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## DRY EYE SYNDROME ASSOCIATED WITH DIABETES MELLITUS: AYURVEDIC AND MODERN VIEW

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### ABSTRACT:

Dry eye syndrome (DES) also known as Keratoconjunctivitis sicca. Diabetes is more prone to dry eye disease and tear film dysfunctions. DM is a disease which affects both the anterior and posterior segment of the eye. DM patients more prone to Cataract, Glaucoma, Dry eye, Superficial Punctuated keratitis, recurrent corneal erosion syndrome, Persistent epithelial defects & also cause microvascular complications like Neuropathy, Retinopathy. Dry eye is the disorders of the tear film due to tear deficiency or excessive evaporation which causes damage to the interpalpebral ocular surface and it is associated with symptoms of ocular discomfort. In diabetes due to poor control of DM damage to any component of lacrimal function unit leads to DES, Diabetic patients have classical symptoms of dry eye including irritation, foreign body sensation, redness, itching, burning sensation etc. In modern sciences it is treated with artificial tears drops. Frequent use of drops again leads to dryness hence alternative treatment is necessary. Ayurvedic classical text Acharya Sushruta describes Shukshkakshipaka under Sarvagata Netra Roga can be correlated with Dry eye. According to Acharya Sushruta it is Vatta vitiated disease, Acharya Vagbhata has quoted it as Vatta-pitta vitiated disease and Sharangadhara considered as Vataraktaja Vitiated disease. By analyzing different opinion of acharaya may cause dry eye by decreasing tear secretion. In Ayurveda many more treatment modalities are available for treating Shukshkakshipaka such as Snehapana, Netra Tarapana, Putapaka, Nasya, Anjana etc. This study enlightens the ayurvedic and modern review on dye eye syndrome in diabetes patient.

**KEYWORDS:** Dry eye syndrome, Diabetes, Sarvagata netra roga, Shushkshipaka

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**INTRODUCTION:**

Ayurveda is a science of life that aims to ensure a healthy mind and a healthy body. Ayurveda aims to improve health to cure disease. Shalakyatantra is the branch of Ashtanga Ayurveda which deals with the disease above the clavical, i.e. Urdhwanga which includes Eye, Nose, Ear, Throat, and Head (1). Sharir has five Dnyedriya among which netra is very important organ. Acharaya Vaghabhata in Uttarsthana chapter 13 has given tremendous important to the protection of the eye. (2) Diabetes has increased in the current scenario due to their lifestyle. The prevalence of diabetes has increased significantly in recent decades, and the disease remains a global epidemic. According to the International Diabetes Federation (IDF), in 2020 India will have 77 million people out of 463 million worldwide. According to the IDF, the prevalence of diabetes in the population is 8.9% (3). Diabetic retinopathy and diabetic cataracts are known complications of diabetes, but dry eye syndrome is also a common problem in diabetics. Diabetes is a disease associated with microvascular complications such as retinopathy, microangiopathy, nephropathy, etc. DM patients are more prone to cataracts, glaucoma, dry eyes, superficial punctate keratitis, recurrent corneal erosions and permanent epithelial damage. Dry eye is a disorder of the tear film caused by a lack of tears or excessive evaporation, which can damage the surface between the eyes. Diabetes caused by poorly controlled hyperglycemia has damaged any component of the tear functional unit leading to DES.

**Dry Eye Syndrome:** Dry eye is also known as keratoconjunctivitis sicca. According to AAO 2013 defined as a group of disorders of the

tear film that are due to reduce tear production or tear film instability associated with ocular discomfort with visual symptoms and inflammatory disease of the ocular surface.

**PATHOPHYSIOLOGY:** Dry eye associated with diabetes mellitus it is due to insufficient tear production due to autonomic neuropathy affecting the nerves that controls the tear or lacrimal gland (N).

**Lacrimal Functional Unit:** (4)- It plays most important part to maintain normal physiology of ocular surface, tear secretion and tear formation. Diabetes mellitus patient is at higher risk to developed lacrimal function unit dysfunction (5).

