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Pharmaceutical Analysis of Phalatrikadi Syrup – A Polyherbal Ayurvedic Hematinic Drug

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Context: Concepts regarding standardization and quality control of Ayurvedic drugs can be traced back to the ancient times. Based on their observations, principles of drug processing and ideal qualities of finished drugs etc. have been documented. Even though the principles developed based upon the scientific parameters prevailing in those days, they are to be viewed and answered looking at the advancement of science and technology of present scenario.
Material and Methods: *Phalatrikadi* syrup a poly herbal formulation containing Haritaki, Bibhitaki, Amalaki, Guduchi, Vasa, Nimba Bhunimba and Katuka and was prepared and subjected to pharmacopeial procedures for analysis of organoleptic, physicochemical, phytochemical and fingerprinting for standardization.
Observation and Results: Findings are pH (Direct) 4.32, Specific gravity 1.389, Refractive Index 1.417, Viscosity (Ostwald) 397.82 , Loss on Drying 19.72%, and Total Ash 0.098%, Acid insoluble ash 0.00%, Total solids 80.27%, Total Sugar 76.92, Total Tannin 0.88%. A test for functional group shows presence of carbohydrates, reducing sugar, tannins, amino acids,saponin glycosides, flavonoids, and steroids in *Phalatrikadi* Syrup. Microbial test analysis of *Phalatrikadi* syrup showed no any microorganism contamination.
Conclusion: *Phalatrikadi* Syrup shows all values in the standard range as per API and suggestive of authenticate and standard pharmaceutical preparation of *Phalatrikadi* syrup.

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Keywords: Phalatrikadi syrup; polyherbal; physicochemical; HPTLC fingerprinting.

1. INTRODUCTION

According to *Ayurveda* a medical quartet with optimum qualities is an essential requisite for the treatment of many disease [1]. Drug is an important component among them. The drug should lend itself to diverse forms for delivery; have several desirable properties to counter diseases; be available in plenty; and be suitable for administration in line with time and location [2].The combinations of medicines described in the textbooks of *Ayurveda* are the outcome of thorough analysis and observations of clinical trials by the ancient Acharyas.

Phalatrikadi Kwath mentioned in the *Panduroga Cikitsa* of *Chakradatta* which is well known for its therapeutic and nutritive value in the management of Pandu (Anaemia) [3]. The ingredients are *Amalaki (Emblica Officinalis Gaertn.)*, Haritaki(*Terminalia chebula Retz.*), *Bibhitaki*(*Terminalia belerica Roxb.*), *Guduchi (Tinospora cordifolia willd.*),Vasa (Adathoda vasica Nees.),*Katuka*(*Picrorrhiza kurrao Royle.*),*Bhunimba* (Andrographis panniculata Pennel.), Nimba (*Azadiracta indica A. Juss*), *Sitakhanda* (Sugar candy) and Honey (Table 1). It is indicated in *Pandu*, *Kamala* and *Halimaka*. Antianemic effect of Phyallanthus emblica [4], Terminalia chebula [5] as well as hemopoietic action of Azadiracta indica [6] was proven in experimental studies. In paediatric age group palatability being at most concern the form of drug has been changed from *Kwath*(Decoction) to syrup which also enhances the shelf-life of the drug and makes convenient for the storage and consumption. Ancient form of drugs needs to be converted in to convenient forms using modern technology is much essential to accommodate in present life style

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In the present study, *Phalatrikadi* kwath is modified to *Phalatrikadi* syrup without altering the quantity of ingredients and subjected to analytical study through organoleptic, physico-chemical, phytochemical, and HPTLC finger printing methods.

2. MATERIALS AND METHODS

2.1 Collection, Identification and Authentication of Raw Drugs

Raw drugs procured from the herbal raw drug dealer from Vadodara, Gujrat. Then identification and authentication of all the raw drugs were done at ALARSIN pharmaceuticals, Mumbai.

