



A Pharmaceutical Analysis of Rajanyadi Syrup –A Polyherbal Ayurvedic Anthelmintic 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.

Article Information

DOI: 10.9734/JPRI/2021/v33i47A33084

Editor(s):

- (1) Dr. Sawadogo Wamtinga Richard, Scientific Research and Innovation, Burkina Faso.
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Complete Peer review History: <https://www.sdiarticle4.com/review-history/75079>

Original Research Article

Received 12 August 2021
Accepted 24 October 2021
Published 30 October 2021

ABSTRACT

Context: According to Ayurveda Acharyas for getting desirable outcome of any medication, it should be precisely analysed. Most of the Ayurveda classical formulations need to be standardized based on newer techniques for their Worldwide acceptance. Rajanyadi churna is one of the widely used formulation by Ayurveda physicians for all types of paediatric disorders mainly GI tract related conditions. Rajanyadi Churna is traditionally used in Churna form, in this study churna was converted into Syrup form for better palatability and convenience of administration. The present study mainly deals with the preparation and standardization of Rajanyadi syrup on the basis of organoleptic characteristics, physicochemical parameters and HPTLC fingerprinting.

Keywords: Rajanyadi syrup; poly herbal; HPTLC fingerprinting.

1. INTRODUCTION

Standardization of poly herbal medicine is the process of developing and agreeing upon technical standards. Specific standards are set to carry out the experimentation, which would lead to the development of a set of characteristics exhibited by the particular poly herbal medicine. Hence, standardization is a tool in the quality control process.

While assuring the quality of the drug, consistency of active principles and therapeutic efficacy, standardization of herbal formulations is an essential part.

Rajanyadi churna is mentioned in the classical formulation used in agni mandya (digestive impairment), atisara (diarrhea), jwara (fever), kamala (jaundice), pandu (anemia), svasa (asthma) and sarvarogahar [1]. The ingredients are *Rajani* (*Curcuma longa* Linn.), *Daruharidra* (*Berberi saristata* Dc.), *Sarala* (*Pinus roxburghii* Sarg.), *Gajapippali* (*Scindapsus officinalis* Roxb.), *Brihati* (*Solanum indicum* Linn.), *Kantakari* (*Solanum surattense* Burm.f.), *Prishniparni* (*Uraria picta* Desv.), *Shatpushpa* (*Anethum sowa* Roxb.), *Sitakhandra* (Sugar candy) and Honey (Table 1). Palatability being at most concern in paediatric age group, in present study the form of drug has modified from churna to syrup without altering the quantity of ingredients and subjected to analytical study through organoleptic, physico-chemical and HPTLC finger printing methods.

2. MATERIALS AND METHODS

2.1 Collection, Identification and Authentication of Raw Drugs

All the raw material used for this study were procured from local market of Vadodara, Gujarat then identification and authentication of the raw drug were done at Pharmacy of Parul Institute of Ayurved, Vadodara, Gujarat.

2.2 Methodology of Preparation of Rajanyadi Syrup

2.2.1 Preparation of rajanyadi kwath (Decoction) [2]

Required quantity of *Rajani*, *Daruharidra*, *Sarala*, *Gajapippali*, *Brihati*, *Kantakar*, *Prishniparni*, *Shatpushpa* are taken in yavkuta form in a clean stainless steel decoction vessel along with clean

water. All drugs are then mixed properly in a vessel and is kept undisturbed place for whole night. Next day this mixture was heated on medium flames in stainless steel vessel till the quantity of liquid reduced to one fourth then filtered.

2.2.2 Preparation of syrup

To this filtered kwath prescribed quantity of powdered sugar was added and then whole mixture heated and stirred until solution attains thread consistency. After cooling syrup honey and preservative sodium benzoate was added in required amount and later was packed in sterile air tight container.

2.2.2.1 Phytochemical and analytical study

Organoleptic characters, physicochemical parameters, solubility test done at Pharmacy of Parul Institute of Ayurveda and HPTLC study done at Vasu Research Centre, GIDC, Makarpura, Vadodara. (Sample ID- AD/21/088 Dated: 13/02/2021). Rajanyadi syrup was analysed by employing various analytical parameters. Organoleptic character like colour, odour, consistency was carried. Physicochemical study to analyse Loss on Drying at 110°C, Total Ash Value, Acid Insoluble Ash, pH, specific gravity, Refractive index, and Total solids content was done.

