

Review Article

Analytical Review of Aschottana Procedure w.r.t. Ophthalmic Drug Delivery

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A B S T R A C T

Aschottana is one of the speciality procedures among kriyakalpas in which the herbal medications in the form of liquid are instilled into the conjunctival sac, drop by drop at a distance of 2 angulas is called as Aschottana. Ocular drugs are usually delivered locally to the eye. Required drug loading, release rate, and ocular retention time of drug delivery systems depend on the potency, bioavailability, and clearance of the drug at the target site. The concept of Aschottana is explained in different eye diseases with different combinations of herbs and minerals. This can be used in preventive and therapeutic conditions. Many herbal Aschottana preparations have also been introduced for ocular drug delivery. These novel formulations may help to surpass ocular barriers. Also, these novel devices and/or formulations possess high precorneal residence time, sustain the drug release, and enhance the ocular bioavailability of therapeutics.

Keywords: Aschottana, Ophthalmic Drug Delivery, Pre-corneal

Introduction

Ayurveda, an ancient science of India, aims to maintain health and preventive lifestyle. Hence to maintain the Indriya kshamatva and to prevent the disease, Acharyas have advocated special therapeutic and preventive procedures for eyes, ear, nose, throat, and oral cavity. Kriyakalpas are speciality procedures of netra which have a multifactorial role in maintaining the health of the eyes.¹ In the present era of revolutionised information technologies, the environment has surpassed the nutritive health and leads to many ocular manifestations. Aschottana is one of the speciality procedures among kriyakalpas in which the herbal medications in the form of liquid are instilled into the conjunctival sac, drop by drop at a distance of 2 angulas is called as Aschottana.²

This procedure is very helpful in acute and chronic conditions

of the eye even this can be practised in the poorva roopa avastha of the roga. Among all the kriyakalpas, Aschottana is the first therapeutic procedure to be adopted. Hence, the references have been found in the Sharangadhara Samhitha, Sushruta Samhitha, Ashtanga Hridaya, Charaka Samhitha and Bhavaprakasha.

Ocular drugs are usually delivered locally to the eye. Required drug loading, release rate, and ocular retention time of drug delivery systems depend on the potency, bioavailability, and clearance of the drug at the target site. Drug-loading capacity of the formulation is limited by the material properties and size constraints of the eye.³

Poorva Karma²

The person should lie down comfortably in the supine position. The therapy room should be devoid of smoke, dust, and wind, and should be well-ventilated.

Pradhana Karma

The lower eyelids are opened by the left hand, then the aschottana dravya is instilled into the inner canthus of the conjunctival sac at 2 angulas height for a stipulated time.

Paschat Karma⁴

The excess aschottana dravya which is draining out should be wiped with sterile cotton gauze and Mrudu Swedana should be given.

Aschottanam is the first line of treatment for all types of eye diseases. It is the procedure to instil the medicated drops into the conjunctival sac near the inner canthus, in an open eye at a height of 2 angulas. The aschottana is divided into 3 types based on the drugs used in different conditions (Table 1).

Table 1. Types of Aschottana³

Types	Sharangadhara	Sushruta
Lekhana aschottana	8 drops	7-8 drops
Snehana aschottana	10 drops	10 drops
Ropana aschottana	12 drops	12 drops

Indications⁴

All the ocular manifestations are associated with pain, itching sensation, foreign body sensation, watering of eyes, burning sensation, and redness. This is the first line of procedural therapy for all types of eye diseases where liquid medicaments are prepared out of leaves, bark, fruits etc. into the conjunctival sac when the eye is completely opened.

Samyak Yoga⁶

- Netra Vimalatha (devoid of secretions)
- Vedana Upashamana (subsiding the ophthalmic pain)
- Vyadhi Shaman (relieving the disease condition)
- Netra Laghavata (lightness of eyes)

Heena Yoga⁷

- Aavila Netrata (turbid eyes)
- Netra Gaurava (heaviness of eyes)
- Roga Vriddhi (provocated diseases of the eyes)

Ati Yoga⁸

- Netra Ragata (redness of eye)
- Dosha Vriddhi (vitiation of Doshas)
- Netra Srava (Epiphora)

Mode of Action of Aschottana⁹

“Nethre cha pranihitam oushadham kosha sandhi sira

srungataka ghranasya srotamsi gatwa urdwam pravratam apavarthayati dosham II”.

The instilled medicine will enter into the netra gata sandhis, patalas, and mandalas. The aschottana dravya eliminates all the vitiated doshas and excretes from the nasa kuhara (nasolacrimal duct).

Aschottana Vyapath¹⁰

If the aschottana dravya is tikshna or ushna, it will lead to a burning sensation, redness, and loss of vision.

If aschottana dravya is used in excess, it can cause foreign body sensation, inability to open the eyelids, and kriya haani of the vartmas.

If aschottana dravya is sheeta, it may produce decreased movement of the eyeball, excessive tears, pricking pain, and foreign body sensation.

If the aschottana dravya is not potent, the disease will not subside.

The different types of Aschottana along with the dosage and indications have been shown in Table 2.