1. The key factors of DES are ocular surface dysfunction, tear hyperosmolarity and tear film instability caused by LFU.

2. Due to hyperglycemia it affects any component of LFU may cause DES. Due to its neural connection leading to inadequate tear productions or excess tear loss, abnormalities in blinking and changes in the tear film composition which is ultimately cause DES (6).

**Diabetes can affect tear film by three ways**

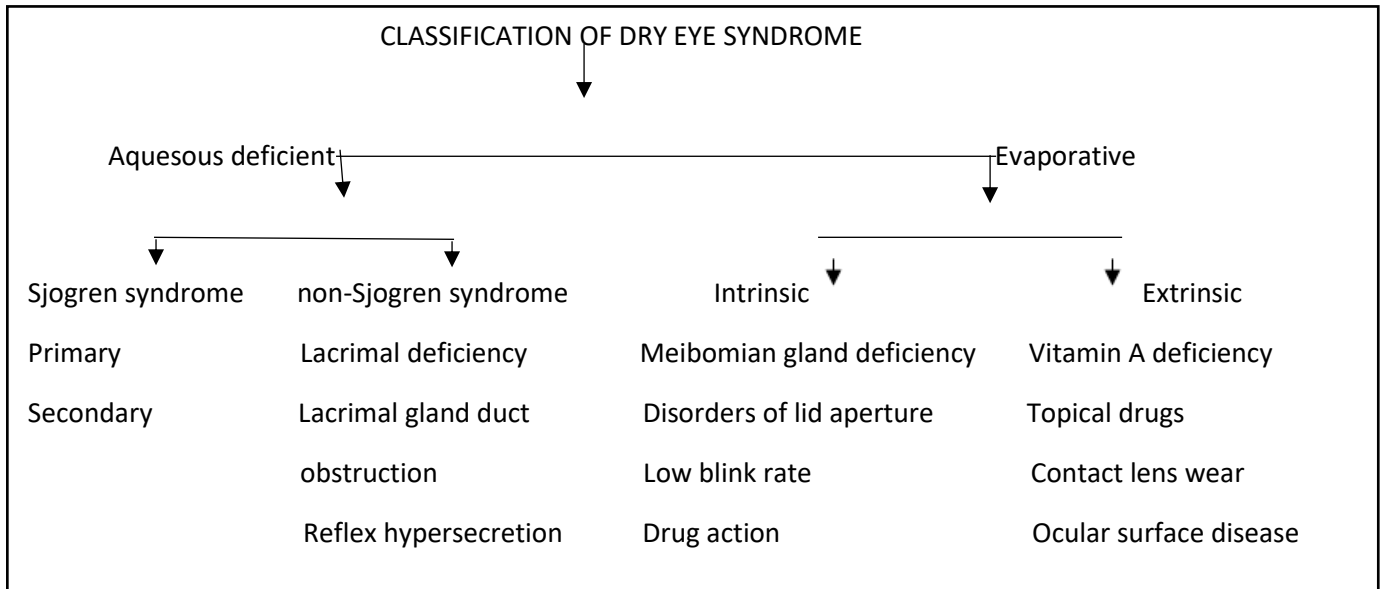
– Research study shows that diabetes induces dry eye more common in type 2 diabetes with complication polyneuropathy. Such patient reduced corneal sensitivity with impaired corneal neurons. (7)

1. Hyperglycemia causes corneal neuropathy i.e. micro vascular damaged to corneal nerves and block feedback mechanism of tear secretion.

2. Lower insulin level interrupt biochemical balance of lacrimal gland and corneal metabolism and epithelium cell proliferation generate ocular dryness. (8)

3. Lacrimal gland inflammation leads to impair tear secretion.

**CLASSIFICATION OF DRY EYE SYNDROMS: (9)**



**Etiopathogenesis According to Ayurveda:**

*Shushkashipaka* caused by vitiation of *vata* or *vata-pitta dosha*. Vitiation of *vata* or *vata-pita* factors cause vitiation of *Doshas* ie. *Vata* and *pitta* affected *rasa* and *rakta dhatu* along with *ashru* and *akshi sneha* (10). *Netra* composed of mainly *Tej mahabhuta* & its *Krishna*,

*Shukla, Ashrubhabga* composed of *Vayu, Jala,* and *Akasha Mahabhuta* respectively. In *Shushkaakshipaka Ativishukshkata* and *Rukshta* are caused by disturbance in *Vayu, Jala,* and *Akasha mahabhutas* which may cause inflammatory changes in *cornea* and *conjunctiva*.

