

# Adhimantha (Glaucoma): A Review Based on Ayurveda and Modern Perspective

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## ABSTRACT

Now a day due to urbanization and pollution the all universe is developing the better system of therapy and medicine in the medical science for treatment the disease and maintain the health. *Shalakya tanta* is a one branch of *Astanga Ayurveda* it deal the disease of *chakshu, nasa, karna. Kantha, mukha and shirah*. *Adhimantha* is disease of *sarvagata netrarogas* explain by *Acharya Susaruta And Vagbhata*. It is a complication of *Abhishyanda*. Glaucoma is a neurodegenerative disorder of optic nerve it is occur mostly elder age group especially over 80 year of age. Any injury of eye, *Virudha ahar and vihar* are cause of glaucoma. Ancient classics described glaucoma as *Adhimantha* which means *Adhi*(Excessive) and *Manth*(Churning); condition where excessive pain in the eye like churning type of pain occur in this disease. The associated symptoms is headache, foreign body sensation, lacrimation, redness of eye and difficulty in vision etc. In such a scenario a study on *Adhimantha* its concept and its management according to *Ayurveda* gain much important. Glaucoma is a major cause for blindness globally it effect million of people in the world. This article describrd *Ayurveda* And Modern perspectives of *Adhimantha* along with its treatment option.

**KEYWORDS:** *Ayurveda, Adhimantha, Shalakya tantra, Glaucoma*

## INTRODUCTION

*"Sarvendriyam Nayanam Pradhanam"*

It means the eye is much more important than all other sense organ, because of good vision and it responsible for Social and intellectual development. In *Authentic classics* like *Sushruta Samhita*<sup>[1]</sup> and *Astanga Hridayam*<sup>[2]</sup> described *Adhimantha* is a *sarvagata netra rogas*. It is an advance condition or complication of *Abhishyanda*. Severe pain in the eyes is the prime symptoms of *Adhimantha*. The *samanya lakshana* of *adhimantha* is severe pain in the eyes like Scooping it from orbit, crushing type of pain, churning type of pain, Headache<sup>[3]</sup> ect.

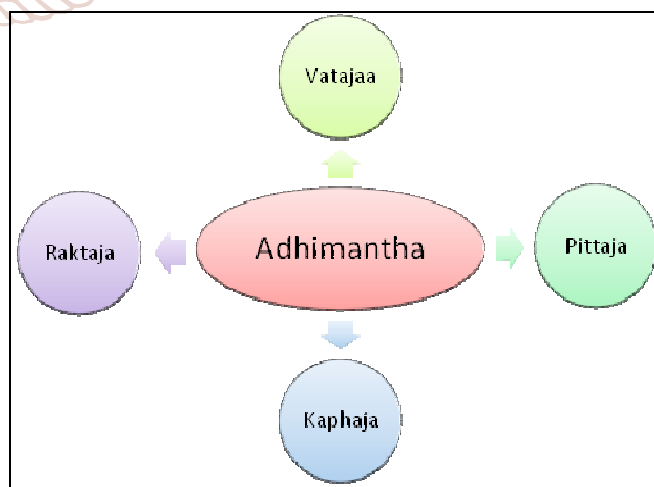
Type Of *Adhimantha*<sup>[4]</sup>:

1. Vataja Adhimantha
2. Pittaja Adhimantha
3. Kaphaja Adhimantha
4. Raktaja Adhimantha

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**Figure 1: Types of Adhimantha as per Ayurveda**

**1. Vataja Adhimantha:** *Vataja Adhimantha* is generated if *vataja abhishyanda* is neglected. Severe pain of various nature like extraction, churning, Foreign body sensation, pricking, tearing, splitting, bursting, *kampana* and half headache ect. *Vagbhata* added in this the pain like *karna*

nada, churning type of pain in head eye and root of the nose and with giddiness<sup>[5]</sup>.

**2. Pitta Adhimantha:** Pitta Adhimantha is generated if Pitta abhishyanda is neglected. Pain or sensations as if caustic alkali or burning coal is applied to eye, eyelids suppurated and its margins excessively swollen, red streaks are seen i.e. severe congestion and eye appears like a piece of liver, lacrimation, perspiration, fainting, burning sensation in eye and head, preserving yellowish object<sup>[6]</sup>.

