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Review Article: *Shushkaakshipaaka* [Dry Eye Syndrome]

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ABSTRACT

Eyes are the windows to the soul. Ayurvedic classical texts and writings have mentioned and discussed about eye and its related disorders, demonstrating the significance of the eye and the ways to protect it. Hence the importance of eye care has always a high priority. Patients with *Shushkaakshipaaka* experience varying severity of symptoms. *Shushkaakshipaaka* is co-related with Dry eye syndrome regarding the similarities in the presentation of signs and symptoms. Most patients complain of eye irritation, blurring of vision that fluctuates across the day and even photophobia. DES significantly reduces the quality of life among those affected. The treatment modalities that are mentioned in classics are of cooling and rejuvenating therapies for *Vataja-Pittaja* disorders can be intervened to treat DES, which increase the stability of tear film and give relief from the symptoms of DES. The treatment principle for *Shushkaakshipaaka* mentioned in Ayurveda classics are *Tarpana*, *Seka*, *Aschotana*, *Anjana* etc., which are known to increase the stability of tear film and give relief from the symptoms of *Shushkaakshipaaka*. Current article focuses to gather all of types, diagnosis, etiology, pathogenesis and treatment of *Shushkaakshipaaka*.

Key words: *Shushkaakshipaaka*, Dry eye syndrome, *Tarpana*, *Seka*, *Aschotana*, *Anjana*

INTRODUCTION

Ashru (tear) secretion is an integral component of the ocular surface physiology; when compromised (quantitatively or qualitatively) leads to *Shushkaakshipaaka* (Dry eye syndrome) with various ocular discomfort symptoms and ultimately the patient may land in corneal blindness. *Shushkaakshipaaka* is one among the "*Sarvagata Netra Rogas*" mentioned by *Acharya's Sushruta*^[1] as well as *Vagbhata*^[2] under *Saadhya Netra Roga*. The symptoms include *Gharsha*, *Toda*, *Bheda*, *Upadeha*, *Krichronmeelana*, *Vikunana*,

Rooksha Daaruna Vartma.^[3]

Dry eye syndrome (DES), also known as keratoconjunctivitis sicca (KCS), a common ocular condition, arises when the tear film does not adequately support biological functions of the ocular surface. It is a multi-factorial disease of the tear and ocular surface. This arises due to environmental or endogenous stress, microbial insult or genetic factors. Acute inflammatory pathways of the ocular surface are triggered with tear dysfunction and hyperosmolarity and this potentiates a chronic inflammatory cycle that is seen in DES. Such inflammatory pathways are driven by host ocular immunity.^[4]

Patients with DES experience varying severity of symptoms. Most patients complain of eye irritation, blurring of vision that fluctuates across the day and even photophobia. DES significantly reduces the quality of life among those affected. The impact of DES on patients was found to be equivalent to unstable angina, a life-threatening cardiac condition.^[5]

Local, systemic and environmental factors play a major role in its pathogenesis. *Vata & Pitta/Rakta* vitiation as per Ayurveda are the major contributing pathological

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factors in its manifestation. Contrary to the available modern medical treatment / management regimen, Ayurveda propounds a systematic systemic/ holistic treatment approach in the treatment of dry eye syndrome.

The treatment modalities that are mentioned in classics are of cooling and rejuvenating therapies for *Vataja-Pittaja* disorders can be intervened to treat DES, which increase the stability of tear film and give relief from the symptoms of DES.

The treatment principle for *Shushkaakshipaaka* mentioned in Ayurveda classics are *Tarpana*, *Seka*, *Aschotana*^[6], *Anjana* etc., which are known to increase the stability of tear film and give relief from the symptoms of *Shushkaakshipaaka*.

DISEASE REVIEW

Shushkaakshipaaka is one among the *Sarvagata Netraroga* mentioned by *Acharyas* under *Saadhya Vyadhi*.

Derivation of word *Shushka*: *Tri (Susha Sheshae + Ktah)*^[7]

Paribhasha^[8]

“*Shushkena Akshipakena Upahatam Akshihi*”

Acharya Madhukosha explains *Shushkaakshipaaka* as *Paka* (Inflammation) of *Netra* which develops as a result of *Shushkata (Adravata)* leading to *Netra Upahata*.

