ABSTRACT
Glaucoma is a chronic progressive optic neuropathy caused by a group of ocular conditions which lead to damage of optic nerve with loss of visual function, most common risk factor is raised intra ocular pressure. Glaucoma being the second leading cause of irreversible blindness worldwide and third leading cause in India. In Ayurveda this condition can be correlated to Adhimanth, On the basis of etiopathogenesis, clinical features, complications and principles of treatment Adhimanth is similar to Glaucoma (Primary open angle Glaucoma).
Looking into the pathogenesis of the Adhimanth the doshas involved are Prana-Vyana vayu, Tarpaka kapha, and Alochaka pitta. The Dooshyas involved are Rasa-Raktha-Mamsa-Medha. This gives the characteristic Optic Nerve Head changes and field defects which may end up in blindness. Drishti is one of the important working units of nethra which is responsible for the vision. Hence all the eye diseases which are confined to drishti or involving Drishti will manifest visual defects. Nidanpanchaka of Adhimanth is described in the article.

KEYWORDS
Glaucoma (POAG), Adhimanth, Nidanpanchaka
INTRODUCTION

Shalakya is an important branch of Ayurveda which deals with the diseases manifesting above the clavicular region. While describing 76 types of eye diseases, Acharya Sushruta has described a separate chapter for Sarvagat akshiroga in uttartantra., Adhimanth comes under this chapter. Adhimantha is one among the Netra rogas explained in classics, which occurs due to negligence or improper treatment of Abhishyanda. Adhimantha presents with features that are similar to those of glaucoma in modern science. The classical features of Kaphaja Adhimanth are Shopha, Srava, Kandu, Gaurav, Avilta, Panshupurna, Shirahshool analogous with Primary Open Angle Glaucoma in which there is gradual progressive loss of vision associated with heaviness in eye and head without any complains of redness and swelling. All the treatment modalities explained for Abhishyanda can be adopted in Adhimantha chikitsa too, along with that Raktamokshana, Basti, Virechana, Swedana, Tarpana, Putapaka, Doomapana, Aschyotana, Nasya, Seka, Shirobasti, Lepana, Anjana, kavala if Adhimantha does not subside by these treatment modalities then Agnikarma should be done above the brows.

Adhimanth can be correlated to Glaucoma because of its similarities. Glaucoma is a chronic progressive optic neuropathy caused by a group of ocular conditions which lead to damage of optic nerve with loss of visual function, most common risk factor is raised intra ocular pressure. Glaucoma being the second leading cause of irreversible blindness worldwide and third leading cause in India. Globally POAG affects more than Angle Closure Glaucoma (ACG) with ratio of 3:1. In India 12 million people are affected accounting for 12.8% of the country’s total blindness approximately 11.2 million persons aged 40 years and older with Glaucoma. Glaucoma however presents an even greater public health challenge than cataract, because the blindness it causes is irreversible. As the efforts of the modern human population are succeeding in increasing the life expectancy, but because of the high tech lifestyle the possibility of developing neurodegenerative disease has also been increasing considerably. In spite of the great technological advances in the field of ophthalmic medicine and surgery, there are numerous challenging problems, existing before modern ophthalmologists that require special attention to develop untraded fields of medical knowledge hidden in ancient medical texts. Modern science which is still in search of
neuroprotective drugs independent of Intraocular pressure is looking towards other system of medicine to find out an effective management in this blinding eye disease either by preventing, heralding and by reversing the progression of optic neuropathy. Therefore search of alternative therapeutic approach independent of IOP reduction is highly sought after, due to the indirect nature and limited effectiveness of IOP lowering therapy in preventing Retinal Ganglion Cell (RGC) death. Glaucoma is a chronic disease that requires lifelong therapy and review. Glaucoma is managed through medical or surgical treatment. Medical management is aimed at lowering the intraocular pressure to levels that permit the normal functioning of the optic nerve. Meiotic, prostaglandin analogues, carbonic anhydrase inhibitors, hyperosmotic agents are used in medical management of glaucoma. Surgical management is commonly undertaken when medical therapy fails to arrest visual field loss, or if the IOP is so high that it is unlikely to be controlled by medication alone than Glaucoma filtering operation or trabeculectomy is employed in such cases, which have their own advantages and disadvantages. This puts a very much economical burden over the country, also the drugs are well known for their toxicity when used in long term.