**3. Kaphaja Adhimantha:** Kaphaja Adhimantha is generated if Kaphaja abhishyanda is neglected. In kaphaja Adhimantha the symptoms like grittiness i.e. foreign body sensation, headache, mild edema i.e. inflamed but not excessively congested, cool feeling, lacrimation and slimy discharge, itching, heaviness, horripilation, difficulty in visualising object due to avilata i.e. corneal haziness, nasadhmana, depressed black portion and elevated white portion i.e. chemosis, praseka i.e. excessive salivation are the chief manifestation<sup>[7]</sup>.

**4. Raktaja Adhimantha:** Raktaja Adhimantha is generated if Raktaja abhishyanda is neglected. Severe pain of various nature like plucked out or pricking type, tenderness due to increase IOP, coppery discolouration resembling a Japapushpa. Krishna portion appears like arishta fruit dipped in blood, eye is inflamed, burning sensation, blood colour discharge and darkness before eye are the clinical feature of raktaja adhimantha vyadhi<sup>[8]</sup>.

#### Nidana:

Entering into reservoirs of water immediately after getting heated up by exposure to sunlight, fire ect. seeing object present very far, avoiding sleep, indulging in bouts of weeping, anger, sorrow and exertion, injury in eye, excess of copulation, consuming sukta arnala and such other sour foods prepared from kulattha, masa, suppressing the urges, excess sweating, inhaling smoke, controlling bouts of vomiting or excess of vomiting, controlling of tears, observing minute objects. By these causes dosas get aggravated and produce diseases<sup>[9]</sup>.

#### Samprapti:

Due to sevana of nidana Aggravated dosas moving upward, through the siras i.e. blood vessels and localised in the eye and give rise to dreadful diseases, in different part of eyes<sup>[10]</sup>.

#### Sadhya-Ashadhyata:

Ancient Acharyas described all 4 type of adhimantha its manageable i.e. if attended in time are manageable. If ignored or patient does not follow diet and seasonal regime. Visual loss occurs as follow:

| Si. No. | Types              | Sushruta <sup>[11]</sup>   | Astanga <sup>[12]</sup>    |
|---------|--------------------|----------------------------|----------------------------|
| 1       | Vataja Adhimantha  | Loss of vision in 6 days   | Loss of vision in 5 day    |
| 2       | Pitta Adhimantha   | Loss of vision immediately | Loss of vision immediately |
| 3       | Kaphaja Adhimantha | Loss of vision in 7 days   | Loss of vision in 7 days   |
| 4       | Raktaja Adhimantha | Loss of vision in 5 days   | Loss of vision in 3 days   |

**Table1: Showing sadhya-ashadhyata of Adhimantha**

**Samanya Chikitsa<sup>[13]</sup>:** Samanya chikitsa sutra i.e. basic principle of management of netraroga/adhimantha, they are under-

- **Rest of eye-** Activities causing eye strain like extensive reading, writing, observing minute objects for a long time, working in dim light ect. Should be avoided.
- **Nidana parivarjana-** Looking at very minute objects, day sleep, exposure to dust-smoke, causative factor for dosa prakopa, not observing rutucharya i.e. seasonal regime and many more.
- **Management of purvarupa-** Sushruta advises to go in for immediate action when purvarupa of the netraroga are observed. The condition is very likely to turn serious depending the pathology of disease. Some remedies used in ophthalmological condition. It is as follows-
  1. Tikshna shirovirechana
  2. Tikshna kwalgraha
  3. Dhumapana
  4. Upavasa
  5. Lepa
  6. Avagunthana
  7. Sechana

**Note-** Vata vitiation occurs due to tikshana shirovirechana, kwalagraha, dhumapana and upavasa. Hence these are avoided to vataja netraroga.