Nidana

Acharyas have described *Hetu* of all *Netra Rogas* in general.

Table 1: Showing the *Netraroga Nidana* according to various *Acharyas*.

SN	<i>Nidana</i>	Su ^[9]	BP ^[10]	MN ^[11]	VS ^[12]	YR ^[13]
1.	<i>Ushnabitaptasyaj alepraveshat</i>	+	+	+	+	+
2.	<i>Durekshana</i>	+	+	+	+	+
3.	<i>Swapnaviparyaya</i>	+	+	+	+	+

4.	<i>Samrodhana</i>	+	+	+	+	+
5.	<i>Kopa</i>	+	+	+	+	+
6.	<i>Shoka</i>	+	+	+	+	+
7.	<i>Sukta-Aranala-Amla-Kulathanishevana</i>	+	+	-	-	-
8.	<i>Shiroabhighata</i>	+	+	+	+	+
9.	<i>Vega Vinigraha</i>	+	+	+	+	+
10.	<i>Atisweda</i>	+	+	+	+	+
11.	<i>Dhumanisevana</i>	+	+	+	+	+
12.	<i>Chardivighata</i>	+	+	+	+	+
13.	<i>Bashpa-Graha</i>	+	+	+	+	+
14.	<i>Sukshmanireekshana</i>	+	+	+	+	+
15.	<i>Atidravnappana /Dravattathanna-Nishi-Sevitata</i>	-	-	+	+	+
16.	<i>Atimadyapanat</i>	-	-	+	+	+
17.	<i>Rituviparyaya</i>	-	-	+	+	+
18.	<i>Ati-Sheegra-Yanaat</i>	-	+	-	-	-
19.	<i>Abhishyanda</i>	+	-	-	-	-

Vishesha Nidana^[14]

The *Vishesha Nidana* which includes *Asatmendriyatha Samyoga*, *Prajnaparadha*, *Parinama* with respect to *Chakshurensdriya* can be considered in case of *Shushkaakshipaaka*.

Asatmendriyatha Samyoga

These abnormal associations or contacts might happen either accidentally, inevitably or intentionally. Each such improper contact causes bad effects not only in the sense organ concerned but also on the mind, body

and makes them diseased. Examples for such abnormal contacts applicable to *Chakshurendriya* are:

Atiyoga (Excessive)

Seeing very bright light or objects for long periods of time, such as sun, TV and constantly looking at the monitor (screen) without blinking.

Heenayoga

Remaining in a very dim light or even darkness, seeing objects in dim light or not seeing at all (not using the eyes properly).

Mithyayoga

Gazing of objects which are very near or very far, concentrating on the small letters over the screen (Improper accommodation), watching bright objects, the surrounding environment like poor visual hygiene, visualizing from a distance of less than six inches or observing the object placed at an uneven height, observing bright (shining) objects. Viewing computer screen or TV screen in improper way can also be considered as of *Mithyayoga* of *Chakshurendriya*.

Table 2: Showing Doshas involved in Shushkaakshipaaka according to various Acharyas.

Doshas involved	Samhita
Vata ^[15]	S.S. and A.S.
Vata and Pitta ^[16]	A.H.
Vata and Rakta ^[17]	Karala
Raktaja ^[18]	MN and BP

