ABSTRACT

Shalaka Tantra is one of the eight specialties of Ashtanga Ayurveda which deals with diseases occur above the clavicle specially related to the sensory organs. Eyes hold special status among all the sense organs because good vision is crucial for social and intellectual development of human beings. Hence authentic classics prescribed several preventive and curative measures for the management of ophthalmic disorders. Among them, topical treatments are very unique, effective in the management of eye diseases and are called “Netra Kriyakalpa”. Netra Kriyakalpa have very fast action on the target tissues of eye. Anjana is a medicinal preparation which is applied on the lower palpebral conjunctiva or the cul-de-sac. Its active principles may be transferred to the interior of the eye according to their hydrophilicity and lipophilicity mainly through the conjunctiva and cornea by paracellular and transcellular pathways respectively. pH, viscosity, tonicity, molecular size and molecular weight of the active ingredients are highly responsible for the absorption of Anjana. According to its form Anjana is of 3 types i.e. Gutika, Rasakriya and Churna. Gutika and Churna types of Anjana can be correlated with ophthalmic suspensions and Rasakriya type is with aqueous solutions/eye drops. Gutika and Curna Anjana have micro particles which may be deposited in the cul-de-sac and thereby increase the bioavailability to enhance ocular absorption. Anjana therapy may be highly beneficial in the anterior segment disorders because of the presence of several anatomical, biological and physiological ocular barriers. However it gives better results on the posterior segment disorders also.

KEYWORDS: Anjana, Netra Kriyakalpa, Hydrophilic, Lipophilic.

INTRODUCTION

Shalaka Tantra is one of the eight specialties of Ashtanga Ayurveda which deals with diseases which occur above the clavicle specially the sensory organs i.e. Eyes, Nose, Ears and Tongue. Eyes hold special status among all the sense organs because good vision is crucial for social and intellectual development of human beings and the knowledge from direct observation (Pratyaksha pramana) can be achieved only by eyes. Other sense organs also depend on the eye sight for their accuracy as quoted by ancient sage Vagbhata.[3] He said that for a man without eyes this world is useless because day and night are same for them even if the other sensory organs are healthy. Thus Vagbhata recommended that all efforts should be performed to protect the eyes throughout the life. Hence authentic classics prescribed several preventive and curative measures to protect the eyes. Almost all the Acharyas prescribed several treatment procedures for the management of ophthalmic disorders such as systemic, surgical, para-surgical and local or topical treatments. Among these several types of treatment modalities local treatments are very specific, effective and unique to the eye diseases and called as "Netra Kriyakalpa". It is similar as Panchakarma in Kayachikithsa. Netra Kriyakalpa have very fast action to the target tissues including posterior segment of the eye.

There are seven Netra Kriyakalpas namely Akshi Tarpana, Putapaka, Seka, Aschyotana, Anjana, Bidalaka and Pindi. The first 5 procedures were mentioned in Susruta Samhitha[2] and last two were prescribed only in Sharangadhara Samhitha[3] along with other 5 procedures.
- Eye ointments – Increases the bioavailability of the drug by increasing tissue contact time and by preventing dilution and quick absorption but cause blurred vision.
- Gels – Have prolonged contact time and do not cause much blurred vision.
- Suspensions - Dispersion of finely divided insoluble active pharmaceutical ingredients in an aqueous solvent consisting of a suitable suspending and dispersing agent which increases the bioavailability.
- Ocuserts – Can be placed in the upper or lower fornix up to a week and allow drug to be released at a relatively constant rate.
- Soft contact lenses – Very good for delivering higher concentrations of drugs in emergency treatment.

