A Pharmaceutical Analysis of Rajanyadi Syrup – A Polyherbal Ayurvedic Anthelminthic 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: 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.

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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 (Berberis aristata 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.), Sitakhanda (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 fingerprinting 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 Ayurveda, 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, Kantakari, 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 Rf, 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).

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

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

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

Table 2. Organoleptic characters 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 Rf Values at 254 nm
Fig. 2. HPTLC plate showing banding pattern and Rf Values at 366 nm
4. DISCUSSION

Rajanyadi syrup contain Rajani (Curcuma longa Linn.), Daruvaridra (Berberis saristata Dc.), Sarala (Pinus roxburghii Sarg.), Gajapippali (Scindapsus officinalis Roxb.), Brihati (Solanum indicum Linn.), Kantakari (Solanum surattense Burm.), Prishniparni (Uraria picta desv.), Shalpushpa (Anethum sowa Roxb.), Sitakhandha (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 became a standard for further study and other remedies in future.

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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