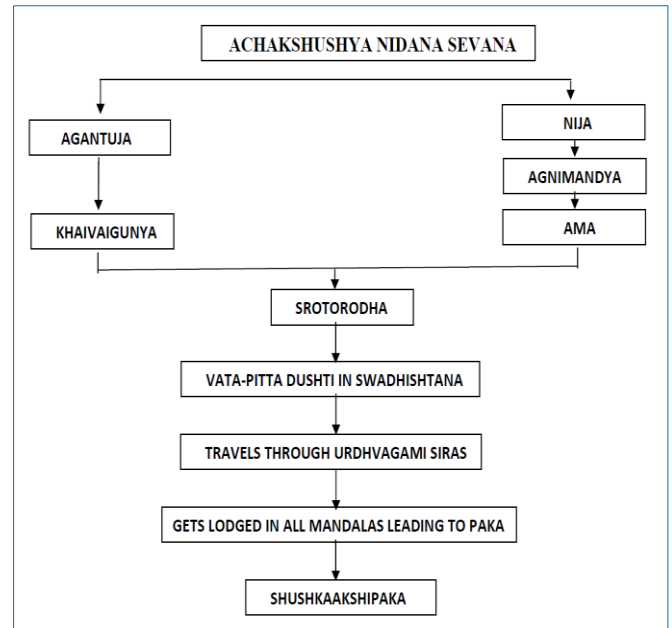
Samprapti

Samanya Samprapti^[19]: *Samanya Samprapti* of *Netraroga* can be considered.

Vishesa Samprapti: Due to the *Nidana Sevana*, *Vata-Pitta* gets vitiated and passes through *Urdhwa Sira*'s and gets accumulated in the parts of the eye like *Vartma*, *Sandhi*, *Shukla Mandala*, *Krishna Mandala*, *Drushti Mandala (Sarvagata)* and manifests the disease as *Shushkaakshipaaka*.

Samprapti of Shushkaashipaka

Chart 1: Showing the Samprapti of Shushkaakshipaaka



Samprapti Ghataka

Table 3: Showing the Samprapthi Ghatakas of Shushkaakshipaaka

Dosha	Vata-Pitta and Rakta
Dushya	Rasa-Rakta
Agni	Mandagni
Srotas	Rasa-Raktavaha Srotas
Srotodushti	Sanga
Rogamarga	Madhyama
Adhistana	All Netramandalas

Purvarupa^[20]

Purvarupa are prodromal symptoms prior to disease felt by the patient.

Table 4: Showing the Samanya Purvarupa of Netrarogas

Avilata	Blurred vision
Sa Samrambham	Angry look

Ashru	Watering
Kandu	Itching
Upadeha	Coating
Guruta	Heaviness
Usha	Burning sensation
Toda	Pricking pain
Raga	Reddish discoloration
Vartmakosha Sula	Painful lids
Vartmakosha Sukapurnabha	Foreign body sensation in lids
Kriyaswakshiyathapura	Reduced movements like blinking

Few of the above *Purvarupas* are also present in prodromal symptoms of *Shushkaakshipaaka* like: *Avilata* (Eye strain and asthenopia), *Sasamrambha* (Foreign body sensations or atypical discomfort in eye), *Kandu* (Itching as a symptom because of eye strain), *Guru* (Eye fatigue), *Usha* (Burning sensation), *Toda* (Pain in eyes), *Sashulamvartmakoshaishu* (Pain in eye lids), *Sukapurnabham* (Foreign body sensation) can be considered as *Purvarupa* of *Shushkaakshipaaka*.

Lakshana

Shushkaakshipaaka is characterized by excessive closure and roughness in eye lids, associated with difficulty in lid movements, blurred vision, burning sensation.

Table 5: Showing the Lakshanas of Shushkaakshipaaka by different Acharyas.

Lakshana	S.S [21]	AH [22]	AS [23]	VS [24]	MN [25]	YR [26]	BR [27]
Garsha	-	+	+	-	-	-	-
Toda	-	+	+	-	-	-	-
Rukshavartmakshi	+	+	+	+	+	+	+
Darunavartmakshi	+	+	+	+	-	+	+

Vikunana	-	+	+	-	+	+	-
Vishushkata	-	+	+	-	-	-	-
Sheethechha	-	+	+	-	-	-	-
Sulapaka	-	+	+	-	-	-	-
Daha	-	-	-	+	+	+	+
Aviladarshanam	+	-	-	+	+	+	+
Krichronmeelana	-	+	+	-	+	-	-
Vilokanam	+	-	-	+	-	-	+
Upadeha	-	+	+	-	-	-	-

Upashaya

Signifies medicines, food items and activities which give feelings of well-being to the patient. *Sheethechha*^[28] – Likeness for cold, it can be considered as the patient might feel better while washing the eyes with cold water.