Among all these Kriyakalpas Anjana has unique therapeutic efficacy for several types of ophthalmic disorders and highly recommended as preventative measure of eye diseases in the Ayurvedic system of medicine. A number of ancient Acharyas prescribed Anjana therapy as daily regimen especially Sauvira Anjana (Animony sulphide) and Rasanjana (decoction of Berberista aristata – Daruharidra) mixed with bee honey as it eliminates Kapha Dosha from the eye because eyes have predominance of Pitta Dosha or Teja Mahabhoota for its proper functioning or clarity of vision.[4,6]

Apart from the Ayurveda the practice of Anjana was prevalent during Indu valley civilization for prevention of diseases as well as cosmetic purposes. Anjana is also mentioned in Atharvaveda however a detailed description is found in Sushruta Samhita, Ashtanga Hridaya, Ashtanga Sangraha and Sharangadhara Samhita which are described its classification, form, dosage, method of application, indications and contraindications etc. “Anakthi thi Anjanam” is the definition of Anjana and word root is Anji because it gives moving, cleaning and clarity to eyes. [7] In this procedure a Lepa (semisolid or solid) is applied on the inner part of the lower eye lid from inner canthus (kaneenika Sandhi) to outer canthus (Apanga Sandhi) with Anjana Shalaka.

Aims and Objectives

1. To review Anjana therapy according to the Ayurvedic point of view.
2. To study the probable mode of action of Anjana according to modern point of view.

Types of Anjana[8,9,10,11]

According to its form Anjana it is of 3 types i.e. Gutika (Pills), Rasakriya (Semisolid) and Churna (powder). Acharya Susruta and Vagbhata mentioned that the strength of Anjana increases in preceding order as Gutika, Rasakriya and Churna. However Acharya Bhavamishra mentioned that order somewhat differently as Rasakriya, Varti and Churna. Hence can be used Anjana according to the severity of the disease as Gutika, Rasakriya and Churna for the most severe, moderate and mild disorders respectively.

As per the action it is again three types namely Lekhana (scrapping), Ropana (healing) and Prasadana (purifying). In Sharangadhara Samhita Snehana (oleation) and in Ashtanga Hridaya Drishti Prasadana (improve vision) type is mentioned instead of Prasadana Anjana in Susruta samhita.

### Table 1: Composition of Anjana

<table>
<thead>
<tr>
<th>Type of Anjana</th>
<th>Composition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lekhana</td>
<td>Tikta, Kashaya, Amla, Katu, Lavana Tastes Kshara, Tikshna Guna</td>
<td>Drain out Doshas from eye lids, vessels, sacs, Srotas &amp; Sringataka Marma through mouth, nostrils &amp; eyes</td>
</tr>
<tr>
<td>Ropana</td>
<td>Kashaya, Tikta + ghee/oil</td>
<td>Healing, improves the colour and visual acuity</td>
</tr>
<tr>
<td>Prasadaana/Snehana/ Drishti Prasadaana</td>
<td>Madhura + ghee/oil</td>
<td>Pacifying the Doshas in vision, oleation</td>
</tr>
</tbody>
</table>

### Indications of Anjana

Anjana should be performed when symptoms of doshas are manifested and located only in the eyes and after the purification of body. Body should be purified by Panchakarma procedures i.e. Nasya, Virechana, Vasti, Raktamokshana.

### Table 2: Indications of Anjana

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>After the Dosha manifested</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Doshas located only in eye</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>After body purification</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Doshas become Pakva</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Slight oedema in eye</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Severe itching in eye</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slimness of eye</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In thick eye secretions</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vataja, Pittaja, Kaphaja &amp; Raktaja disorders</td>
<td>+</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
In addition to above indications Sharangadharasamhita[14] and Bhavaprakasha[16] recommended that the time of Anjana procedure according to the seasons.

In afternoon – Hemanta and Sisira In morning – Grishma In evening – Sarath Any time – Vasant In rainy season Anjana should not be too much of cold or too much of hot.

