



Review Article

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REVIEW ON ASCHYOTANA AND EYE DROPS

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Abstract

Aschyotana is the instillation of the drug in the form of drops into the eyes from a height of two *Angulas*. In *Netra Rogas* when the symptoms like *Ruk*, *Toda*, *Kandu*, *Gharsha*, *Kleda*, *Ashru*, *Daha*, *Raga*, *Shotha* are present *Aschyotana* is the treatment of choice. *Aschyotana* is considered as the first line of treatment in all eye disease where the *Doshik* vitiation is minimal. Eye drops are accessible in the forms of water and oil solutions, emulsions, or suspensions of one or more active ingredients, which may contain preservatives if stored in multi use packaging. An attempt is made to review on *Aschyotana* and eye drops in this presentation.

Key words

Aschyotana, *Netra Rogas*, *Kriyakalpas*, Ophthalmic Drop,

INTRODUCTION

Netraroga Chikitsa is given after confirming whether it is manifested independently or in association with other disease. If the disease is independent and present only to eye, local eye treatment procedures have important role. Broadly *Netra Roga Chikitsa* is classified into *Samanya Chikitsa* and *Visesha Chikitsa*. *Sarvadaihika Chikitsa* includes *Panchakarma* and *Visesha Chikitsa* includes *Netra Kriyakalpas* which are the local external medicinal therapies of eye modulated to suit the peculiarities of the eye such as *Tarpana*, *Putapaka*, *Seka*, *Aschyotana*, *Anjana*, *Vibalaka* and *Pindi*. *Kriyakalpa* means the procedures in which various drugs are applied in and around the eye ball as a treatment modality.¹ The efficacy of these procedures depends on selection of drug, mode of preparation, mode of instillation and ocular drug absorption.

Oushadha Kalpana increases the quality of medicine and influences the action of the drug. For *Aschyotana* different mode of preparations like *Swarasa*, *Kashaya*, *Rasakriya*, *Putapaka*, *Ksheerapaka*, *Ghrita Kalpana*, *Arka* are commonly used. *Aschyotana* with *Arka* is considered to be more potent and less irritant as it is a distilled liquid of crude drug compared to *Swarasa* and *Rasakriya*. Residence time of *Ghrita Kalpana* and *Arka* in the eye is more by which absorption will also be more.

Introduction to *Aschyotana*

Aschyotana is the instillation of the drug in the form of drops into the eyes from a height of 2 *Angulas*. It is the primary method of all ophthalmic medication employed in all eye diseases where *Doshik* vitiation is minimal or *Roga* is of *Alpabala*.² Etymology of the word '*Aschyotana*' is derived from the root '*Aa + shchyu + ta + Lyut pratyaya*' by adding the '*Lyut*' *Pratyaya*. The literary meaning of the *Aschyotana* is elimination of *Doshas* by dropping or flowing.

Indications

In *Avasthika Kala* especially in *Vyaktavastha* of *Roga*, when the symptoms like *Ruk*, *Toda*, *Kandu*, *Gharsha*, *Kleda*, *Ashru*, *Daha*, *Raga*, *Shotha* are present *Aschyotana* is the treatment of choice. In *Nityaga Kala* especially in day time and *Prathama Yama* of *Nishi*, *Aschyotana* is to be done. Based on the vitiated *Dosha*, *Aschyotana* is done in the morning in *Kaphaja Roga*, at noon in *Pittajaroga*, in the evening in *Vatajaroga* or any time when the pain is aggravated.³

Contra-indications

In *Avasthikakala*, *Amavastha* and *Prabala Roga Aschyotana* should not be done. In *Nityaga Kala* at night *Aschyotana* should not be done.⁴

Matra of Aschyotana

Type	<i>Suhsrutha</i> (Su.U. 18/45-46)	<i>Sharangadhara</i> (Sha.U. 13/13-14)	<i>Bhava Prakasha netra</i> <i>rogadhikara 63/148)</i>
<i>Snehana</i>	10 Bindu	10 Bindu	12 Bindu
<i>Lekhana</i>	7- 8 Bindu	8 Bindu	8 Bindu
<i>Ropana</i>	12 Bindu	12 Bindu	10 Bindu