1. **Tikshna shirovirechana-** Tikshna shirovirechana should be contraindicated in vataja adhimantha.
2. **Tikshna kwalgraha-** Tikshna kwalgraha should be contraindicated in vataja adhimantha.
3. **Dhumapana-** Dhumapana should be contraindicated in vataja adhimantha.
4. **Upavasa-** Upavasa should be contraindicated in vataja adhimantha.
5. **Lepa-** If adhimantha presenting symptoms like burning sensation, sliminess, redness, lacrimation and edema, lepa or bidalaka is used with ingredients ground in water. This ingredient is chandana, maricha, patra, ela, suvarnagairika, tagar, rasanjana, saindhava and yashtimadhu. In the initial stages of ophthalmic disease i.e. in Amavastha anjana is contraindicated and hence lepa is advised. This is responsible for Amapachana as well.
6. **Avagunthana-** 1 part of shigru beeja, 4 part of manovaha and 16 part of lodhra powder should be bagged in cotton cloth and avachurnana i.e. sprinkling should be performed.
7. **Sechana-** Kwatha is prepared by adding 40gm daruharidara in 640 ml of water and boiling it till 1/8<sup>th</sup> portion remains. Sechana is executed after mixing honey in it. It is beneficial in eye diseases aggravated by all doshas.

#### Sequence of management of recently developed ophthalmic disease by charak<sup>[14]</sup>:

In newly developed netraroga bidalaka application relieves burning, upadeha, lacrimation, edema and redness.

- Anjana-** 1. Rasakriya of shunthi, saindhava and ghrutamanda.  
2. Fine powders of saindhava, swarnagairik and honey.

- **Chikitsa of samavastha:** The ancient Acharyas had mentioned to adopt 6 different events for Amapachana in samavastha as under-
  1. Langhana for 4 days.

2. *Seka*
3. *Bashpasweda*
4. Intake of *madhura* and *tikta* food item.
5. *Lepa* or *pralepa*
6. *Dhumapana*

Generally *samavastha* lasts for 4 days and hence some management should be continued for a period of 4 days.

- **Chikitsa of niramavastha:** As soon as *niramavastha* is acquired after treating the *purvarupavastha* and *samavastha*, general and local *dosha shodhana* and *shaman* is performed.
- A. General management- after clinically assessing bala, indications, contraindications in a patients; *snehana*, *swedana*, *vaman*, *virechana* etc. should be followed for general *dosha shodhana* so that local *doshavruddhi* in eye can be prevented. If *sodhana* is contraindicated, *dosha samana* is preferred. *Rakta* being main *dushya*, it must be eliminated from the body. Hence much stress is given on *raktamokshana* in all the 4 type of *adhimantha*.
  - B. Location of *raktamokshana* are *sira of upanasika* or *lalata* or *apanga*.
  - C. Local *dosha sodhana* or *shaman* is achieved by various *kriyakalpa* like *tarapan*, *putapaka*, *ashchotana* etc.

**Apathaya:** In order to avoid further accumulation of *ama anjana*, *ghrutapana*, *kasaya* or *kwathapana*, heavy food items and bathing should be avoided.

#### MODERN PERSPECTIVE:

Glaucoma is not a single disease process but a group of disorders characterized by a progressive optic neuropathy in a characteristic appearance of the optic disc and a specific pattern of irreversible visual field defects that are associated frequently but not invariably with raised intraocular pressure (IOP). Thus, IOP is most common risk factor but not the only risk factor development the glaucoma. Glaucoma is a condition that damages optic nerve. It gets worse over time. It's often linked to a buildup of pressure inside the eye. Glaucoma tends to run in families<sup>[15]</sup>.

About 6 to 67 million people have glaucoma globally. The disease affects about 2 million people in the United States. It occurs more commonly among older people. Closed-angle glaucoma is more common in women. Glaucoma has been called the "silent thief of sight", because the loss of vision usually occurs slowly over a long period of time. Worldwide, glaucoma is the second-leading cause of blindness after cataracts. Cataracts caused 51% of blindness in 2010, while glaucoma caused 8% and india 12.8%. The word "glaucoma" is from Ancient Greek *glaukos*, which means blue, green, or gray. In English, the word was used as early as 1587 but did not become commonly used until after 1850, when the development of the ophthalmoscope allowed people to see the optic nerve damage<sup>[16]</sup>.

#### CLASSIFICATION<sup>[17]</sup>:

There are 3 main kinds-

- A. Congenital and development glaucoma.
- B. Primary glaucoma.
  - I. Primary open angle glaucoma.
  - II. Primary angle closure glaucoma.
- C. Secondary glaucoma.

