alcohol Sol. Extractives
1.	<i>Holoptelea integrifolia</i>	6.47%	1.88%	11.14%	14.36%
2.	<i>Boerhaavia diffusa</i>	5.00%	1.84%	11.05%	6.12%
3.	<i>Plumbago zeylanica</i>	5.43%	1.84%	18.22%	14.62%
4.	<i>Terminalia chebula</i>	2.74%	1.93%	52.96%	43.12%
5.	<i>Piper longum</i>	6.97%	1.85%	44.10%	6.55%
6.	<i>Zingiber officinale</i>	4.88%	1.55%	10.10%	4.8%

3.2. Organoleptic and Physicochemical Assessment

Organoleptic and physicochemical assessment is the primary identification and quality evaluation of a product perceived by sense organs and with basic laboratory instruments. The organoleptic parameters of freshly prepared Chiruvilwadi kashayam were analysed and the details were listed in Table -3.

Table 3 Organoleptic and physicochemical parameters of Chiruvilwadi kashayam

Sl.	Parameters	Observations
1.	Colour	Dark brown
2.	Odour	Characteristic
3.	Taste	Bitter sour
4.	pH	4.38
5.	Specific Gravity	1.031
6.	Total Soluble Solids	7.00

3.3. Preliminary Phytochemical Analysis

The activity of a herb depends on the class of phytoconstituents or specific phytoconstituents being present in it. In majority, of the herbals which are in use the knowledge about these is fairly known. Therefore, it is necessary to devise a method of standardization based upon the presence of these chemicals. Hence the primary phytochemical analysis plays very important role in the efficacy of particular drug action. The phytochemical constituents present in Chiruvilwadi kashayam is listed in Table- 4.

Table 4 Phytochemical analysis of Chiruvilwadi kashayam

Sl.	Phytochemical constituents	Name of the test	Present (+) /Absent (-)
1.	Carbohydrate	Molisch's test	+
2.	Sugar	Benedict test	+
3.	Reducing sugar	Fehling's test	+
4.	Ketose	Seliwanoff's test	+
5.	Amino acid	Ninhydrin test	-
6.	Protein	Ninhydrin test	-
7.	Starch	K I test	-
8.	Quinone	H ₂ SO ₄	-
9.	Glycoside	Salkowski test	+
10.	Flavonoid	Alkaline reagent	+
11.	Phenol	Phenol reagent test	+
12.	Saponin	Foam test	+
13.	Alkaloid	Wagner reagent	-
14.	Tannin	Ferric chloride test	+
15.	Coumarin	NaOH test	+

'+' : Presence, '-' : Absence

3.4. Thin Layer Chromatography (TLC) Fingerprint Analysis

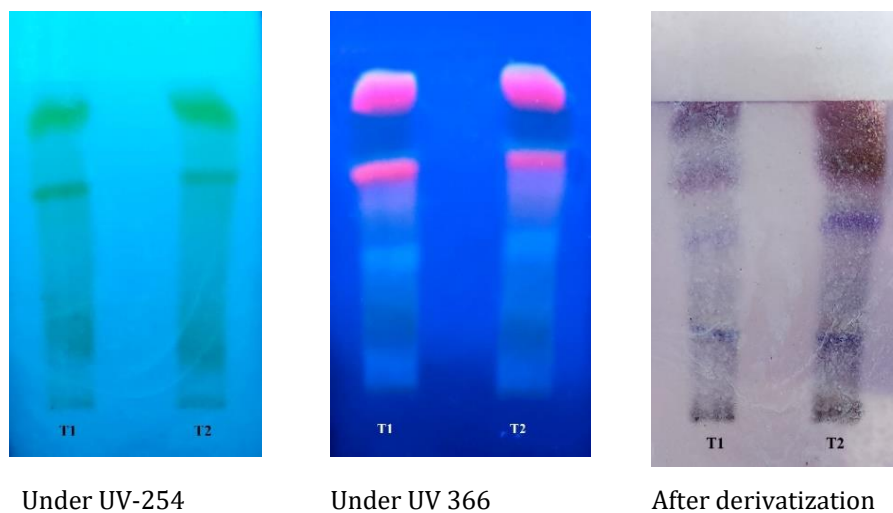


Figure 1 TLC profile of Chiruvilwadi kashayam

TLC is a very simple tool to standardize a drug, formulations and more relevant than other analytical methods. It is relatively simple, handy, easier, quick, convenient, efficient and inexpensive method for quick assessment of the quality of most of the herbal preparations. Chromatographic fingerprinting with its ability to characterize chemical composition of herbal drug products can serve as a useful tool for appraising batch to batch consistency [11]. TLC profile of Chiruvilwadi kashayam shows Rf values 0.2,0.35, 0.6 and 0.7 under UV 254, Under UV 366 Rf values are 0.15,0.2,0.25,0.35,0.4,0.53,0.58 and 0.7 and after derivatization Rf values are 0.2,0.35,0.47,0.58 ,0.6 and 0.7.

4. Conclusion

This study aims to step in the standardization of traditional medicines for its scientific acceptance. Chiruvilwadi Kashayam was characterized on the basis of organoleptic, physical, phytochemical and chromatographic fingerprint analysis. Bitter sour taste, dark brown colour, presence of carbohydrate, sugar, reducing sugar, ketose, glycoside,

flavonoid, phenol, saponin, tannin and coumarin were found to be characteristic of the Kashayam and these phytochemicals have potential applications for curing various diseases. TLC analysis using Toluene: Ethyl acetate: Formic acid (5:4:1) as mobile phase was found suitable for consistency evaluation of the kashayam. All these parameters may be employed as standard reference for quality control analysis of the formulation. Also, this type of scientific validation helps in developing new treatment protocols and it can be taken as a reference standard of Chiruvilwadi Kashayam.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors have no conflicts of interest to declare.

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Author's short biography

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