AIMS AND OBJECTIVES
To analyze the panchalakshana nidana of the Adhimanth and the aetio-pathogenesis of the Primary Open Angle Glaucoma. To analyze the treatment useful for the management of the disease.

MATERIALS AND METHODS -
As the study is a review study, the available literature like the samhitas and other books are searched for the disease and all the relevant content is considered and analyzed to get a comprehensive concept in the management of Primary Open Angle Glaucoma.

DEPERIVATION-
The word Adhimanth is composed of 2 words Adhi + Manth. The word Adhi means as a prefix to verbs, over above, besides in addition referring to concerned subject (V.S.Apte) and the word manth means mathna, churing, hurting injuring (V.S. Apte)
Adhimanth means severe churning or twisting pain eyes.

DEFINITION
All Abhisyanda will lead to respective Adhimantha, if not treated properly and neglected. The word Adhi-Mantha indicates excessive churning type of pain. The word Tivra Vedana (acute pain) is a common feature in all Adhimantha. In addition to
pain there will be Dosha specific discomforts due to involvement of different Doshas. The pain is very severe as the patient feels that his eye is being extracted from its socket and churned along half of the head. Adhimantha can also lead to blindness in addition to pain (Acharya Adhamalla in Dipika) Hence, pain and loss of vision are the differentiating factors between Abhisyanda and Adhimantha. The loss of vision is one of the characteristic features of this disease (Vyadhi Swabhava). The pain in Adhimantha will radiate to temporal region, teeth and occipital region. There are four types of Adhimantha. Gada nigraha, Madhava nidana, Yogaratnakar and other medieval authors have not described the features of these types separately. Adhimantha can be compared with any painful loss of vision like Primary Open Angle Glaucoma (mild pain or heaviness of eyes), Acute congestive glaucoma, Acute uvietis and endophthalmitis etc.

1. Vataja adhimanth main symptoms is pricking pain in eyes.
2. Pittaja adhimanth main symptoms is burning pain in eyes.
3. Kaphaja adhimanth main symptoms is heaviness and itching sensation in eyes.
4. Raktaja adhimanth main symptoms is rakta prakopa vedana.

**Nidanapanchaka** –

**Nidana / Etiology** –

Adhimanth does not have specific nidana hence the general nidana of netra roga are must be considered as the cause for Adhimanth. The homeostasis of Prana vayu-Alochaka pitta-Tarpaka kapha & Raktha dhatu are the important factors for carrying out the normal physiological functioning of eye.

1. **Aharaja nidana** were habit of Abhisayandi guru aharas in an increasing order respectively. Abhishyandi and guru aharas leads to Kapha prakopa & Sama samsa Meda dhatu.
2. **Viharaj nidana** had Atapa-anala sevana of about, Sookshma nireekshan, Swapna viparyaya, Alpa nidrata due to various causes. Excessive close work cause excessive convergence, strain in the eyes, which may bring the degenerative changes in the eye including trabecular meshwork, resulting in Glaucoma. Some study shows excessive exposure to intense light (including U V radiation) may damage or cause the death of Retinal ganglion cells leading to formation of Glaucoma.
3. **Manasika bhavas** like Bhaya, Klesha Shoka, Kopa, Vishada and, Eershya. Swapna Viparyaya leads to Agnimandya & Kapha prakopa.

**Purvarup** –

The Purvaroop for Netra roga (Adhimanth) may be Avyakta lakshan or
sometimes Ashru Shrava, Avila darshana, Guruta etc. in the netra may be seen. The Primary Open Angle Glaucoma (POAG) in the initial to moderate stage is symptomless except blurriness of vision; discomfort in the eye, heaviness in the eye may be seen in highly raised IOP.

**Rupa (Clinical features):**
The classical features of Kaphaja adhimantha are Shopha, Srava, Kandu, Gaurav, Avilta, Panshpurna, Shirahshool, Rupam pashyati dukhen, and Nasadhmana analogous with Primary Open Angle Glaucoma in which there is gradual progressive loss of vision associated with heaviness in eye and head without any complains of redness and swelling.