#### Congenital and development glaucoma:

Congenital Glaucoma is a group of disorders associated with abnormal intraocular pressure due to development abnormalities of the angle of anterior chamber causing obstruction to the drainage of aqueous humour.

#### Primary open angle glaucoma:

It is the type of glaucoma in which there is no obvious systemic or ocular cause of rise in the intraocular pressure. Angle of anterior chamber is open. It is characterised by slowly progressive raised IOP along with cupping of optic disc and visual field defects.

#### Primary angle closure glaucoma:

Primary angle closure glaucoma occurs when the drainage angle of the eye becomes blocked. Intraocular pressure usually goes up very fast. The pressure rises because the iris partially or completely blocks off the angle of anterior chamber.

#### Secondary Glaucoma:

Secondary glaucoma is not a disease entity, but group of disorders in which rise of intraocular pressure is associated with some primary ocular or systemic disease. Therefore, clinical features comprise that of primary disease and that due to effects of raised intraocular pressure.

#### CAUSES:

The fluid inside eye, called aqueous humor, usually flows out of the eye through a mesh-like channel. If this channel gets blocked, the liquid builds up. Sometimes, experts don't know what causes this blockage. But it can be inherited, meaning it's passed from parents to children.

Less common causes of glaucoma include a blunt or chemical injury to eye, severe eye infection, blocked blood vessels inside the eye, and inflammatory conditions. It's rare, but eye surgery to correct another condition can sometimes bring it on. It usually affects both eyes, but it may be worse in one than the other<sup>[18]</sup>.

#### SYMPTOMS<sup>[19]</sup>:

Most people with Primary open angle glaucoma don't have symptoms. If symptoms do develop, it's usually late in the disease. That's why glaucoma is often called the "sneak thief of vision." The main sign is usually a loss of side, or peripheral, vision. Symptoms of Primary angle closure glaucoma usually come on faster and are more obvious. Damage can happen quickly. The symptoms of glaucoma are-

- Seeing halos around lights
- Vision loss
- Redness in eye
- Eye that looks hazy (particularly in infants)
- Upset stomach or vomiting
- Eye pain

#### DIAGNOSIS:

Glaucoma tests are painless and don't take long. Physician will test vision. Use drops to widen (dilate) pupils and examine the eyes. The physician will examine optic nerve for signs of glaucoma and take photographs. Physician will do a test called tonometry to check intraocular pressure. Physician may also do a visual field test to see lost of peripheral vision<sup>[20]</sup>.

**TREATMENT<sup>[21]</sup>:**

Physician may use prescription eye drops, oral medications, laser surgery, or microsurgery to lower pressure in the eye.

**Eye drops:** These either lower the creation of fluid in the eye or increase its flow out, lowering eye pressure. Side effects include allergies, redness, stinging, blurred vision, and irritated eyes. Some glaucoma drugs may affect on heart and lungs.

**Oral medication:** The oral medication drugs such as a beta-blocker or a carbonic anhydrase inhibitor. These drugs can improve drainage or slow the creation of fluid in the eye.

**Laser surgery:** This procedure can slightly raise the flow of fluid from eye if have open-angle glaucoma. It can stop fluid blockage if have angle-closure glaucoma. Procedures include:

- **Trabeculoplasty.** This opens the drainage area.
- **Iridotomy.** This makes a tiny hole in your iris to let fluid flow more freely.
- **Cyclophotocoagulation.** This treats areas of the middle layer of eye to lower fluid production.

**Microsurgery:** In a procedure called a trabeculectomy, physician creates a new channel to drain the fluid and ease eye pressure. This form of surgery may need to be done more than once. Physician might implant a tube to help drain fluid. This surgery can cause temporary or permanent vision loss, as well as bleeding or infection.

Open-angle glaucoma is most often treated with combinations of eye drops, laser trabeculoplasty, and microsurgery. Doctors tend to start with medications, but early laser surgery or microsurgery could work better for some people.

Infant or congenital glaucoma usually treated with surgery because the cause is a problem with drainage system.