Table 2. Types of Aschottana, Dosage and Indications¹⁰

	Snehana Aschottana	Lekhana Aschottana	Ropana Aschottana
Pramana	10 drops	8 drops	12 drops
Indications	Vataja Abhishyanda (Allergic conjunctivitis) Dryness of eyes	Pothakee (trachoma) Kaphaja abhishyanda (infective conjunctivitis)	Acute conjunctivitis Conjunctival haemorrhage Corneal ulcers
Drugs	Ghee, milk, Jeevaneeya gana drugs	Haridra (turmeric) Shigru/ Moringa oleifera Spatika (alum) 1% shirish	Durva (Cynodon dactylon), Nimba (Azadirachta indica), Jatiphala (Myristica fragrans), Guduchi (Tinospora cordifolia), Katuki (Strychnos potatorum)

The Aschottana is a special ophthalmic therapeutic procedure explained under netra kriyakalpas in all the Ayurveda classical texts such as Sushruta Samhitha Sharangadhara

and other contemporary Indian medical literature. The concept of Aschottana is explained in different eye diseases with different combinations of herbs and minerals. This can be used in preventive and therapeutic conditions. The herbal or herbo-mineral decoctions (kashayas), fresh herbal juices (swarasa), ksheera paka and snehana dravyas (herbs processed with ghee) are used in the Aschottana procedure.^{11,12}

Eye drops are the conventional dosage forms that account for 90% of currently accessible ophthalmic formulations. Topical delivery of eye drops into the cul-de-sac is by far, the most common route of ocular drug delivery. Absorption from the site maybe corneal or non-corneal. The non-corneal route includes through the sclera and conjunctiva into the intraocular tissue. Aschottana is the most convenient and patient compliant route of drug administration.

The delivery of drugs to the targeted ocular tissues is restricted by various precorneal, dynamic and static ocular barriers. Also, therapeutic drug levels are not maintained for a longer duration in target tissues. Ocular drug delivery research accelerated the advancement towards developing a novel, safe, and patient compliant formulation and drug delivery devices/ techniques, which may surpass these barriers and maintain drug levels in tissues. Many herbal Aschottana preparations have also been introduced for ocular drug delivery. These novel formulations may help to surpass ocular barriers. Also, these novel devices and/ or formulations possess high precorneal residence time, sustain the drug release, and enhance the ocular bioavailability of therapeutics. An update of current research advancements in ocular drug delivery necessitates and helps drug delivery.

Discussion

In Ayurveda, many of the Aschottana dravyas have been advocated in different conditions with different herbo-mineral compounds, which are used for various therapeutic purposes, they are ghee-based, Kashaya-based, swarasa-based and a few are lipid-based. Hence the efficacy of the Aschottana depends on the ingredients and vehicle of the drug component. The absorption of the drug depends on many factors like permeability of the drug, composition of pre-corneal tear film, pH, specific gravity, anti-microbial property etc.

Ocular bioavailability is very low with topical drop administration. Numerous anatomical and physiological constraints such as tear turnover, nasolacrimal drainage, reflex blinking, and ocular static and dynamic barriers pose a challenge and form the deeper ocular drug permeation.¹³ Permeation enhancers of herbal eye drops improve the corneal uptake by modifying the corneal integrity. The addition of permeation enhancers to ocular solutions improves the ocular drug bioavailability. Hence traditional

Aschottana dravyas are divided into different therapeutic conditions, based on ghee, decoctions, milk, medicated Sneha (lipid-based) vehicular media. The Aschottana dravyas act in different modes of action depending on the binding chemical constituent and the carrying vehicle.

The following properties are essential to optimise the ocular drug delivery system through Aschottana:

- Aschottana dravya is having the properties of corneal penetration
- Aschottana dravya contact time with corneal tissue is maintained
- Non-irritative, pH balanced Aschottana dravya are essential and the need of the hour
- It should be sterile and should pass all the GMP certified ophthalmic drops criteria
- The different rasas of dravyas exhibit different properties, hence by analysing the physico-chemical constituents of the herbal extracts, it is evident to note that specific constituents are absorbed through specific lamellar layers of the eye

Conclusion

The single or multi-drug formulations in the form of aqueous/ lipid extract which should contain micro nanoparticles of constituents are essential for present ophthalmic conditions.

Maintenance of 6 to 7 pH concentration along with sterility tested drops to be used. The binding of the drug depends on the physico-chemical properties of the nanoparticles or micro-particles along with the vehicular media.

In the last few decades, many approaches have been utilised for the treatment of ocular diseases. Nanotechnology-based ophthalmic formulations are one of the approaches which are currently being pursued for both anterior, as well as posterior segment drug delivery. Nanotechnology-based systems with an appropriate particle size can be designed to ensure low irritation, adequate bioavailability, and ocular tissue compatibility.¹³ In this regard, there is an urgent need to develop the standardised ophthalmic drops in Ayurveda, hence interdisciplinary research will fill the gap between the conventional holistic ophthalmic treatments.

Conflict of Interest: None

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