2.2 Methodology of Preparation of *Phalatrikadi* Syrup

2.2.1 Preparation of *Phalatrikadi Kwath* (Decoction) [7]

Required quantity of *Amalaki, Haritaki, Bibhitaki, Guduchi, Vasa, Katuka, Bhunimba, Nimba* were pounded to form coarse powder and then soaked overnight in eight parts of potable water. On next day, this mixture was heated on medium flame in stainless steel vessel till the quantity of liquid reduced to one fourth and then filtered.

2.2.2 Preparation of syrup

To this filterd kwath, prescribed quantity of powdered sugar candy added and stirred till it dissolves completely, then whole mixture heated again on low flame untill solution attains onethread consistency. After cooling, honey was added into the syrup and was packed in sterile air tight container.

Phytochemical and Analytical Study: Organoleptic characters, physicochemical parameters, phytochemicalanalysis, microbial limit test and HPTLC study done at Vasu Research Centre, GIDC, Makarpura, Vadodara. (Sample ID- AD/20/033Dated: 06/02/2020).

Phalatrikadi syrup was analyzed by employing various analytical parameters. Organoleptic characters like colour, odour, consistency, taste were carried out.Physicochemical study to analyze Loss on Drying at 105^0C,Total Ash Value, Acid Insoluble Ash, pH, specific gravity, Refractive index, Viscosity and Total solidswas done [8,9].Phytochemical identification of Alkaloids, Flavonoids, Saponin glycoside, steroids, proteins, amino acids, carbohydrates, reducing sugar,were assessed as per standard procedure [10,9].Total sugar (%) by UV spectrophotometer, Total Tannin (%) were also estimated [10].Microbial limit test was also carried to find presence of organisms [8].

HPTLC Finger Printing [11,12,13]: 5 grams of syrup sample weighed and diluted with 10 ml of distilled water. Mixture transferred to a separate funnel and partition done with 20 ml of ethyl acetate. The layer of ethyl acetate collected and

procedure repeated with 15 ml of ethyl acetate. Both the ethyl acetate layers pooled in evaporating dish and evaporated till these are completely dried. Reconstituted the sample with 2 ml of ethyl acetate and obtained solution was applied on a pre coated MERCK-TLC/PHTLC silica gel 60 F_{254} on aluminum sheets to a band width of 10mm using CAMAG Linomat 5 – applicator. Phalatrikadi syrup plate was developed in Toluene: Ethyl acetate: Formic acid: Methnol in the ratio of 6:3:0.1:1 respectively. After derivatization in CAMAG-dip tank for one minute with Vanillin- sulphuric acid reagent visualized in short and long UV. The plate was scanned at 254 nm, 366 nm, 540 nm and R_f, colour spots and densitometric scan were recorded.

3. RESULTS AND DISCUSSION

Organoleptic characters of the *Phalatrikadi* syrup were illustrated in Table 2. The dark brown colour of *kwath* turned to brown after adding sugar into the syrup. Physicochemical parameters pH (Direct) of any liquid provides the quantitative indication of the acidity or alkalinity of a solution which was 4.32 i.e. acidic. Specific gravity of syrup reference value not less than 1.30, as Specific gravity of *Phalatrikadi* syrup was1.389 which is equal to the referred value, which suggests that the quality of prepared syrup is within normal limits. Refractive index 1.417, Viscosity (Ostwald) 397.82, loss on drying was 19.72%, Total Ash value 0.098% w/w, Acid insoluble ash 0.00% w/w and Total solids were 80.27.Total solids are the measure of the combined content of inorganic and organic substances present in the syrup. The presence of sugar particles in the syrup cause significant increase of Total solids in syrup. On Assay analysis Total Sugar by UV was 76.92 which includes both reducing and nonreducing sugars i.e. sugars with and without aldehyde and ketone group. Total Tannin was 0.88% (Table 2).

On phytochemical analysis of syrup, Carbohydrates, Reducing sugar, Tannin, Alkaloids and steroids are present in the sample (Table 3).Total microbial and fungal count was nil in *Phalatrikadi* syrup by Microbial limit test. (Table 4). Which indicates that the medicine was prepared in hygienically under aseptic condition. Thus, the self-preservative action of sugar in the Syrup. Due to high osmotic pressure in Syrup it does not allow the growth of bacteria, fungi and moulds, thus preventing decomposition.