**RISK FACTORS<sup>[22]</sup>**

Glaucoma mostly affects adults over 40, but young adults, children, and even infants can have it. The risk factors of glaucoma are-

- Over 40 year of age
- Have a family history of glaucoma
- Poor vision
- Diabetes
- Take certain steroid medications such as prednisone
- Injury to eyes
- Corneas that are thinner than usual
- High blood pressure, heart disease, diabetes, or sickle cell anemia
- Have high eye pressure

**PREVENTION**

Glaucoma can't be prevent. But if find it early, it can be lower risk of eye damage. These steps may help protect the vision:

- Have regular eye exams
- Learn family history
- Follow Physician instructions
- Protect the eyes

**CONCLUSION:**

Finally it may be concluded that, when the proper *chikitsa* of *Abhishayanda* are not given or if neglected then *Adhimantha*

is occure. The severe pain like plucked out eye ball from orbit is a main symptoms of *adhimantha*, due to its presenting symptoms it is divided in to 4 type those are *Vataja*, *Pittaja*, *Kaphaja* and *Raktaja*. The treatment should be given same like *Abhishyanda*. *Adhimantha* is a disease of *sarvagata netrarogas* and *samprapi* involve severe pain and visual disturbance. The majority of disease incidences can occur in those who are 80 year of age globally. Normal IOP pressure is 15 to 20 mm of Hg, by schiotz tonometer, the solid and semi solid contents which are responsible for maintenance of IOP. Globally 8% blindness occur due to glaucoma and in india its 12.8%. The treatment approaches involve reduced Pain of eye, improve vision and maintain IOP level. *Ayurveda* also prescribed conventional formulation such as *Navnetrasatri varti*, *Gairikadi lepa*, *Nimbaptradi gutika*, *Bilvaanjana* ect. These formulation brakes the *samprapti* of disease, improve vision, relief pain and maintain IOP level.

**REFERENCES:**

- [1] Acharya Susruta, *Susrutasamhita* of mahrshi Susruta, Uttarsthan, 6<sup>th</sup> Chapter, 3-4<sup>th</sup> sholaka, Edited with *Ayurveda-Tattva-Sandipika*, By Kaviraj Ambikadutta Shastri, Varanashi, Chaukhamba Sanskrit Sansthan, Reprint-2014, Page no-33.
- [2] Acharya Vagbhata, *Astanga Hrdayam* of Srimadvagbhata, Uttarsthan, 15<sup>th</sup> Chapter, 3-4<sup>th</sup> shlokas, Edited with *Nirmala hindi commentary*, By Dr. Bramhanand Tripathi, Delhi, Chaukhamba Sanskrit Pratishthan, Reprint-2014, Page no-984.
- [3] Acharya Susruta, *Susrutasamhita* of mahrshi Susruta, Uttarsthan, 6<sup>th</sup> Chapter, 11<sup>th</sup> sholaka, Edited with *Ayurveda-Tattva-Sandipika*, By Kaviraj Ambikadutta Shastri, Varanashi, Chaukhamba Sanskrit Sansthan, Reprint-2014, Page no-35.
- [4] Acharya Susruta, *Susrutasamhita* of mahrshi Susruta, Uttarsthan, 6<sup>th</sup> Chapter, 3-4<sup>th</sup> sholaka, Edited with *Ayurveda-Tattva-Sandipika*, By Kaviraj Ambikadutta Shastri, Varanashi, Chaukhamba Sanskrit Sansthan, Reprint-2014, Page no-33.
- [5] Acharya Vagbhata, *Astanga Hrdayam* of Srimadvagbhata, Uttarsthan, 15<sup>th</sup> Chapter, 3-4<sup>th</sup> shlokas, Edited with *Nirmala hindi commentary*, By Dr. Bramhanand Tripathi, Delhi, Chaukhamba Sanskrit Pratishthan, Reprint-2014, Page no-984.
- [6] Acharya Susruta, *Susrutasamhita* of mahrshi Susruta, Uttarsthan, 6<sup>th</sup> Chapter, 15<sup>th</sup> sholaka, Edited with *Ayurveda-Tattva-Sandipika*, By Kaviraj Ambikadutta Shastri, Varanashi, Chaukhamba Sanskrit Sansthan, Reprint-2014, Page no-36.
- [7] Acharya Vagbhata, *Astanga Hrdayam* of Srimadvagbhata, Uttarsthan, 15<sup>th</sup> Chapter, 9<sup>th</sup> shlokas, Edited with *Nirmala hindi commentary*, By Dr. Bramhanand Tripathi, Delhi, Chaukhamba Sanskrit Pratishthan, Reprint-2014, Page no-985-986.
- [8] Acharya Susruta, *Susrutasamhita* of mahrshi Susruta, Uttarsthan, 6<sup>th</sup> Chapter, 18-19<sup>th</sup> sholaka, Edited with *Ayurveda-Tattva-Sandipika*, By Kaviraj Ambikadutta Shastri, Varanashi, Chaukhamba Sanskrit Sansthan, Reprint-2014, Page no-36.
- [9] Acharya Susruta, *Susrutasamhita* of mahrshi Susruta, Uttarsthan, 6<sup>th</sup> Chapter, 10<sup>th</sup> sholaka, Edited with