**SIGN AND SYMPTOMS:**

Sr.No.	According to Acharya Sushruta (11)	According to Modern
1.	Kunita Vartma	Inability to close eyelids
2.	Daruna and Ruksha Vartma	Hard, Rough eyelids
3.	Avila Darashna	Blurring of Vision
4.	Daruna Pratibodhana	Difficulty in opening the eyelids

Sr. No.	According to Acharya Vagbhata (12)	According to Modern
1.	Gahrsha	Foreign Body Sensation
2.	Todha	Pricking Sensation
3.	Bheda	Tearing pain
4.	Upadeha	Stickiness of Eyelids
5.	Rukshta and Darunatwa of Vartma and Akshi	Roughness and hardness of the eyelids and eye
6.	Siteksha	Desire for cold
7.	Shula	Pain
8.	Paka	Inflammation

**EXAMINATION:** Following examination should be done in Dry Eye Syndrome associated with DM.

<b>Ophthalmic Examination</b>	<b>Lab Investigation</b>
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• Visual Acuity	• CBC
• Torch Examination	• BSL – Fasting and Postmeal
• Slit Lamp Examination	• ESR
• Fundus Examination	• Urine – Sugar and Albumin
	• HbA1C

**OPHTHALMIC INVESTIGATION:** <sup>(13)</sup>

- I. **Tear Film break- up time:** The tear film BUT is abnormal in aqueous tear deficiency and Meibomian gland disorders. The BUT is the interval between the last blink and the appearance of the first randomly distributed dry spot. A BUT less than 10 seconds is suspicious of dry eye.
- II. **Schimer Test:** It is a useful assessment of aqueous tear production. The test can be performed with or without anesthetic. The test can be performed with the help of no 41 Whatman filter paper, 5mm wide and 35 mm long. The filter paper is folded 5mm from one end and inserted at the junction middle and outer third of the lower lid, taking care not to touch the cornea and eyelashes. After 5min the filter paper is removed and amount of wetting from the fold measured. Less than 10mm of wetting without anesthesia and less than 6mm with anesthesia is considered as abnormal.
- III. **Ocular Surface Staining:** It is done with the help of Fluorescein stain, Rose Bengal stain, Lissamine Green. It is useful in corneal and conjunctival epithelium damaged. The pattern of staining may aid diagnosis:
  - Interpalpebral staining of the cornea and conjunctiva is common in aqueous deficiency.
  - Superior conjunctival staining – May indicate superior limbic keratoconjunctivitis.
  - Inferior corneal and conjunctival stain – Present in patient with blepharitis or exposure.
- IV. **Other Investigation:** The following tests are rarely performed in clinical practices.
  - Fluorescein clearance test
  - Tear film osmolarity

- Tear constituent
- Phenol red thread test
- Tear meniscometry
- Impression cytology

**TREATMENT:** According to Ayurveda, all Acharya said that shushakashipaka is sadya vyadhi and if it is treated properly, it can be reversible. It is caused by vitiation of *vata* or *vata-pitta dosha*. Vitiation of *vata* or *vata-pita* factors cause vitiation of *Doshas* ie. *Vata* and *pitta* affected *rasa* and *rakta dhatu* along with *ashru* and *akshi sneha* therefore aim of treatment modalities should be *vatta pitta shaman* along with *rakta dhatu prasadana* and increasing *snehan* effect of eyes (10). In *astangsangraha* has mentioned, if *vatadosha* prevails then treat as like *vataabhishtyanda* and if *pitta dosha* prevails then treat as like *pitaabhishtyadha*. Acharya *shushruta*, in *sarvagat netra roga chikitsa adhya* suggested following treatment modalities, such as *snehapana* or *ghrutapana*, *Basti*, *Nasya*, *Tarpana*, *Putapaka*, *Snehana* / *Parisheka*, *Ashotana*, *Anjana* etc(14).