Not only the seasonal recommendations; ancient Acharyas mentioned the time of Anjana application within the day also. Almost all of them recommended Anjana therapy only in the morning, evening and night neither in day time.[15,17] Preferably in the morning Lekana type of Anjana for Kapaha diseases, in evening Snehana type for Vataja diseases and in the night Prasadan type for Pittaja diseases.[18]

**Contraindications for Anjana[19,20,21]**

Anjana process is contraindicated in those suffering from fatigue, Udavarta, excessive lacrimation, alcoholic, anger, fear, fever (especially early stage of fever), suppression of natural urges and disorders of head as it causes redness-discomfort-diminish of vision-discharge-pain in eyes. Also it should not be applied during the period of less sleep (causes incapability in function), in windy days (damage the visual acuity), on exposure to dust and smoke (causes redness of eyes), in the presence of eye discharge and Adhimantha-defective vision with pain (produces congestion and pain), just after the Nasya, Vamana and Virechana procedures (produces congestion and pain), in headache (causes disorders in the head), after a head bath, in excessive cold days and before sunrise (due to firmness of Doshas), during indigestion (obstructs the channels-Srotas) and beginning of impulse of Dosa. Especially these contraindications are recommended for Lekhana Anjana.

Apart from above contraindications Acharya Bhavamishra advised that it should not be performed in excessively cold-hot-breezy days. If performed it will causes thickness, redness blindness due to a aggravation of excessively cold.

**Dosage of Anjana**

Table 3: Anjana Dosage as Per the Susruta Samhitha[22]

<table>
<thead>
<tr>
<th>Type of Anjana</th>
<th>Lekhana</th>
<th>Prasadhana</th>
<th>Ropana</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gutika</td>
<td>1 Harenu</td>
<td>1 1/2 Harenu</td>
<td>2 Harenu</td>
</tr>
<tr>
<td>Raskriya</td>
<td>1 Harenu</td>
<td>1 1/2 Harenu</td>
<td>2 Harenu</td>
</tr>
<tr>
<td>Churna</td>
<td>2 Shalaka</td>
<td>3 Shalaka</td>
<td>4 Shalaka</td>
</tr>
</tbody>
</table>

Note – Harenu is a Sanskrit technical word translating to “black cardamon”. It is also known by the name Harenuka. The botanical name is Vitex agnus-castu, and is commonly known in English as “vitex”, “chaste tree”, “chasteberry”. [23] As per the Sharangadharasamhitha[24],

**Gutikanjana –** According to the potency of raw materials Tikshna (high in potency) - 1 Harenu Madhyama (moderate in potency) - 1 1/2 Harenu Mrudu (mild in potency) - 2 Harenu

**Rasakriyanjana –** According to the quantity of drug Uttama matra - 3 Vidanga Madhyama matra - 2 Vidanga

Heena matra - 1 Vidanga

Note: The meaning of Vidanga is a seed of Embelia ribes which is also known as false black pepper.

**Churnanjana –** According to the action of drug Virechana Karma - 2 Shalakas Mrudu Karma - 3 Shalakas Snehana Karma - 4 Shalakas

**How to Perform Anjana Therapy[25,26]**

Almost all the Acharyas prescribed it should be applied from the inner canthus to the outer canthus and vice-versa on the inner part of the eye lid or on the palpebral conjunctiva by using an Anjana Shalaka or physician’s finger. But here they have not mentioned the exact eye lid ie. upper or lower. Hence it can be taken as lower palpebral conjunctiva or cul-de-sac because it provided enough space to application and easy to perform.

Susruta and Vaghbata described the procedure in detailed. Physician should be hold the two eye lids separately with his left hand (with the thumb and index finger) and hold the Anjana Shalaka by his right hand. It can be applied several times which provides proper application and increases the bio availability. But it should not be applied excessively or with painful manipulation. Patient is asked to move the eyeballs upwards and rotate slowly which allows the medicine to spread over the eye. Also eyelids be moved slightly by eye massaging this might be helpful for increase absorption by enhancing blood circulation around the eyes. But blinking, squeezing or washing of the lids should not be done till the properly performed Anjana features appeared.

Eye wash with water or suitable medicines for the respective disease, Doshas or season is recommended as Paschat Karma. Otherwise remaining medicines may vitiate the Doshas and give rise to the disease and caused itching sensation. To control these Dhumpana (medicinal smoking) can be performed. Pratyanjana (restorative collyrium) can be applied to control the irritation as well.