Ayurveda-Tattva-Sandipika, By Kaviraj Ambikadutta Shastri, Varanashi, Chaukhamba Sanskrit Sansthan, Reprint-2014, Page no-35.

- [10] Acharya Susruta, Susrutasamhita of mahrshi Susruta, Uttarsthan, 1<sup>st</sup> Chapter, 20<sup>th</sup> sholaka, Edited with Ayurveda-Tattva-Sandipika, By Kaviraj Ambikadutta Shastri, Varanashi, Chaukhamba Sanskrit Sansthan, Reprint-2014, Page no-13.
- [11] Acharya Susruta, Susrutasamhita of mahrshi Susruta, Uttarsthan, 6<sup>th</sup> Chapter, 20<sup>th</sup> sholaka, Edited with Ayurveda-Tattva-Sandipika, By Kaviraj Ambikadutta Shastri, Varanashi, Chaukhamba Sanskrit Sansthan, Reprint-2014, Page no-36.
- [12] Acharya Vagbhata, Astanga Hridayam of Srimadvagbhata, Uttarsthan, 15<sup>th</sup> Chapter, 24<sup>th</sup> shlokas, Edited with Nirmala hindi commentary, By Dr. Bramhanand Tripathi, Delhi, Chaukhamba Sanskrit Pratishthan, Reprint-2014, Page no-988.
- [13] Prof. Dr. Narayan J. Vidwansa, Text Book Of Shalakya Tantra, English Translation, Pune, Vimal Vision Publication, Page no-174-178.
- [14] Acharya Charaka, Charaksamhita of Agnivesa, Chikitsasthana, 26<sup>th</sup> Chapter, 230-232<sup>th</sup> sholaka, Edited with Vaidyamanorama, Hindi commentary, by Acharya Vidyadhar Shukla And Prof. Ravi Dutta Tripathi, Delhi,

Chaukhamba Sanskrit Pratishthan, Reprint-2012, Page no-658-659.

- [15] A. K. Khurana, Comprehensive Ophthalmology, 3<sup>rd</sup> Section, 10<sup>th</sup> Chapter, Sixth Edition, New Delhi, Jaypee, The Health Sciences Publisher, 2015, Page no.224.
- [16] <http://en.m.wikipedia.org/wiki/glaucoma>.
- [17] Dr. Rajbir Singh, Text Book Of Shalakya Tantra, Hindi Translation, Vol. 1<sup>st</sup>, 11<sup>th</sup> Chapter, First Edition, New Delhi, Choukhambha Publication, 2016, Page no-174-178.
- [18] A. K. Khurana, Comprehensive Ophthalmology, 3<sup>rd</sup> Section, 10<sup>th</sup> Chapter, Sixth Edition, New Delhi, Jaypee, The Health Sciences Publisher, 2015, Page no.223-224.
- [19] Dr. Dingari Lakshmana Chary, Text Book Of Shalakya Tantra, English Translation, Delhi, Chaukhamba Sanskrit Pratishthan, Page no-171.
- [20] A. K. Khurana, Comprehensive Ophthalmology, 3<sup>rd</sup> Section, 10<sup>th</sup> Chapter, Sixth Edition, New Delhi, Jaypee, The Health Sciences Publisher, 2015, Page no.226.
- [21] Prof. Dr. Narayan J. Vidwansa, Text Book Of Shalakya Tantra, English Translation, Pune, Vimal Vision Publication, Page no-210-212 & 215-216.
- [22] <http://www.webmd.com/eye-health/glaucoma-eyes>.