**Modern Treatment modalities: (9)**

The underlying causative factors of dry eye are not reversible and management is therefore structured around the control of symptoms and prevention of surface damaged. DEWS have produced guidelines and suggest treatment option depends on severity of disease graded from 1 to 4.

**Level 1:**

- a) Education and environmental / dietary modifications
  - Establishment of realistic expectations and emphasis on the importance of compliance
  - Lifestyle review – importance of blinking during reading, watching TV, Using laptops /

computers and management of contact lens wear.

- Environmental review – eg. Increasing humidity.
- Instillation aid for eye drops should be advocated for patient with reduced dexterity.
- The patient with refractive surgery advice caution. It can exacerbate dry eye
- b) Systemic medication review – Discontinuation of toxic and preserved topical medication if possible.
- c) Artificial substitutes (Gels and Ointments) –
- d) Eyelid Therapy –
  - In Blepharitis, basic measures such as warm compresses and lid hygiene.
  - Lid Surgery – eg. Entropion, Ectropion, Excessive lid laxity or scleral show.
  - Nocturnal Lagophthalmos – At bedtime closed the eyelids with taping, wearing swimming goggles during sleep, in extreme cases by lateral tarsorrhaphy.

#### Level 2:

- a) Non preserved tear substitutes
- b) Anti-inflammatory agents – Such as topical steroid, oral omega fatty acids, topical cyclosporine.
- c) Tetracyclines – in meibomianitis.
- d) Punctal piugs
- e) Secretagogues eg. pilocarpine
- f) Moisture chamber spectacles and spectacle side shields

#### Level 3:

- a) Serum eye drops
- b) Contact lense
- c) Permanent punctal occlusion

#### Level 4:

- a) Systemic anti-inflammatory agents
- b) Surgery
  - Eyelid surgery such as Tarsorrhaphy
  - Slivary gland autotransplantation
  - Mucous membrane or amniotic membrane transplantation for corneal comlications.

#### Tear substitutes

- **Drops and Gels –**

- Cellulose derivatives is useful for mild cases such as hypercellulose, methylcellulose.
- Carbomer gel – It is long lasting, adhere to ocular surface and some patients are troubled by slight blurring.
- Polyvinyl Alcohol – It is useful in mucin deficiency and increases the persistence of tear film. Such as Sodium hyaluronate, povidone, glycerine, propylene glycol.
- **Ointments** – Containing paraffin mineral oil can be used at bedtime.
- **Eyelid sprays** – are applied to the closed eyes and typically contain a liposome-based agent that may stabilize the tear film and reduce evaporation.
- **Artificial tear insert** – It is used in some patients once or twice daily.
- **Mucolytic Agent** - Acetylcystein 5% drops may be useful in patient with corneal filaments and mucous plaques which acetylcysteine dissolves.
- Optimization of environmental humidity –**
  - Reduction of room temperature
  - Room humidifiers

#### DISCUSSION:

In diabetes mellitus, due to hyperglycemia damaged to any component of lacrimal functional unit leads to insufficient tear secretions and blinking and results in Keratoconjunctivitis sicca. In Ayurveda therapy such as maintain moisture and give lubrication to cornea, conjunctiva and prevent other complications caused due to dry eye in diabetes. *Ghrita* having *Chakshukshya* properties and when it is medicated with other *chakshukshya dravya* there is increase in its *guna* and it gives better effect in Dry eye syndrome.

#### CONCLUSION:

Diagnosis and management of dry eye syndrome associated with diabetes mellitus should be done properly. Ayurvedic treatment such as snehapana or ghrutapana,

Basti, Nasya, Tarpana, Putapaka, Snehana / Parisheka, Ashotana, Anjana stimulates secretion of lacrimal gland and Meibomian glands and kept cornea and conjunctiva moist. Ayurvedic treatment is cost effective and don't have any side effect. It as an alternative treatment for patient to cure dry eye syndrome.

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