Chromatographic study (HPTLC) of final product *Phalatrikadi syrup* carried to establish fingerprinting profile. Rf values and colour of the spots in chromatogram developed in Toluene: Ethyl acetate: Formic acid: Methanol in the ratio of 6:3:0.1:1 was recorded. TLC photo documentation revealed presence of many phytoconstituents with different Rf values and HPTLC densitometric scan of the plates showed numerous bands. Study revealed, at 254nm got 8 spots,densitometric scan at 254 nm revealed 8 peaks corresponding to 8 different compounds in the syrup, compounds with Rf - 0.14, 0.25, 0.36, 0.50, 0.56, 0.59, 0.67 and 0.90 (Fig. 1). At 366nm only 5 spots, densitometric scan at 366 nm revealed 5 peaks corresponding to 5 different compounds in the syrup, compounds with Rf - 0.25, 0.44, 0.50, 0.59 and 0.66were found and maximum R_f value was 0.66 in track1 (Fig. 2)and at 540nm 8 spots were found, densitometric scan at 540 nm revealed 8 peaks corresponding to 8 different compounds in the syrup, compounds with Rf - 0.13, 0.34, 0.37, 0.40, 0.51, 0.57, 0.64 and 0.81, maximum $R_f$value was 0.81 in track 1 (Fig. 3).

Table 1. Composition, used parts and quantity of drugs used in *Phalatrikadi* syrup

Name	Botanical name	Part used	Ratio
Amalaki	*Emblica officinalis Gaertn.*	Dried fruit	1 Part
Haritaki	*Terminalia chebula Retz.*	Dried fruit	1 Part
Bibhitaki	*Terminalia bellerica Roxb.*	Dried fruit	1 Part
Guduchi	*Tinospora cordifolia Willd.*	Stem	1 Part
Vasa	*Adathoda vasica A. Juss.*	Panchang	1 Parts
Katuka	*Picrorrhiza kurrao Royle.*	Rhizome	1 Part
Bhunimba	*Andrographis panniculata Pennel.*	Panchang	
Nimba	*Azadiracta indica Nees.*	Stem bark	
Sitakhanda	*Sugar candy*	-	70%w/v
Honey	*Honey*		$1/6^{th}$ part

Phalatrikadi syrup contain *Terminalia bellirica* [14] fruit its extracts and phyto -constituent ellagic acid exhibited appreciable radical scavenging, antioxidant and hepatoprotective activity in aceclofenac-induced liver injury which are important for treating Anemia.

Triphla churna have significant role to clearance of HBs Ag rapidly and normalise Liver Transminase in Hepatitis B infection and hence Phalatrikadi syrup also acting on Kamla [15].

Table 2. Organoleptic characters and physicochemical parameters of *Phatarikadi* Syrup

Sl. No	Parameters	Results
1	Description	Brown coloured viscous liquid with characteristic odour
2	pH (Direct)	4.32
3	Specific gravity	1.389
4	Refractive Index	1.417
5	Viscosity (Ostwald)	397.82
6	Loss on Drying	19.72%
7	Total Ash	0.098
8	Acid insoluble ash	0.00%
9	Total solids	80.27%
10	Total Sugar	76.92
11	Total Tannin	0.88