Anupashaya

All the *Nidan*s can be considered as *Anupashaya* for *Shushkaakshipaaka*.

Sadhyasadyata

Sarvagata Aushadha Sadhya Vyadhi^[29]

Chikitsa

Shushkaakshipaaka should be treated similar to *Vataja Abhishyanda* with *Ghritha* processed with *Kulira Mamsa Rasa*.^[30] *Seka* with *Ksheera* and *Saindhava* is mentioned.^[31]

Aschotana can be performed with *Darvi*, *Prapaundarika Kwatha*, *Manjishta Kwatha*, *Mridweeka Kwatha* or *Chandanadi Kwatha*.^[32] *Nasya Karma* should be performed with *Anu Taila* or *Sarivadi Taila*. *Aschotana* and *Putapaka* is indicated with *Snigdha* and *Jeevaneeyagana Dravya Samsiddha Ghritha*. *Anjana* can be performed with *Masi* should be obtained by burning the hair dipped in ghee in *Antardhuma Karma*.^[33] *Churnanjana* prepared from *Manjista*, *Triphala*, *Katankata*, *Loha Bhasma* and *Srotonjana* can be

applied. *Pindanjana* prepared from mixing equal quantity of *Tamra, Raja, Sahachara Pushpa, Pundarika, Madhuka, Kalanusari, Sariva* with *Aja-Dugdha*. *Sneha Anjana* prepared from *Anupa Mamsa Vasa* with the powders of *Shunti* and *Saindhava*. *Basti Karma* with *Ghritha Manda, Madhuka* and *Shatavari* are specially indicated in the treatment of *Shushkaakshipaaka*.^[34]

Disease Review - Modern Science

Dry Eye Syndrome^[35]

Dry eye syndrome refers to a group of disorders of the tear film that are due to reduced tear production or excessive tear evaporation, associated with ocular discomfort and/or visual symptoms and possible disease of the ocular surface.

Etiology of Dry Eye Syndrome

1. Due to deficiency in tear film component.
2. Due to Impaired eye lid function.
3. Epitheliopathies.

Due to deficiency in tear film component

1. **Aqueous tear deficiency:** (Keratoconjunctivitis sicca.)

Seen in conditions like

- Congenital alacrimia
- Paralytic hyosecretion
- Primary and secondary Sjogren’s syndrome
- Idiopathic hyosecretion.

2. **Mucin deficiency dry eye:** Occurs when goblet cells are damaged, as in Vitamin A deficiency (Xerophthalmia). In cases of Conjunctival scarring diseases Such as Trachoma, chemical Burns, Radiations etc.

3. **Lipid deficiency abnormalities:** It has only been seen in some cases of congenital absence of meibomian glands Common in patients with chronic blepharitis and chronic meibomitis.

4. **Impaired eyelid functions:**

Seen in

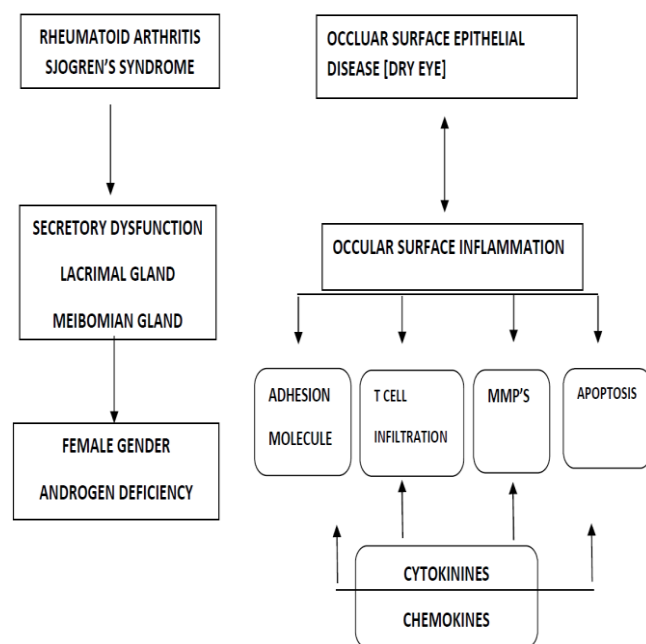
- Bell’s palsy, Exposure keratitis
- Symblepharon, Pterygium

- Lagophthalmos, Ectropion etc.

