

PREPARATION OF *RAJNIDAARU* EYE DROPS: AN AYURVEDIC FORMULATION FOR *SHUSHKAAKSHIPAKA* (DRY EYE SYNDROME)

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ABSTRACT

Netra seka or also called as *Netra dhara* has been given a fundamental importance in Ayurveda for the treatment of various eye diseases. *Kwatha* prepared for *seka* contains water soluble constituents of drug. As the *seka* is time consuming procedure so it is difficult for the patients to do regularly resulting in poor compliance by the patient. *Rajnidaaru* Eye Drops preparation is indicated in *Shushkaakshipaka* (Dry Eye Syndrome) which is mentioned in *Shushruta Samhitha*, contains the ingredients *Curcuma longa* L. (*Haridra*) and *Barberis aristata* DC (*Daruharidra*). The *Rajnidaaru* eye drops was prepared by using modern pharmaceuticals equipment. The eye drops is formulated with ingredients mentioned in *Shushrut Samhita* and developed as per Indian Pharmacopeia (IP, 1996) complying quality standards and other parameters.

KEYWORDS: *Seka*, *Rajnidaaru*, *Shushkaakshipaka*, *Haridra*, *Daruharidra*.

INTRODUCTION

Dry eye produces discomfort and reduced vision due to chronically unstable tear film which repeatedly breaks up into dry spots between blinks, exposing cornea and conjunctival epithelium to evaporation. The tears are composed of three layers-Oily layer Secreted by Meibomian Glands and Watery layer- Secreted by Lacrimal glands whereas Mucous layer secreted by conjunctival glands (goblet cells). Problem in any of these layers results in dryness of eyes.^[1] According to *Ayurvedic* point of view Dry Eye Syndrome is

Shushkaakshipaka, is *sarvagata netraroga*. In *Ayurveda* a number of treatment modalities have been described for the management of *Shushkaakshipaka* like *aschyotana & seka* with *snigdha*, *vataharadravyas*, *snehananjanas* and *netratarpana*. From various formulations advised in the management of *Shushkaakshipaka* by *Rajnidaaru seka*^[2] has been selected.

Disadvantages of Seka

Seka is time consuming procedure because patient or physician has to prepare fresh every time, in aseptic condition which is not followed by all the patient, standard dose is not maintained as dose variation occurs from patient to Patient. Day to day practice of the *Seka* is quite difficult because an assistant is required to perform it so it is not much in practice.

Advantages of Eyedrops

- Topical administration is preferred over the systemic mode for treating ocular diseases and conditions. So it is most common form of local drug use in ophthalmic practice.
- It is simple to administer, easy to carry, relatively inexpensive and does not obscure vision. So patients prefer eye drops formulation.
- Packing in aseptic condition is also possible.
- Dose variation is minimum.

Hence it is difficult for the patients to do regularly resulting in poor compliance by the patient. So it was decided to modify it in the form of eye drops which is less time consuming and patient can use it anywhere with better compliance and shall be cost effective.

This article highlights the different steps and stages of preparation of *Rajnidaaru* eye drops.

MATERIALS AND METHOD

Ingredients of the formulation

1. *Curcuma longa* L. (Haridra)
2. *Barberis aristata* DC (Daaruharidra).



***Curcuma longa* L. (Haridra)**

Botanical name : *Curcuma longa* Linn.

Family : Zingiberaceae

Synonyms : *Rajni, Nisha, Gauri, Krimighna, Yoshitpriya, Kanchani, Varavarnini, Hattavilasinsi, Haldi*

Part used : Rhizome

- **Rasa :** *Tikta, Katu*
- **Guna :** *Ruksha, Laghu*
- **Veerya :** *Ushna*
- **Vipaka :** *Katu*
- **Doshaghnata :** *Tridosha Shamaka*

Action and uses: *Antihepatotoxic, Antihistaminic, Antibacterial, Anti fungal, Analgesic, Antiinflammatory, Antiprotozoal, Antifertility, Antiarthritic, Hypocholesteremic, CNS depressant, Cholagogue, Insecticidal etc.*