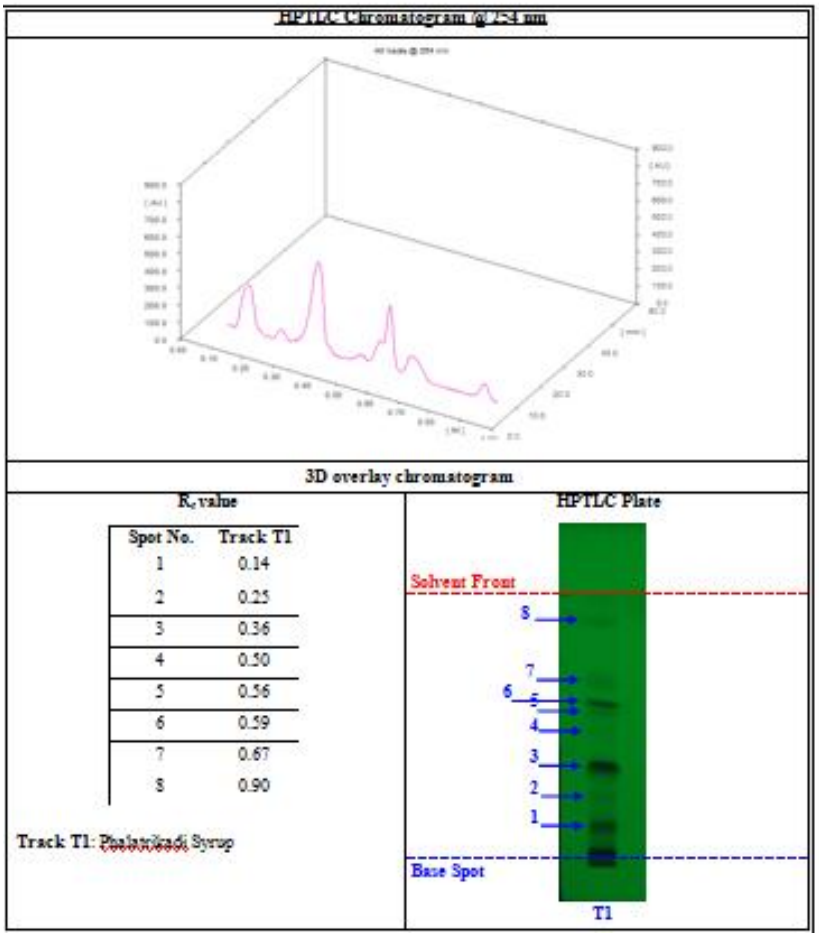

Fig. 1. HPTLC plate showing banding pattern and Rf values at 254 nm

Table 3. Phytochemical analysis of *Phalatrikadi* syrup

Test for	Result
Carbohydrates	+++
Reducing sugar	+++
Amino acids	-
Protein	-
Alkaloid	-
Tannin	++
Flavonoids	+
Saponin glycoside	-
Steroids	+

Table 4. Microbial limit test of *Phalatrikadi* syrup

1	Total plate count	20 cfu*/ml
2	Total yeast &Mould count	Absent
3	*Escherichia coli*	Absent
4	*Salmonella*	Absent
5	*Staphylococcus aureus*	Absent
6	*Pseudomonas aeruginosa*	Absent