Pathogenesis

The ocular surface and tear-secreting glands function as an integrated unit. Disease or dysfunction of this functional unit results in an unstable and poorly maintained tear film that causes ocular irritation symptoms and possible damage to the ocular surface epithelium. Dysfunction of this integrated unit may develop from aging, a decrease in supportive factors (such as androgen hormones), systemic inflammatory diseases (such as Sjögren syndrome or rheumatoid arthritis), ocular surface diseases (such as herpes simplex virus [HSV] keratitis) or surgeries that disrupt the trigeminal afferent sensory nerves (e.g., LASIK), and systemic diseases or medications that disrupt the efferent cholinergic nerves that stimulate tear secretion. Decreased tear secretion and clearance initiates an inflammatory response on the ocular surface that involves both soluble and cellular mediators.

Chart 2: Showing the pathogenesis of Dry Eye



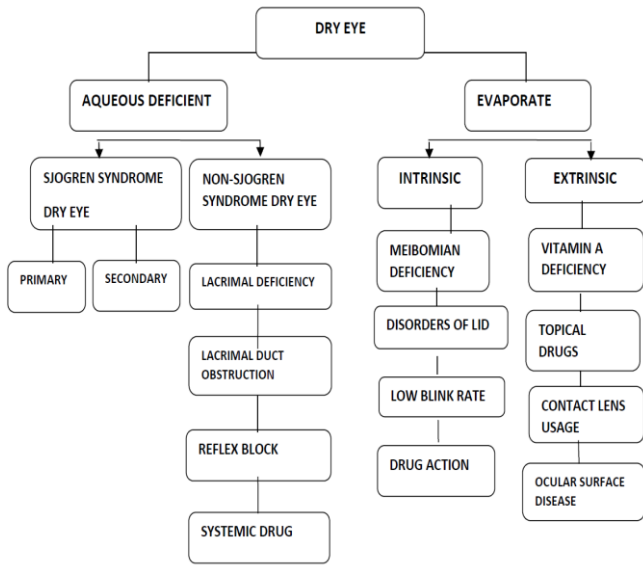
Clinical Features

Symptoms of Dry Eye Include

- Irritation
- Foreign body (sandy) sensation

- Feeling of dryness
- Itching
- Non-specific ocular discomfort
- Chronically sore eyes

Chart 3: Showing the classification of Dry Eye



Signs

- Posterior blepharitis and meibomian gland dysfunction.
- Conjunctiva may show mild keratinisation and redness.

Tear Film

- In the normal eye, as the tear film breaks down, the mucin layer becomes contaminated with lipid but is washed away.
- In the dry eye, the lipid-contaminated mucin accumulates in the tear film as particles and debris that move with each blink.
- Froth in the tear film or along the eyelid margin occurs in meibomian gland dysfunction.

Cornea

- Punctate epithelial erosions that stain with fluorescein.
- Filaments consist of mucus strands lined with epithelium attached at one end to the corneal surface in case of severe dry eye conditions.

Complications

- Peripheral superficial corneal neovascularization
- Epithelial breakdown, melting, perforation and bacterial keratitis.

Diagnosis

Tear Film Tests

1. Tear film break-up (BUT)

It is the interval between a complete blink and appearance of first randomly distributed dry spot on the cornea. It is noted after instilling a drop of fluorescein and examining in cobalt-blue light of a slit-lamp. BUT is an indicator of adequacy of mucin component of tears. Normal values of TBUT range from 15 to 35 seconds. Values less than 10 seconds imply an unstable tear film.