However Anjana which are used as therapeutics should not be very strong or very weak in potency, very little or very large in quantity, too thin or too thick in consistency, very rough and too hot.[27]

**Samyakyoga, Atiyoiga and Heenayoga Features of Anjana[28]**

Acharya Susrutha explained well about the Samyakyoga, Atiyoiga and Heenayoga features of Lekhana, Prasadan and Ropana types of Anjana. Features of properly performed Anjana therapy are known as Samyakyoga Lakshana whereas excessively performed features are known as Atiyoiga Lakshana. Inadequately performed features are called Heenayoga Lakshana.

- **Samyakyoga Lakshana of Lekhana Anjana** are non slimines of eyes, lightness of eyes, non discharging, swift in action, cleanliness of eyes and subsided the complications.
- **Atiyoiga Lakshana of Lekhana Anjana** are deviation of eyes, hardness of eyes, discoloration of eyes, drooping of eyes, roughness of eyes and excessive discharge. All of the above characteristics features cause Vata Dosha vitiation which must be managed.
**Santarpana Karma** (Saturation) along with other Vata alleviating measures.

- In inadequately performed Lekhana Anjana Doshas get more aggravated. This should be corrected by performing Dhumpana (medicinal smoking), Nasya (Snuffing) and Anjana therapy.
- In properly performed Prasadana Anjana eyes attain unctuousness-proper colour and strength, cheerfulness of eyes, cleanliness of eyes and it functions perfectly.
- If Prasadana Anjana is applied excessively, eye is affected with some mild disorders. In this case rough drugs should be used to pacifying Dosha.
- Prasadana Anjana applied insufficiently becomes useless.
- All the features such as Samyakya, Atiya and Heenayoga of Ropana Anjana are same as Prasadana Anjana but results moderately.

Hence for the better efficacy proper dose of Anjana must be advised.

**Materials Used in Anjana Karma**

- **Anjana shalaka**
- **Anjana patra**
- Drugs are the essential materials for Anjana Karma.

**Anjana Shalaka**[^29][30][31]

Anjana Shalaka or collyrium probe is a cylindrical rod with 8 Angulas in length which is made of metals, stones or horns of animals and ends should be bluntly pointed like a flower bud.

**Anjana Patra**[^32]

The container used for the storage of Anjana is known as Anjana Patra. The material should be taken according to the medicinal property of the drug. It is further advised the Anjana Shalaka also can be made accordingly.

**Routes of Ocular Drug Administration and Drug Absorption in Relation to Anjana**

Drugs can be administered to eye by various routes such as topical, periocular, intraocular and systemic. Periocular route includes subconjunctival, sub-tenon’s, peribulbar and retrobulbar whereas intraocular route is consists of intracameral and intravitreal types. Among all these routes topical route is the most flavored route specially for the anterior segment and ocular surface disorders. However the route should be selected according to the target ocular tissue.

Anjana is a medicinal preparation which applies on the lower palpebral conjunctiva or the cul-de-sac. Therefore this can be taken as topical type of ocular drug administration. The major tasks of developing topical ocular drugs are increase the bioavailability and control or constant release of drug delivery. Because preconveal factors, anatomical barriers and systemic absorption are negatively affect the bioavailability.

Mainly affected preconveal factors include solution drainage, blinking, tear film, tear turn over and induced lacrimation.[^33] Tear film offers the first resistance due to its high turnover rate. Lacrimal turnover rate is about 1 μl /min. Thus excess volume is flown to the nasolacrimal duct within a few minutes.[^34] Mucin present in the tear film plays a protective role by forming a hydrophilic layer that moves over the glycocalyx of the ocular surface and clears debris and pathogens including ocular drugs also.[^35] Human tear volume is estimated to be 7 μl. The cul-de-sac can transiently contain around 30 μl of the administered eye drop. However, tear film displays a rapid restoration time of 2–3 min, and most of the topically administered solutions are washed out within just 15–30 s after its instillation.[^35] Blinking of eyes promote the drainage of instilled ocular drugs through the nasolacrimal duct. Each blinking removes about 2 μl of fluid from the cul-de-sac.[^36] Due to the spontaneous tear flow instilled drugs are completely lost from the cul-de-sac in about 5 minutes and 80% of the drug lost through the nasolacrimal drainage.[^37] Considering all the preconveal factors, contact time with the absorptive membranes is lower, which is considered to be the primary reason for less than 5% of the applied dose reaching the intraocular tissues.[^36]