2.2.2.2 HPTLC finger printing [3,4,5]

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 F254 on aluminium sheets to a band width of 10mm using CAMAG Linomat 5 – applicator. Rajanyadi syrup plate was developed in Toluene: Ethyl acetate: Formic acid: Methanol 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

Organoleptic characters of the Rajanyadi syrup are illustrated in (Table 2). The dark brown colour of kwath turned to light brown after adding sugar syrup. Physicochemical parameters (Table 3) **pH** of any liquid provides the quantitative indication of the acidity or alkalinity of a solution which was 5.5 i.e. acidic. **Specific gravity** of Rajanyadi syrup was 1.2414, suggests that the quality of prepared syrup is within normal limits. **Refractive index** 1.4580, **Loss on drying** at 110 C was 20.10 (%w/w), **Total Ash value** 7.396% w/w, **Acid insoluble ash** 0.5684% w/w and Total solids were 76.20. **Solubility test** of Rajanyadi syrup (Table 4) shows that it is soluble in Methanol, Chloroform, 0.5 N HCL, water and insoluble in Diethyl ether. **Chromatographic study (HPTLC)** of final product Rajanyadi 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 v/v was recorded. TLC photo documentation revealed presence of many phyto constituents with different Rf values and HPTLC densitometric scan of the plates showed numerous bands. Study revealed, at 254 nm got 10 spots, densitometric scan at 254 nm revealed 10 peaks corresponding to 10 different compounds in the syrup, compounds with Rf - 0.38, 0.45, 0.50, 0.52, 0.62, 0.68, 0.74, 0.82, 0.91 and 0.95 (Fig. 1). At 366 nm only 8 spots, densitometric scan at 366 nm revealed 8 peaks corresponding to 8 different compounds in the syrup, compounds with Rf - 0.32, 0.45, 0.50, 0.62, 0.68, 0.82, 0.91 and 0.95 were found (Fig. 2) and at 540 nm 9 spots were found, densitometric scan at 540 nm revealed 9 peaks corresponding to 9 different compounds in the syrup, compounds with Rf - 0.07, 0.11, 0.45, 0.50, 0.62, 0.68, 0.74, 0.82 and 0.91, maximum Rf value was 0.91 in track 1 (Fig. 3).

Table 1. Composition, parts used and physicochemical parameters of rajanyadi syrup

S.N.	Sanskrit Name	Scientific Name	Part Used	Ratio
1	Rajani	<i>Curcuma longa</i> Linn.	Rhizome	1 Part
2	Daruharidra	<i>Berberisaristata</i> Dc.	Heart wood	1 Part
3	Sarala	<i>Pinus roxburghii</i> Sarg.	Heart wood	1 Part
4	Gajapippali	<i>Scindapsus officinalis</i> Roxb.	Dried fruit	1 Part
5	Brihati	<i>Solanum indicum</i> Linn.	Whole plant	1 Part
6	Kantakari	<i>Solanum surattense</i> Burm.f.	Whole plant	1 Part
7	Prishniparni	<i>Uraria picta</i> Desv.	Root, leaf	1 Part
8	Shatpushpa	<i>Anethum sowa</i> Roxb	Fruit	1 Part
9	Shitophala (Sugar)	-	-	20w/v%
10	Madhu (Honey)	-	-	60w/v%
11	Sodium benzoate (Preservative)	-	-	1% in 1 liter

Table 2. Organoleptic characters of rajanyadi syrup

Parameters	Results
Color	Light Brown
Odor	Sweet, Aromatic
Taste	Sweet
Consistency	Liquid

Table 3. Physico-chemical parameters of rajanyadi syrup

S.No.	Parameter	Results
1.	Loss on Drying at 110 c (%w/w)	20.10
2.	Total Ash Value (%w/w)	7.396
3.	Acid Insoluble Ash (%w/w)	0.5684
4.	pH Value	5.5
5.	Specific gravity (cc)	1.2414
6.	Refractive index	1.4580
7.	Total solid content	76.20

Table 4. Solubility test of rajanyadi syrup

SR.NO	Solvent	Results
1	Methanol	Soluble
2	Chloroform	Soluble
3	Diethyl ether	Insoluble
4	HCL (0.5 N)	Soluble
5	Water	Soluble