Chemical constituents: The main component of the root is a volatile oil, containing turmerone, and there are other coloring agents called curcuminoids in turmeric. Curcuminoids consist of curcumin demethoxycurcumin, 5'-methoxycurcumin, and dihydrocurcumin, which are found to be natural antioxidants. In a standard form, turmeric contains moisture (>9%), curcumin (5–6.6%), extraneous matter (<0.5% by weight), mould (<3%), and volatile oils (<3.5%). Volatile oils include d- α -phellandrene, d-sabinene, cinol, borneol, zingiberene, and sesquiterpenes. There are a variety of sesquiterpenes, like germacrone; termerone; ar-(+)-, α -, and β -termerones; β -bisabolene; α -curcumene; zingiberene; β -sesquiphellanderene; bisacurone; curcumenone; dehydrocurdione; procurcumadiol; bis-acumol; curcumenol; isoprocurcumenol; epiprocurcumenol; procurcumenol; zedoaronediol; and curlone, many of which are specific for a species.^[3]



***Berberis aristata* DC (*Daruharidra*).**

Botanical name - *Berberis aristata* DC.

Family- Berberidaceae

Synonyms:- *Daruharidra*, *Peetadaaru*, *Pachampacha*, *Patankateri*, *Parjani*, *Daarvi*, *Kaaliyaka*.

Rasaadi Gunas

Part used: Root, stem, extract (*Rasanjana*).

- **Rasa** : Tikta, Kashaaya (*Rasaanjana*- Katu)
- **Guna** : Laghu, Rooksha
- **Veerya** : Ushna
- **Vipaka** : Katu
- **Karma** :Kapha Pittahara, Chedana, Shothahara, Vedanasthapana, Vranashodhana, Vranaropana, Chakshushys, Jwaraghna

Action and use: The plant is tonic, stomachic, antipyretic and useful in piles, sores, eye diseases particularly conjunctivitis.^[4] Root bark is useful in remittent and intermittent fevers, periodic neuralgia. *Rasaanjana*(crude extract) is useful in applications of eye lids and chronic ophthalmic diseases.

Chemical constituents- The plant contains barberine, oxyberberine, berbamine, aromoline, karachine, palmatine, oxyacanthine and taxilamine.^[5] *Berberis aristata* contains protoberberine and bis isoquinoline type of alkaloid. Root of plant *Berberis aristata* contains alkaloid which are berbamine, Berberine, oxycanthine, epiberberine, palmatine, dehydrocaroline, jatrorhizine and columbamine.^[6]

Pharmacognosy of Crude drug (Haridra & Daruharidra) present in *Rajnidaaru* eye drops

Materials

- Haridra(Rhizome)
- Daruharidra(Stem)

Method of slide preparation

Microscopic analysis-

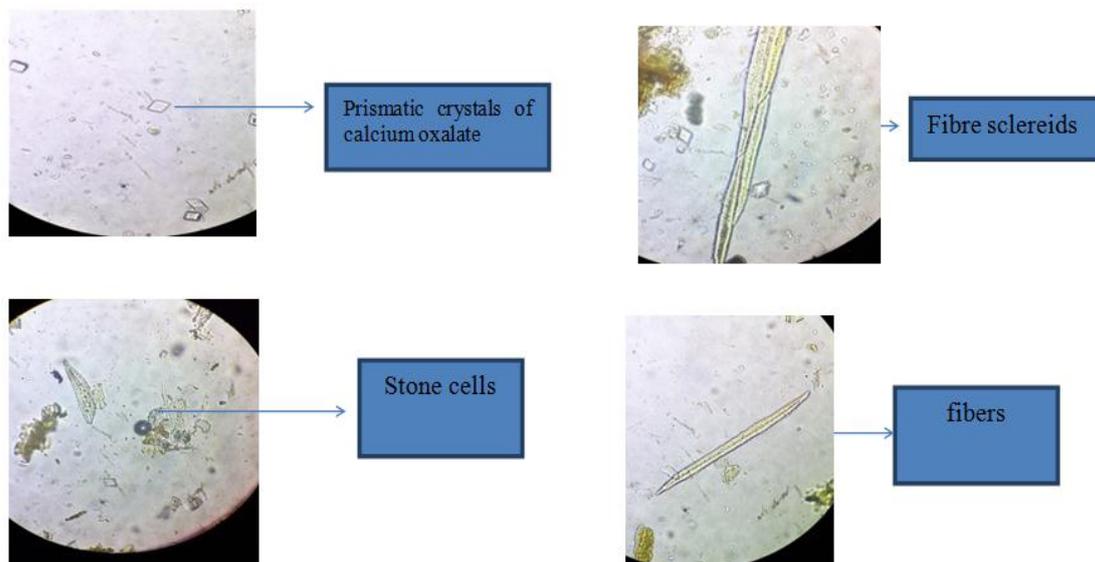
- 1) Sample preparation- Transverse section of *Daruharidra*(stem) & *Haridra*(rhizome) was taken and stained with safranin blue.
- 2) Mounting- Transverse section of *Daruharidra*(stem) & *Haridra*(rhizome) was transferred to a clean glass micro slide & mounted with a drop of glycerine.
- 3) Observation –Slides were observed under compound microscope & captured images by using 10X & 40X magnifications.
- 4) Microscopic evaluation-It was done for different sample images at different appearances. The sample appearance were matched with API.