**Samprapti (Pathophysiology) - :**
The Pathophysiology of POAG are mainly 4 pathological events -

1. Increased resistance to aqueous humor outflow at trabecular meshwork (Margavarana/Srotho Sanga).
2. Hypoperfusion to ONH (Srotho sanga/Vimarga gamana).
3. Failure of auto immunity & apoptosis (Vyadhi kshamatva hani/Bala hani) due to prakupita vata & kapha kshaya.
4. ONH Modification (Dhatu kshaya) the hampered orthrograde / retrograde axoplasmic flow secondary to above events, leading to structural & functional damage of RGC, resulting in loss of normal retinal sensitivity to the light stimulus in early condition and later characteristic of visual field defects (Patalagatha timira) or permanent total blindness in advanced cases.

**Dosh-Dooshya -:**

Vata prakopa -Vyana vayu causes disturbance in Rasa-Rakta Vahana (ONH perfusion).
- Prana vayu causes Chakshu (Drishti) upaghata
- Impairment in Rasa-Rakta prasarar & loss of sithiti sthapakatva property which is important factor for Sankocha-Visphara of Srothamsi.

Alochaka pitta - Roopa grihana nasha/Drishti nasha/Timira/Visual field defects.

Tarpaka kapha - Vyadhi kshamatva hani (Dhatu tejo rupi ojo hrasa)
- Impaired nourishment to the netravayava, structural deformity in the aqueous out flow (collapse of channels) & ONH.

Rasa-Rakta - Has Pichhila-Klinnatha-Ghanataha Vriddhi & Jiva shonitha Rupi ojo hani

Mamsa-Medho Dhatu - Loss in the structural integrity of blood vessels.
The doshas involved are Prana-Vyana vayu, Tarpaka kapha, and Alochaka pitta.
The *Dooshyas* involved are *Rasa-Rakta-Mamsa-Medha*. This gives the characteristic ONH changes and field defects which may end up in blindness. *Drishti* is one of the important working units of *netra* which is responsible for the vision. Hence all the eye diseases which are confined to *drishti* or involving *drishti* will manifest visual defects. In Ayurveda the visual disturbances are broadly discussed under *Drishti gatha roga*. The characteristic visual field defects of POAG resembles with that of *lakshanas* discussed under *Prathama, Dvitiya & Tritiya patalagatha timira* by our Acharyas.

**Samprpti ghatak-**

- **Dosha**: Prana-Vyana, Alocaka Pitta & *Tamaka Kapha*.
- **Dooshya**: *Rasa-Rakta-Mamsa-Medho dhatu*.
- **Agni**: *Jataragni Dushti* leading to *Rasa-Rakta-Mamsa-Medho Dushti*.
- **Ama**: *Jataragni and Dhatwagni mandyajanya*.
- **Srothus**: *Rasavaha-Raktavaha-Mamsavaha-Medovaha Srothus*.
- **Srothodusti Prakara**: *Sanga, Siragranthi. Vimargagamana,*
- **Udbhava sthana**: *Amashaya*.
- **Sanchara sthana**: *Rasayani (microvasculature)*.
- **Vyaktha sthana**: *Netra in particular Drishti (RGCs / Optic Nerve)*.
- **Roga marg**: *Madhyama Roga marga as Shiras is madhyama*.
- **The Secretion of the aqueous humor** (sympathetic & parasympathetic System) is also disturbed by the aggravated Kapha.

The results in impairment is not only the quantity of aqueous humor but also in the quality of it.

- Because of these two events there will be a kind of stress/tension in the anterior segment of the eye this may also leads to further tear & shear.
- Phenomenon (pressure trauma) in the outflow system, which further accentuates the resistance. Like this, the vicious cycle continues.
- Hypoperfusion (under nourishment) to optic nerve head is secondary to the Sanga (obstruction) in the Rasayani’s.
- The *Rasayani dourbalya* (microangiopathy) in the ONH level results in decreased blood supply (ischemia) to optic nerve in particular retinal ganglion cells (RGCs) resulting in their slowly decaying/death.

The modification in the ONH (morphologic Changes) & RNFL occurs secondary to the above events i.e. *Dhatukshaya* (hypo perfusion).