Eye is an extremely accessible organ foreign material. When considering anatomical barriers cornea and conjunctiva act as main barriers which are the most superficial layers of the eye. Cornea has five layers among them main three layers responsible for the drug transportation namely; outer lipophilic epithelium and Bowmen’s membrane (which acts as a barrier for hydrophilics), middle hydrophilic stroma (which acts as barrier for lipophilics) and inner less lipophilic endothelium (which forms barrier to hydrophilics).[^37] The tight junctions in the most superficial layer of corneal epithelium limit the paracellular drug permeation.[^38] It serve as selective barrier for the small molecules and completely prevent the diffusion of large molecules.[^37] However lipophilic drugs have higher permeability than hydrophilic drugs via the corneal epithelium.[^39] Despite the high permeability of lipophilic drugs corneal pores in between the tight junctions allow to penetrate small hydrophilic molecules (<3nm).[^37] Corneal stroma is hydrophilic in nature and a relatively open structure. Molecular weight up to 500,000 kd and hydrophilics can pass through it and it is comparatively act as a barrier for lipophilics.[^37] Endothelium offers little resistance for the drugs due to the presence of gap junctions. Due to biphasic solubility nature of cornea both the lipophilic and hydrophilic molecules can pass through it. Especially lipophilics travels through the transcellular pathway and hydrophilic molecules from the paracellular pathway (through the tight junctions of epithelium) both by diffusion.[^37] Thus the transcorneal permeation is the main route of drug entrance from lacrimal fluid to the aqueous humour. From the aqueous humour drugs can easily enter to the ciliary body and iris where the drug may bind to the melanin. This forms a reservoir which is released drugs gradually to the surrounding cells which prolong the drug activity.[^40]

The superficial layer of the conjunctival epithelium has tight junctions which are act as the main barrier for the drug penetration. In here also lipophilic drugs can diffuse through transcellular pathway and hydrophilic drugs passage through the paracellular
The conjunctiva is a highly vascularised structure; hence it is a major route for systemic drug absorption after topical instillation. This systemic absorption reduces the bioavailability and drug transportation to the target ocular tissue. Not only the cornea and conjunctiva; sclera also plays an important role on the drug absorption. However it is more permeable to larger molecules than conjunctiva and cornea. It is poorly vascularized and consists mainly collagen and mucopolysaccharides through which drugs can diffuse to the vitreous.

Another way of bioavailability reduction is systemic absorption. Drugs can reach the systemic circulation after topical ocular delivery by several routes such as through the aqueous humor, ciliary body, iris, eyelid margins and especially via the nasal mucosa. Systemic absorbed drugs have to cross the blood ocular barriers to reach the target ocular tissue and have less chance of reaching ocular tissues. Regarding Anjana therapy considerable amount of drug may pass to the nasolacrimal duct due to increased lacrimation and then undergo to systemic absorption. In addition to nasolacrimal drainage by tear evaporation, drug binding to proteins in tear, drug metabolism by tear enzymes also responsible for reduce the drug absorption amount.

Anjana therapy as a kind of topical administration may be highly activated in the anterior segment of the eye which is up to the crystalline lens. Its active principles may be transfer to the interior of the eye according to their hydrophilicity and lipophilicity mainly through the conjunctiva and cornea respectively.

### Pharmacokinetics of Anjana

The process of drug uptake by the body, distribution to the target tissues, its biotransformation or its metabolism and the method of excretion from the body is known as pharmacokinetics of a drug. The main drug absorptions methods to eye is consists of passive diffusion, carrier mediated transport (facilitated diffusion and active transport) and endocytosis. Passive diffusion refers to the process of movement of drug molecules across the biological barrier according to its concentration. It does not need energy and this is the primary mode of drug transport across the ocular surface. Passive diffusion also depends upon the degree of ionization (pH) and lipid solubility of the drug. Also some drugs are transported across the biological barriers by carrier mediated transport. In this method carrier molecules presented on the membrane surface forms a complex with the drug molecule. Carrier mediated diffusion of molecules along the concentration gradient is known as facilitated diffusion which does not require energy. Its rate of diffusion depends upon the ability of drug molecules to bind with the carrier and the availability of carriers. Active transport refers to carrier mediated drug transport against the concentration gradient; it requires energy. Uptake of drug molecules by plasma membrane derived vesicles is named as endocytosis. Therefore all the topical instillations including Anjana transport cross the conjunctiva, cornea, sclera, iris, ciliary body, lens etc via the above mentioned drug absorption methods.