** Colony forming unit*

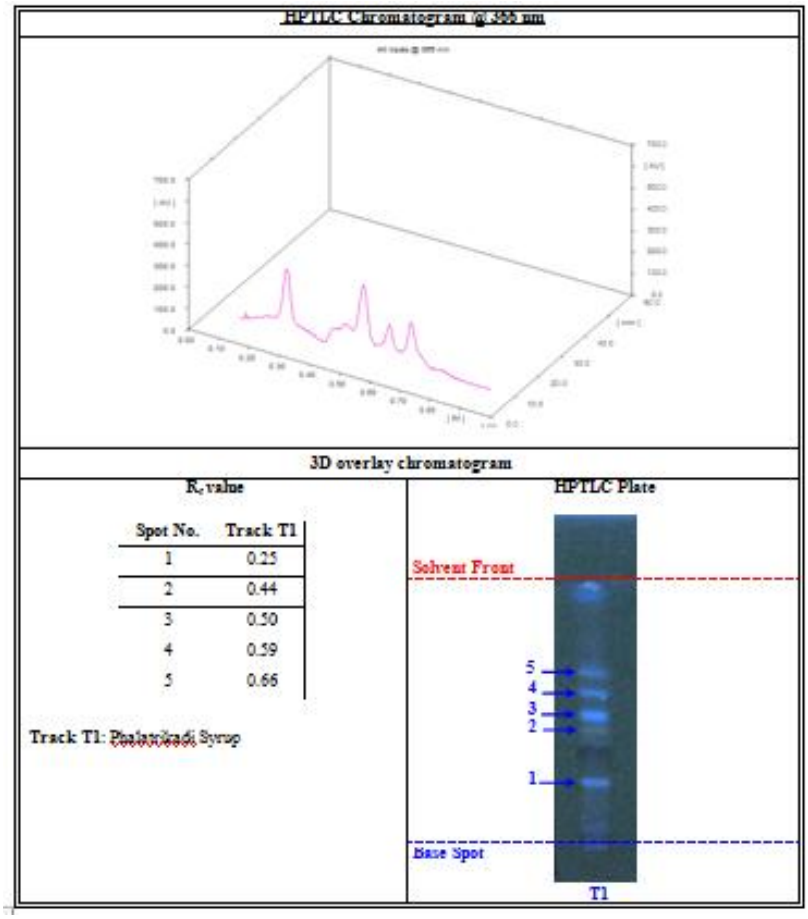

Fig. 2 . HPTLC plate showing banding pattern and Rf Values at 366 nm

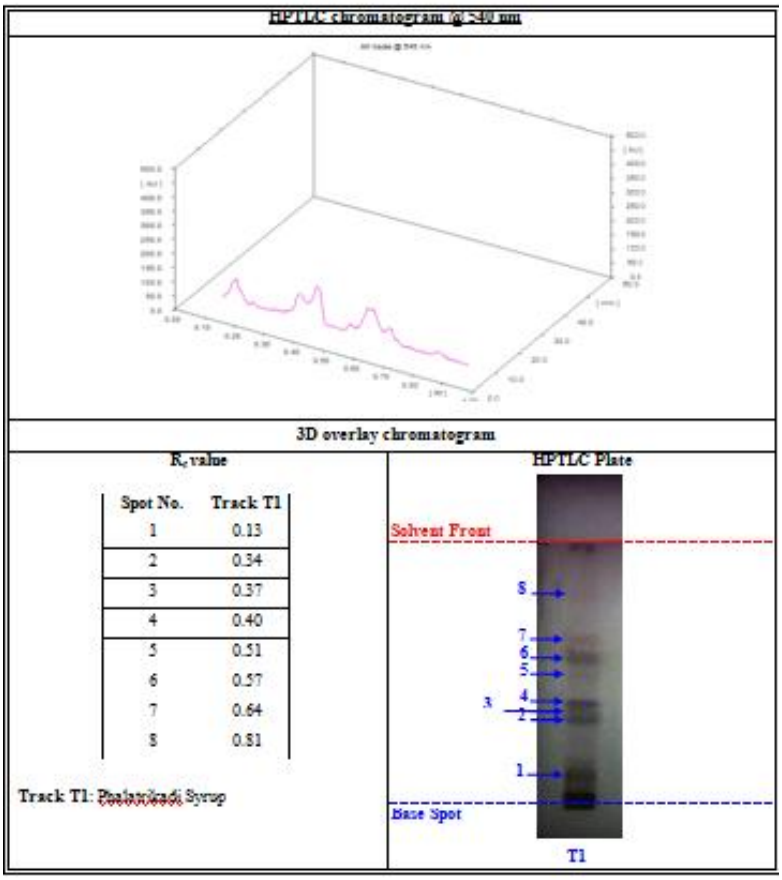

Fig. 3. HPTLC plate showing banding pattern and Rf values at 540 nm

4. CONCLUSION

Poly herbal preparations are best analyzed for quality through its physicochemical and phytochemical analysis. HPTLC fingerprinting is an essential method to validate same preparation for assessment of quality and to authenticate the drug for its reproducibility. The analytical data and HPTLC finger print profile obtained in the present study for *Phalatrikadi* syrup with suitable solvent system will help to develop preliminary standards for the authenticating, reproduction, assessment of quality and safety for *Phalatrikadi* syrup.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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