2. Schirmer’s test

The Schirmer test is a useful assessment of aqueous tear production. The test involves measuring the amount of wetting of a special, 5 mm wide and 35 mm long. The test can be performed with or without topical anaesthesia. When performed with an anaesthetic (Schirmer 2 whereas without anaesthetic (Schirmer 1) The filter paper is folded 5 mm from one end and inserted at the junction of the middle and outer third of the lower lid. The patient is asked to keep the eyes gently closed. Less than 10 mm of wetting after 5 minutes without anaesthesia and less than 6 mm with anaesthesia is considered abnormal.

3. Rose Bengal Staining Method

Rose Bengal is a dye that has an affinity for dead or devitalized epithelial cells that have a lost or altered mucous layer. Corneal filaments and plaques are also shown up more clearly by the dye and the use of a red-free filter may help visualization. A 1% solution of Rose Bengal or a moistened impregnated strip can be used.

Other Tests

- Lactoferrin test
- Phenol red thread test
- Tear meniscometry

- Tear film osmolarity
- Impression cytology

Management of Dry Eye^[36]

There is no cure for dry eye syndrome and some people have recurring episodes for the rest of their lives, but there are treatments to help control the symptoms. The exact treatment for dry eye syndrome depends on whether symptoms are caused by the decreased production of tears, tears that evaporate too quickly, or an underlying condition.

Conservative Management

Lubricant Treatments

Mild to moderate cases of dry eye syndrome can usually be treated using lubricant eye treatments that consist of a range of drops, gels and ointments.

Oily Tear Eye Drops

Eye drops that replenish the oily part of the tear film and reduce evaporation from the surface of the eye can also be used for mild to moderate degree of dryness. These preparations include synthetic guar gums or liposomal sprays.

Eye Ointments

Eye ointments can also be used to help lubricate the eyes and help keep them moist overnight because the tears can evaporate, while sleeping eyes are not fully closed.

Anti-Inflammatory Treatments

The underlying problem with long-term dry eye syndrome is inflammation in and around the eye. Therefore, one of the anti-inflammatory treatments can also be performed.

Corticosteroid Eye Drops and Ointments

Corticosteroids are powerful anti-inflammatory medications that can be given as eye drops or ointments in severe cases of dry eye syndrome.

Oral Tetracyclines

Low doses of medications called tetracyclines can be used as anti-inflammatory agents for a minimum of three to four months, sometimes much longer.

Ciclosporine Eye Drops

Ciclosporine is a medication that suppresses the activity of the immune system and can be used in the treatment of dry eye syndrome.

Surgical Management

Punctal Occlusion

Punctal occlusion involves using small plugs called punctal plugs to seal tear ducts. Tears will not drain into the tear ducts and eyes should remain moist. Main aim is to restrict the loss of amount of normally secreted tear.

Salivary Gland Auto transplantation

Salivary gland auto-transplantation is an uncommon procedure that is usually only recommended after all other treatment options have been failed.

CONCLUSION

The eye is the main sense organ gifted by God to human beings. An individual who is blind, day and night are the same and this beautiful world is of no use to him even if he possesses a lot of wealth, so sincere efforts should be made by every individual to preserve his/her vision till the last breath of life. In spite of remarkable progress and advances in the field of modern ophthalmology, there are some limitations. Ayurveda, the ancient system of medicine gives valuable guide lines not only in treatment aspects but also in preventive line. *Netra Kriyakalpa* like *Snehapana*, *Tarpana*, *Putapaka*, *Nasya*, *Anjana* are the local therapeutic procedures which if promptly used shows objective evidences of excellent responses. According to Ayurveda, dry eye is not merely an ocular surface disorder, rather this is one of manifestation of the deranged metabolism/depreciation of body tissues. *Ashru* (tear film) is the byproduct of *Rasa*, *Meda*, and *Majja Dhatu*s and without normalizing / altering them we cannot treat dry eye syndrome optimally. Systemic and holistic approach to treat the disease *Shushkaakshipaaka*, (*Sarvagata Vata-Pitta / Raktaja Netra Roga*) and managing this humeral imbalance, along with local / topical therapeutical procedures, the condition could be managed well.

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