According to its form Anjana is 3 types i.e. Gutika, Rasakriya and Churna. Hence the Gutika and Churna types of Anjana can be correlated with ophthalmic suspensions and Rasakriya type is with aqueous solutions/eye drops. Rasakriya Anjana is completely soluble without any sedimentation hence it can be compared with modern eye drops. Because of its solubility and micro molecules it can be rapidly and easily absorbed but its drainage out from the cul-de-sac is rapid. Thus its bioavailability and rate of ocular absorption is comparatively lesser than the other two types of Anjana forms. Gutika and Churna types of Anjana have sedimented micro particle; so that these types can be correlated with ophthalmic suspensions. Suspensions are non-invasive ocular topical drop drug carrier systems which can be defined as dispersion of finely divided insoluble active pharmacological ingredients in an aqueous solvent consisting of a suitable suspending and dispersing agent. Suspension particles retain in cul-de-sac and thereby improve drug contact time and duration of action relative to drug solution. Duration of drug action for suspension depends upon the particle size of the drug. Because suspensions contain micronized drug molecules most preferably less than 10 µm in diameter. Therefore particle size of active agent plays a key role because sedimentation rate, agglomeration and resuspendability are totally affected by the size of particles. Suspensions' drug delivery system takes place in two phases i.e. rapid and slow. Small particle size promotes fast dissolution and fast absorption but these small particles tend to easily drain out from the cul-de-sac which may results decrease the bioavailability and absorption. Mean while larger particle size helps retain particles for longer time and slow drug dissolution. Thus an optimal particle size is expected to result in optimum drug activity.

In case of Anjana preparation Gutica and Churna types prepared by dry milling, grinding and micro pulverization which are the processes help in getting optimal particle size but still it has not standardized the best particle size. Thus it can be taken as <10 µm because that size generally minimizes the ocular irritation. As per the modern pharmacology ophthalmic suspensions should be formulate according to the following steps with proper sterilization method.

1. Preparation of a dispersion of the drug
2. Preparation of the structured vehicle, followed by addition of the drug dispersion
3. Addition of the other adjuncts – preservatives, wetting agents, suspending agents etc.
4. Homogenization

All the above 4 steps are followed by Anjana process except the adding specific preservatives because drugs itself act as preservatives and most of the time freshly prepared drugs are use in Ayurveda. Meanwhile bee honey, ghee, breast milk and some of the medicinal fresh juices commonly use as vehicles and wetting agents. Hence it should be carefully monitored for the proper maintenance of sterilization of the drug. Moreover
optimum pH, tonicity and viscosity of the preparation are play a significant role on its bioavailability and amount and rate of absorption.

PROBABLE MODE OF ACTION OF ANJANA

Once applied an Anjana it acts as a foreign body to ocular surface. Hence eye gets reflex secretion in response to foreign particles on cornea and conjunctiva. Due to that considerable amount of drug washes out from the eye by weeping and another major portion may drainage to the nasolacrimal duct (NLD). Apart from these another part may be eliminated from the ocular surface by evaporation (mainly Rasakriya Anjana), metabolization by tear enzymes and get in contact with tear proteins. Finally it mains in the cul-de-sac a very less amount of Anjana for the ocular absorption; meanwhile the portion drainage to the NLD may absorb to the systemic circulation by nasolaryngeal and oral mucosa. On the other hand Gutika and Churna Anjana have micro particles which may be deposited in the cul-de-sac and thereby increase the bioavailability to enhance ocular absorption.