Temperature of medicine:⁵

<i>Dosha Dushti</i>	Temperature
<i>Vata</i>	<i>Ushna</i>
<i>Rakta and Pitta</i>	<i>Sheetha</i>
<i>Kapha</i>	<i>Koshna</i>

Guna of medicine:⁶

<i>Dosha Dushti</i>	Guna
<i>Vata</i>	<i>Tikta rasa, Snigdha guna</i>
<i>Pitta</i>	<i>Madhura rasa, Sheeta guna</i>
<i>Kapha</i>	<i>Tiktarasa, Ushnaruksha guna</i>

Procedure of Aschyotana⁷

In *Poorva karma* the patient should be comfortably lying down in supine position, in *Kriyakalpa* theatre. In *Pradhana karma* the procedure of instillation of specified drops of

liquid medicine to the open eye from a height of two *Angulas* is done. The drugs can be held either in a conch shell, small vessels or in a piece of cotton. The medicine remaining in the eye should be wiped off with a piece of cotton or soft cloth immediately after the stipulated time. As *Paschat Karma* a mild fomentation with warm water is beneficial in *Kapha Vata* diseases and advised not to see bright things.

Dharana Kala of drug in *Aschyotana* is 100 *Matra Kala* or 200 *Matra Kala* or until the *Samyak Lakshana* is achieved.

Duration of Aschyotana Karma can be done for 1 to 3 days or until patient can tolerate. *Aschyotana* can be done till *Vedana Nivritti* or *Vyadhi Shanthi* is attained.

Samyak Lakshana of Aschyotana:⁸

<i>Vyadhiupashamana</i>	Feeling of relief from disease
<i>Vedanashaman</i>	Reduction of pain
<i>Vaimalyatha</i>	Clarity of vision
<i>Prakritavarnautpatti</i>	Relief from congestion or discolouration
<i>Kriyapatava</i>	Easy movement of eyelids
<i>Netra Laghava</i>	Lightness of eye

Mode of instillation of drug

Aschyotana is the process of instillation of liquid medicine drop by drop from a height of 2 *Angulas* in the *Kaneenika Sandhi* (Medial Cantus).

Mode of action of Aschyotana:

Gathwasandhisithamghraanammmukhasrotamsibheshaja

*Urdhwagannayanenyasthamapatharpayatthe malaan*⁹

The instilled medicine will penetrate into the *Sandhi* (*Kaneenika Sandhi*) where the medicine is instilled, then to the *Shuklamandala*, then to *Ghraana*, *Mukha* and remove the *Mala* present in *Urdhwabhaga*.

Atiyoga Lakshana of Aschyotana: The *Lakshanas* of excessively performed *Aschyotana* includes *Ruja* (pain in the eyes), *Sopha* (swelling of eyes), *Pidika* (blisters in the eyes), *Timira* (reduction in eye sight).¹⁰

Hinayoga Lakshana of Aschyotana:

Hinayoga of *Aschyotana* leads to *Paka* (pus formation in the eyes), *Asru* (excessive tear secretion in the eyes), *Harsha* (feeling of horripilation in the eyes), and *Doshodgama* (vitiation of all doshas). The *Pratikriya* for *Atiyoga* and *Hinayoga* of *Aschyotana* includes performing appropriate *Doshahara* measures like *Dhumapana*, *Nasyakarma* and *Anjana*.

Merits of Aschyotana:

Aschyotana helps in reducing *Ruk*, *Toda* (painful conditions), *Kandu* (itching sensation), *Gharsha* (irritation or foreign body sensation), *Asru* (excessive watering), *Daha* (Burning Sensation), *Raga* (Congestion or redness of eyes) *Paka*, *Sopha* (features of inflammation).¹¹

Eye drop or Ophthalmic Drop

Ophthalmic preparations are sterile, liquid, semi-solid, or solid preparations that may contain one or more active pharmaceutical ingredient intended for application to the conjunctiva, sac or the eyelids. The developed drug forms for topical ocular administration are eye drops, ointments, in situ gels, inserts, with multi compartment drug delivery systems.¹²

Ophthalmic drops are accessible in the forms of water and oil solutions, emulsions, or suspensions of one or more active ingredients, which may contain preservatives for storage. These forms are sterile and isotonic. The optimum pH for eye drops equals that of tear fluid and is about 7.4.¹³ In deciding whether to buffer the drug in this form, one should take into account the stability of active ingredient and the tissue tolerance to the preparation. If the pH value gets outside the range of 4–8 which is tolerated by eye, the patient may feel discomfort, there may be irritation, and the drug bioavailability can decrease because of increased tearing.