5) RESULTS

The powder of Daruharidra shows- Prismatic crystals of calcium oxalate, Fibre --Sclereids, Stone cells and Fibres.

The powder of Hardra shows, Fibers, epidermis & stone cells.

DARUHARIDRA



HARIDRA**Collection and authentication of raw drugs**

The above mentioned drugs were collected from Khari Baoli, New Delhi, India. The drug analysis and standardization was done at All india institute of Ayurveda, Sarita Vihar, New Delhi and HPTLC was done in Bhaisajya Kalpana laboratory, All india institute of Ayurveda.

Apparatus required for distillation

Distillation is the process by which liquid is vaporized and recollected by cooling and condensing the vapor.

The apparatus required for distillation are as follows

1. Boiler (Heating mantle) – it is used to apply heat
2. Vessel, in which vapors are produced by heating the liquid up to its boiling point.
3. Condenser - This functions as a cooling device of vapors either by circulation of water or air at atmospheric temperature.
4. Receiver - It is used for the collection of the condensed liquid.

Method of preparation

Rajnidaru eye drops were prepared by using different parts of medicinally important plant such as Haridra (Rhizome), *Daruharidra* (stem), in equal quantity. The above mentioned plant materials were taken and made into coarse powder and soaked overnight in 10 parts of water. Next morning, the soaked drugs were subjected for the distillation process. The vapors are condensed and collected in a receiver. In the beginning, the vapors consist of only steam and may not contain the essential principles of the drugs. It should therefore be discarded. The last portion also may not contain therapeutically essential substance and should be discarded. The final product was in the form of drops. The eye drops is formulated with

ingredients and developed as per Indian Pharmacopeia (IP, 1996) complying quality standards and other parameters such as isotonic to lacrimal fluid, particulate matter, pH, Sodium chloride content, sterility test besides permissible preservatives and packing specifications etc.

Precautions to be taken during preparation of *Rajnidaaru* Eye Drops -

1. The drugs should be in coarse powder form.
2. The coarse powdered drugs should be soaked in water and then should be subjected to the distillation process.

Duration of preparation- 3 Hours Test of distillate is a suspension of the distillate in water which should be clear and transparent. Colour according to the nature of the drugs used and smell of the predominant drug.

Organoleptic parameters of finished product

| S.No | Parameters | Rajnidaaru Eye Drops |
|------|------------|--------------------------------|
| 1 | Texture | Watery |
| 2 | Colour | Pale colored (turmeric colour) |
| 3 | Taste | Specific Taste |
| 4 | Odour | Specific odour as Haridra |

DISCUSSION

Rajnidaaru eye drops was pale colored (turmeric colour) and liquid in consistency which establishes the optimum presentation of distillate. The specific odour and taste of distillate is attributed to the ingredients used for its preparation. The disease *Shushkaakshipaka* (Dry eye Syndrome) is the most common eye disease which produces discomfort and poor vision and it may also lead to secondary infection. Therefore, to prevent the secondary infections in patients of *Shushkaakshipaka* (Dry eye Syndrome) aseptic condition was maintained during whole procedure.

CONCLUSION

Preparations described in conventional Ayurvedic texts need to be converted according to time and feasibility. Modification of *Seka kalpana* into eye drop was done for better compliance from patients. Eye drop is clear liquid, having colour according to the nature of the drugs used and smell of the predominant drug. Distillated liquid is having more shelf life, easy to prepare and administer.

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