The ocular absorption of Anjana may initiate though the conjunctiva and cornea. Mainly lipophilic active ingredients may absorb through the cornea by transcellular pathway and hyrophilics from the conjunctiva by paracellular pathway. This ocular absorption may be depend on the passive diffusion, carrier mediated transport (facilitated diffusion and active transport) and endocytosis. Also pH, viscosity, tonicity and most importantly molecular size and molecular weight of the active ingredients play a major role of the same. Once it crosses the conjunctiva (mainly hydrophilics); the sclera is more permeable and it allows drugs to penetrate the other interior structures of the eye i.e. ciliary body, iris, aqueous humour, lens, vitreous ect. But due to high vascularization of conjunctiva, ciliary body and iris considerable amount of drug may be enter to the systemic circulation again. The drugs pass though the corneal epithelium (mainly lipophilics) directly goes to the aqueous humour and distribute to the other ocular tissues. However some of the drugs coming to the aqueous humour either via cornea or conjunctiva are undergo to metabolization by the enzymes present in the aqueous.

Considering all these factors it can be said that Anjana therapy may be highly activated in the anterior segment of the eye because of the presence of several anatomical, biological and physiological ocular barriers. But in the system of Ayurveda pharmacological actions of a drug may explain according to its pharmacological properties which are included Rasa, Guna, Virya, Vipaka and Prabhava. These qualitative qualities are still not explained and interpreted in accordance to the modern science. Hence as per the view of Ayurveda these qualitative measures may act on the posterior segment of the eye.

DISCUSSION AND CONCLUSION

Considering all of above discussed factors Anjana therapy is a holistic, well developed method of topical ocular drug administration which is described in detail with its indications, contraindications, application method, pre and post procedure measures, dosage forms and even proper storage advices in authentic texts. It can be taken as a further development of Ashyotana due to its increased bioavailability on the ocular surface than the Ashyotana. Not only that ancient Achryas advised some processes to overcome some practical difficulties of Anjana therapy too such as Anjana should be applied from medial canthus to lateral canthus and vice versa; which increases bioavailability, just after the application the patient is asked to move the eyeballs upwards and rotate slowly which allows the medicine to spread over the eye, eyelids should be moved slightly by eye massaging with close eyes this might be helpful for increase absorption by limiting nasolacrimal drainage. However the exact mode of action of the Anjana therapy is still not proved by any experimental studies. Hence now it is high time to prove our ancient knowledge in accordance to modern point of view.

High ocular irritation and less contact time are the main problems in Anjana therapy. Ocular irritation can be minimize by using the optimal particle size (<10 µm) and using pH between 6.5 to 7.6; which is the pH value of normal tears. Meanwhile bioavailability can be increase by using optimal viscosity and tonicity. The optimal viscosity for ophthimalic preparation is 12-15cp and optima tonicity is 266-445mOsm/kg. Normally instilled drugs completely disappear from the cul-de-sac in about 5 min specially eye drops. Thus if the second drop is applied 5 min after the 1st drop then no washout effect occurs on the 1st drop. Hence this theory can be applied for the Rasakriya Anjana for optimal results; however for the Churna Anjana and Gutika Anjana have higher bioavailability itself.

Most of the modern topical ocular preparations are not able to reach up to the posterior segment. But Anjana is a good, simple, easy and effective treatment modality for treating both the anterior and posterior segment disorders of the eye which is being practiced more than 5000 years. Finally it can be concluded that Anjana is an ideal remedy for various types of ophthalmic disorders; which can be used as preventive as well as curative measure.
Available online at: [http://ijapr.in](http://ijapr.in)

**REFERENCES**

23. http://www.wisdomlib.org/definition/hare%E1%B9%87u/index.html, access date 22/05/2016
44. Urtti A et-al, Systemic Absorption of ocular Pilocarpine is Modified by Polymer Matrics, International Journal of Pharmacology, 1985;23(2), pp-147-61

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*Address for correspondence
Dr Kankan Gamage Surangi
MS Scholar,
Department of Shalakya Tantra,
National Institute of Ayurveda,
Jaipur, Rajasthan, India.
Ph: 07665539668
Email: surangtkg@gmail.com