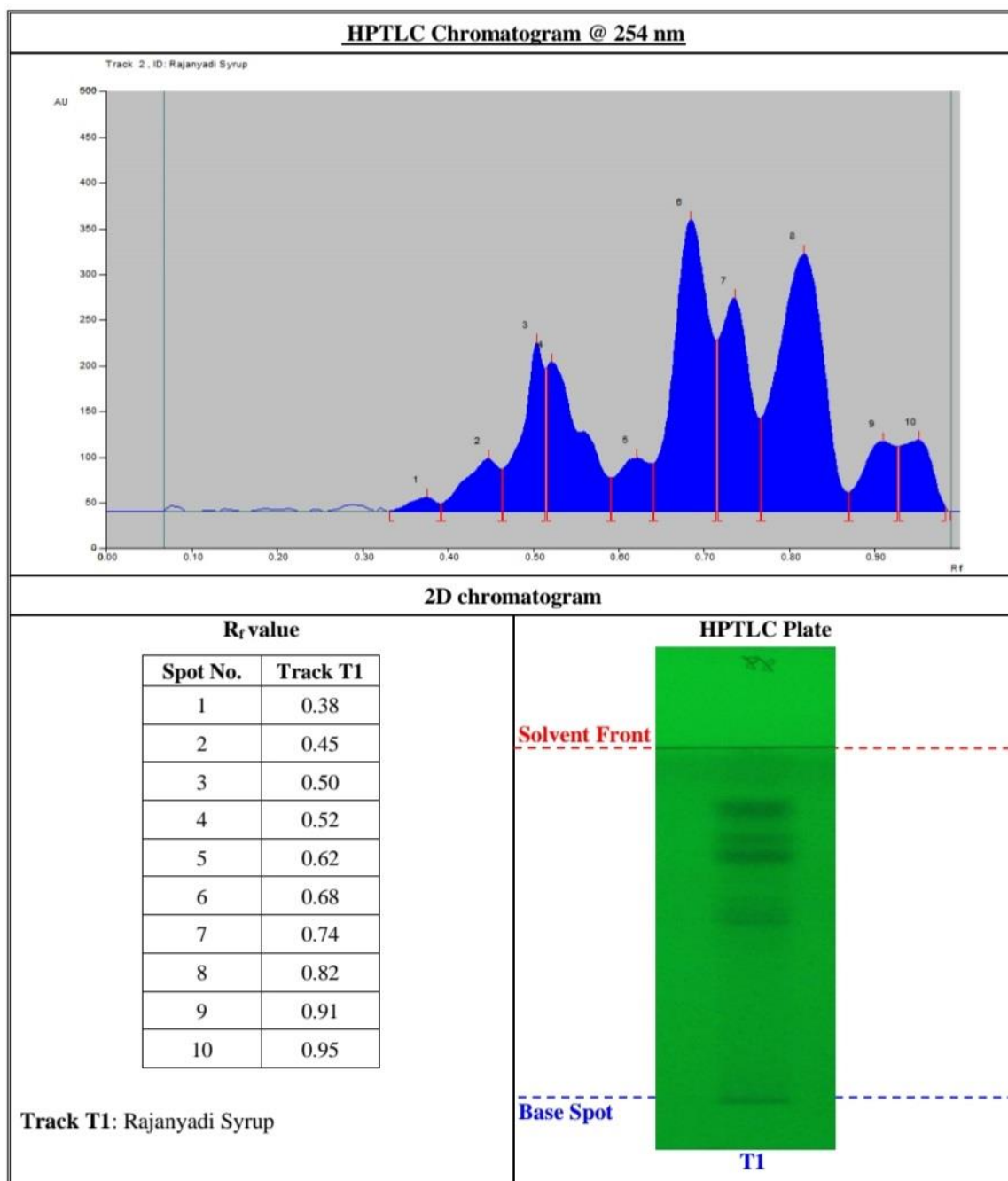


Fig. 1. HPTLC plate showing banding pattern and R_f Values at 254 nm

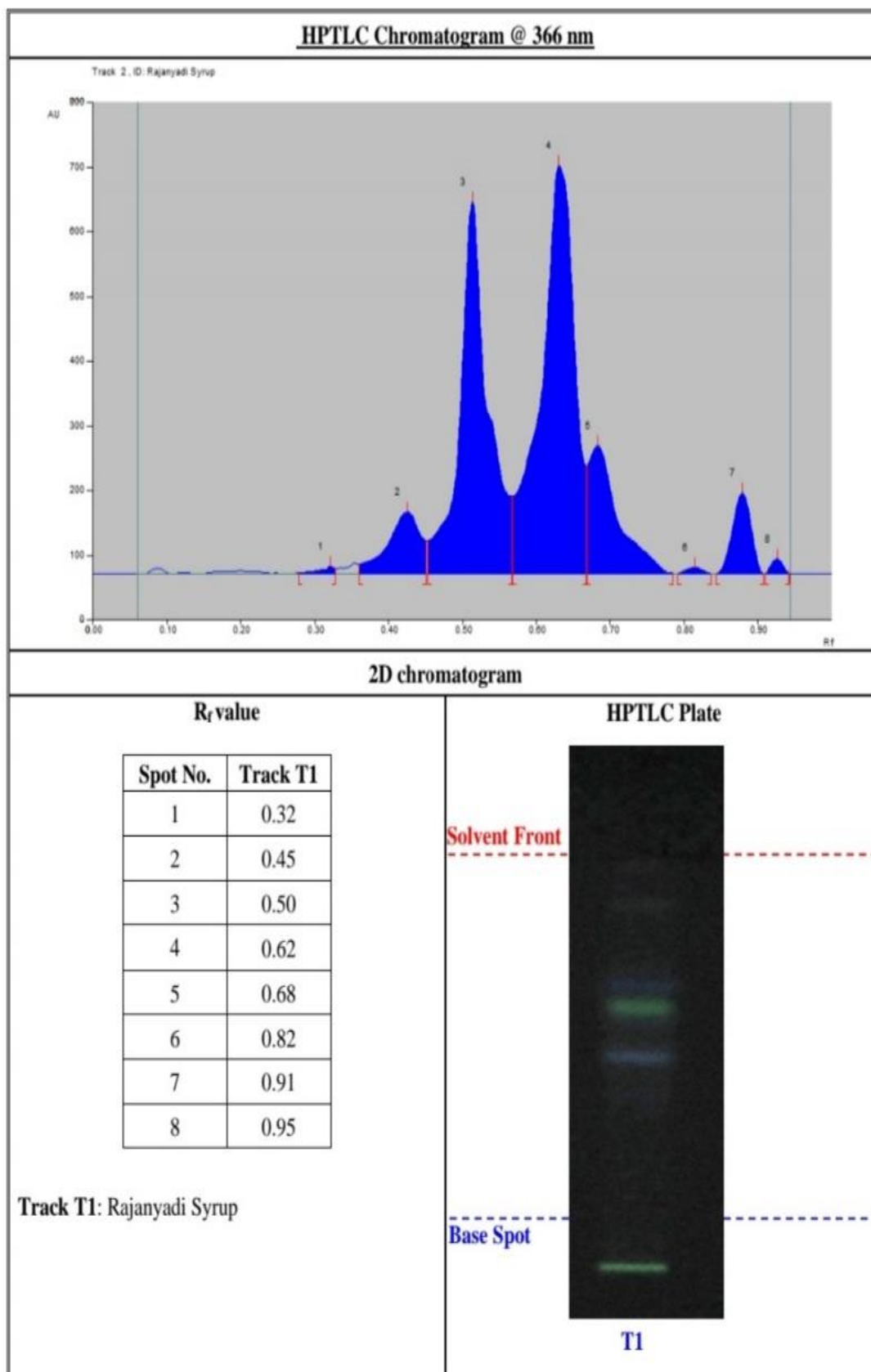


Fig. 2. HPTLC plate showing banding pattern and R_f Values at 366 nm

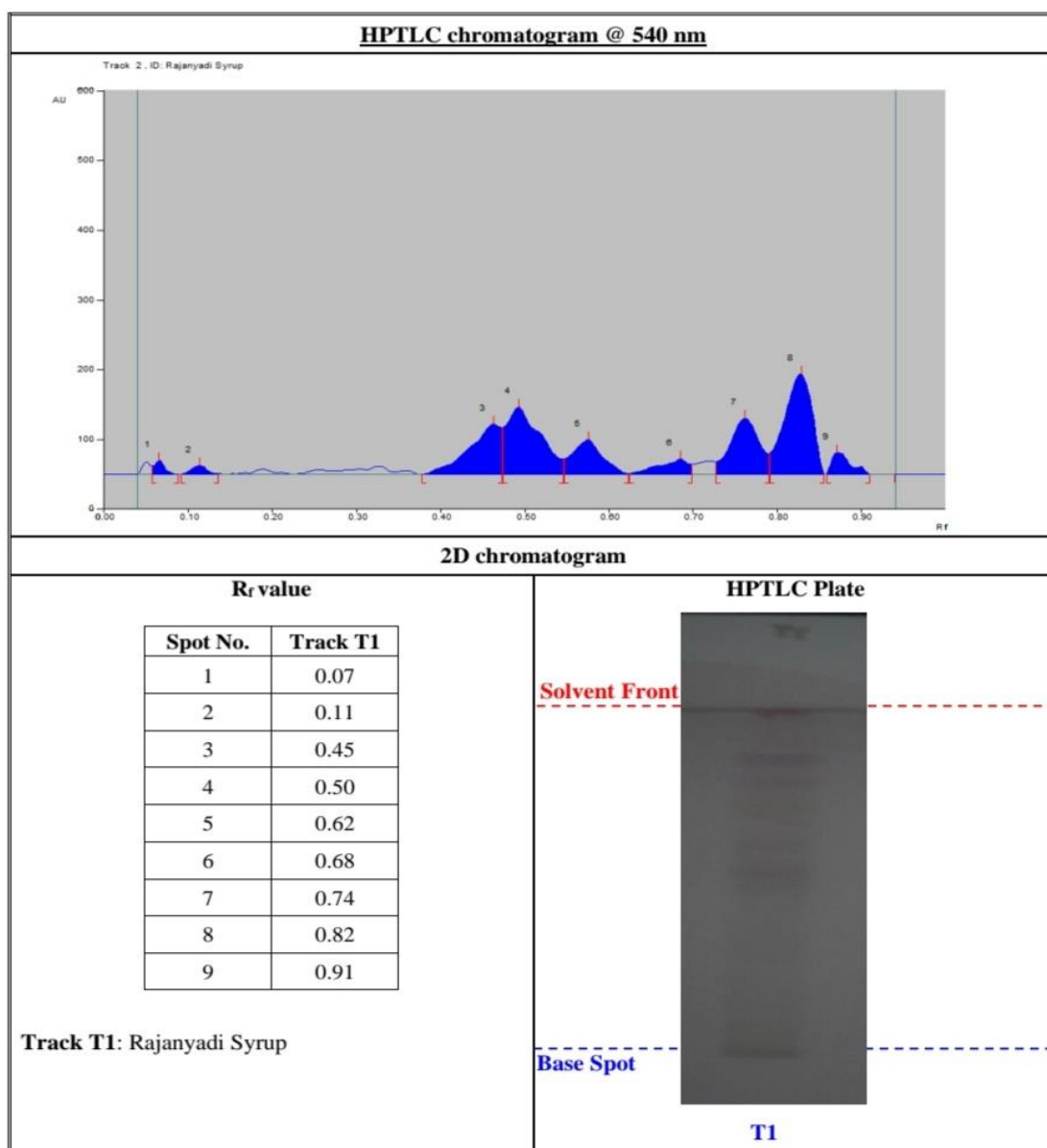


Fig. 3. HPTLC plate showing banding pattern and R_f Values at 540 nm

4. DISCUSSION

Rajanyadi syrup contain *Rajani* (*Curcuma longa* Linn.), *Daruharidra* (*Berberi saristata* Dc.), *Sarala* (*Pinus roxburghii* Sarg.), *Gajapippali* (*Scindapsus officinalis* Roxb.), *Brihati* (*Solanum indicum* Linn.), *Kantakari* (*Solanum surattense* Burm.f.), *Prishniparni* (*Uraria picta* desv.), *Shatpushpa* (*Anethum sowa* Roxb.), *Sitakhand* (Sugar candy) and Honey. Anthelmintic action of the ME and AE of the rhizome of *Curcuma longa* Linn. was observed in experimental studies [6]. *Solanum indicum* Linn. contains 4 different types of anthelmintic compounds [7]. *Anethum*

sowa Roxb. seeds contain essential oils having antispasmodic activity which is helpful to decrease the symptoms of worm infestation like abdominal pain, flatulence etc [8].

5. CONCLUSION

Intestinal worm infections in humans is a silent epidemic that destroys the health, wellbeing and learning potential of millions of children in many developing countries today. It is noticed that recurrence rate is very high due to development of resistance towards routine anthelmintic drugs. Poly herbal preparations are best

analysed to validate the preparation for assessment of quality and to authenticate the drug for its reproducibility. HPTLC finger printing is commonly used technique in synthetic chemistry for identifying volatiles, compounds, determining their purity and following the progress of a reaction. It also permits the optimization of the solvent system for a given separation problem. The analytical data and HPTLC finger print profile obtained in the present study for Rajanyadi syrup will help to develop SMP (Standard manufacturing process) of Rajanyadi syrup which will become a standard for further study and other remedies in future.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENT

The authors are acknowledging hereby the management of Parul University and Vasu Research Centre for their support and cooperation in the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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