Examinations ophthalmic drops have to be performed in order to determine the properties by performing in-vitro and in-vivo experiments. This is to determine sterility,

the pH, clarity of solutions, visual assessment, size of the particles, tonicity/osmolarity, viscosity, amount of substance, amount of preservative and stability of eye drops.

Determining pH

The pH of eye drop is most often determined using a potentiometric method. In this method, the pH value is determined by measuring potential difference between electrodes placed in examined and reference solutions of known pH or between measurement (glass) electrode and reference (calomel or silver chloride) electrode, both placed in examined preparation.¹⁴

Eye Irritancy Test (Draize Eye Test): Eye toxicity and irritancy test called Draize eye test should be performed for dosage forms, for all ophthalmic drops. Examinations are usually carried out on rabbit's eye. The eye drops are introduced to conjunctival sac or applied directly on the cornea. An assessment of eyeball condition before and after introducing eye drop is done by observation of the eyeball in suitable light, using magnifying glass or a slit lamp for evaluation. For visualization of changes include dyeing with fluorescein and taking photos of eyeball. The discomfort level after application of eye drop may be indicated by the number of blinking or rubbings of the eye. The evaluation takes place usually after 1 h, 24 h, 48 h, and 72 h from introducing a drug form on the eyeball and, if essential, also after 7 or 21 days.¹⁵

Examination of Size and Morphology of Particles

For examination of particles' size multiple methods are employed: optical microscopy (microscopic particle count test), light obscuration particle count test, dynamic imaging analysis, laser diffraction particle analyzers, electron microscopy (SEM, TEM, AFM), DLS (dynamic light scattering), Coulter Counter test, and nanoparticle tracking analysis (NTA) is to be done.¹⁶

Manufacture: The manufacturing processes of any ophthalmic drops should meet the requirements of Good Manufacturing Practices (GMP), especially with regard to cross contamination.

Methods of sterilization: Packaging must be adequate to protect eye drop from light, moisture, microbial contamination, and damage due to handling and transportation.

Labeling: Each eye drop must comply with the labeling requirements established by Good Manufacturing Practices. The label should include the name of the pharmaceutical product, the name of the active ingredient; International Non-proprietary Names should be used wherever possible. The concentration of the active ingredient and the amount or the volume of preparation in the container, the batch number assigned by the manufacturer, the expiry date, the utilization period, and, when required, the date of manufacture. Any special storage conditions or handling precautions that may be necessary, if applicable, the period of use after opening the container, directions for use, warnings and precautions that may be necessary, the name and address of the manufacturer or the person responsible for placing the product on the market. If applicable, the name and concentration of antimicrobial agent and antioxidant incorporated in the preparation and the statement "This preparation is sterile" is labeled over the bottles.

Storage: Ophthalmic drops should maintain their integrity throughout their shelf-life when stored at the temperature indicated on the label. Special storage recommendations or limitations are indicated in individual monographs.

Visual inspection: Each eye drop after preparation should be kept in a glass bottle or a glass test tube for visual inspection. Presence of physical instability is demonstrated by the cloudiness of aqueous solutions, due to the formation of a precipitate.

Containers: Ophthalmic drops are normally supplied in suitable multidose containers that allow successive drops of the preparation to be administered. The maximum volume of the preparation in such a container should be no more than 10 ml. Containers used for eye drops can be made out of good quality plastic or glass bottles.

Test for sterility: The tests for sterility were done by detecting the presence of viable forms of bacteria, fungi and yeast in or on preparations. The tests were carried out under strict aseptic techniques to avoid accidental contamination of the preparation. Eye drops may be provided in suitable single-dose containers that will maintain the sterility of the contents and the applicator up to the time of use. It is recommended that single-dose containers for surgical use should not include any antimicrobial agents.¹⁷

Ocular Pharmacokinetics: The ocular pharmacokinetics, are more concerned with the ocular compartments, which comprise of the tear film and cul-de-sac, the anterior

chamber, the vitreous cavity and the periocular space. The most topical ophthalmic drugs exhibit first order kinetics. In first order kinetics the absorption rate and elimination rate of the drugs vary directly with the drug concentration. Therefore, the drug half-life is constant regardless of the amount of drug that is present. In zero order kinetics, either the absorption or elimination of the drug being studied is directly related to a functional capacity which may become saturated with increasing drug concentration.¹⁸

Mechanism of Eye drop: The first compartment for absorption is cul-de-sac and tears film. Normally the total tear film volume is much smaller than commonly appreciated, being in the range of 7 to 10 microlitres. With the application of a topical drop, the cul-de-sac and tear film compartment can expand transiently to perhaps 30 micro litres. However, this has to be considered in the knowledge that the average commercially prepared topical drop typically has a volume of 40 to 70 micro litres. Therefore these eye drops cannot be fully accommodated even if the cul-de-sac and tear film compartment temporarily expands. The average drop size vastly exceeds capacity of tear-film and cul-de-sac. Topical drops transiently double the tear fluid turnover. Avoid 2nd drop wash-out then wait for at least 5 minute delay between drops. Pouch method with closed non-blinking eye, reduces elimination of the drop.¹⁹

Absorption of eye drop

The methods of administering ocular drugs are topical or extra ocular drug via either conjunctival or episcleral absorption (non corneal) and transcorneal absorption.

Intra ocular penetration of drug depends on the permeability of the drug through lacrimation; tear drainage and composition of percorneal tear film. Topical administration of drug into inferior fornix of the conjunctiva is the most common route of ocular drug delivery. Both lacrimation and blinking influence the residence time of the drug in the fornix. Therefore the efficacy of the drug depends on the anatomy and physiology of the lids, the pre corneal tear film, the conjunctiva, cornea and the lacrimal system.

The conjunctival sac has a capacity of approximately 15-20microlitre. Natural tear film volume is 7-8 microlitre. Tear turnover is 16% per minute during a normal blink rate of 15-20 blinks per minute. Most solution applicators deliver 50-100 microlitres per drop

and thus substantial amount of drug is lost through over spill on administration. Turnover of the tears is also highly dependent on environmental conditions particularly dependant on environmental conditions particularly temperature and humidity. The epithelium of conjunctiva is continuous with that of cornea and epidermis of the lid. It contains goblet cells, which produce mucus and are integral part of tear film.

In eye drops drug absorption through conjunctiva requires transport basically through the epithelium. In sub conjunctival stroma, which is highly vascular owing to the rich superficial venous plexus and lid margin vessels, drugs may absorb in significant concentration into circulation. After administration of eye drop into inferior fornix, drugs drain directly through nasolacrimal duct into nose where measurable systemic absorption via nasal and nasopharyngeal mucosa occurs. By varying the form and potency of drug, more residence time in the fornix and more absorption of eye drop is achieved.

CONCLUSION:

Ashchyotana is the foremost procedure indicated in all ocular ailments in the prodromal stage of *Netra Rogas*. Indication of *Ashchyotana*, contra indication, method of administration, mode of action, *Kala, Matra, Guna, Samyak Yoga, Atiyoga, Ayoga Lakshmans* has been explained. Eye drops is the most common form in ophthalmic practice, because the standard dose of the eye drops is maintained and patients can easily carry it with them and instill it whenever required. Ocular pharmacokinetics, absorption, mechanism of eye drops; test for sterility, Eye Irritancy Test, determining pH of ophthalmic drops has been explained in this paper. This paper is a review of the available literature which allows planning studies to be conducted on standardization of *Aschyothana* and Ophthalmic drops.

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