Generally, Glaucoma is correlated to the *Adhimantha* which is having pathognomic feature of “*Nayanetivra vedna*” which is true only in case of Angle Closure Glaucoma (ACG). However, pain is not a feature in POAG except a mild headache or heaviness in the eye, in very highly raised IOP. The other symptoms of *Adhimantha*
involving different *doshas* like, *Rupampashyatidukhen* (visual disturbance/field defects), *Shopha natisrambah* (high IOP), *Hanyaddrishiti* (injury to *Drishti*/*Retina*/Optic Nerve) which points out towards Glaucoma and the ultimate affect is on *Drishti* (retina/ON) leading to visual field defects as seen in patients of chronic POAG. Acharya Vagbhata while explaining *Sarvagata roga chikitsa* said that *Timira pratishedha* based upon the symptoms & the involved *doshas*. Acharya Sushrutha also, in *Sutrasthana*, clearly said that, the root cause for the diseases are *Doshas* and the treatment should be planned based upon the clinical features & *doshas* involved.

The critical analysis of pathophysiology of POAG in *Ayurvedic* perspective has four important events; first there is increased resistance to aqueous humor outflow secondary to the degeneration/sclerosis of filtering apparatus which results in increased IOP (*margavarana*). Secondly, there is ischemia (hypo perfusion) to Optic nerve head (ONH) where in hypo perfusion may or may not be IOP dependent (*Sookshma srothosanga /Rasayani dourbalya*). Thirdly failure of Local Immunity (*Dhatu roop/Ojo hrasa/Vyadhi kshamatva hani*) and fourthly remodeling of ONH secondary to the above three factors (*Dhatu kshaya*).

**AYURVEDIC PERSPECTIVES OF AQUEOUS HUMOUR DYNAMICS:**

The circulation of *Rasa-Rakta* is based upon the theory of ‘*Kedārī – Kulyā Nyāya*’.9 This *nyaya* also applies to the Aqueous hemodynamic. The Aqueous hemodynamic also depends upon pressure gradient where the fluid travels from one field to other field i.e. from posterior chamber to the anterior chamber and then through angle of anterior chamber in to the trabecular meshwork, from there drained out in to the episcleral vessels through the collecting ducts. During this movement the *Rasa dhatu* nourishes the surrounding structures and also receives the waste material from them. Thus helping to maintaining the equilibrium in those tissues.

**HETU (Causative Factors)**

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Vata dusti  Kapha dusti  Pitta dusti
   ↓          ↓           ↓
   Agnimandya Ama/ Mala
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Involves Netra Adhisthana (Dristi Patal)

Shrotoavrodha
(Deposition of extracellular material at the level of Trabecular meshwork and Uveal tissue which causes increased resistance in drainage channel)

Dhatu Kshaya (Due to lack of Poshana)
(Nutritional loss causes tissue loss)

Optic Nerve Head damage (ONH)
(Reduced supply of Oxygen, Nutritional and Survival Factors of ONH)

Schematic representation of pathogenesis of Adhimantha

Samprapti vighatana - :

HE T U (Causative Factors)

Shrotoavrodha
(Deposition of extracellular material at the level of Trabecular meshwork and Uveal tissue)

Dhatu kshaya (↓ Poshana)
(Nutritional loss causes tissue loss)

Optic Atrophy

Shrotorodh har chikitsa

Brahana chikitsa

Lekhana, Shoth hara, Vatanulomana,
Tikshna drugs
(Kapha shaman)

Balya, Brahana, Chakshusya drugs
(Vata shaman)

PRIMARY OPEN ANGLE

GLAUCOMA VIS-À-VIS

ADHIMANTHA:

1. Generally speaking, Glaucoma is correlated to the Adhimantha which is having pathognomic feature of “Nayanteivra vedna” which is true only in ACG. However, pain is not a feature in POAG.

2. In POAG if IOP is very high then there may be mild eye ache/heaviness in the eye and headache.

3. Other symptoms of Adhimantha involving different doshas like Rupampashyati dukhen (Visual disturbance/field defects), Shopha natisrambah (high IOP), Hanyaddrishti (injury to Drishti/Retina/Optic nerve) which points out towards Glaucoma and the ultimate affect is on Drishti (retina/ON) leading to visual field defects as seen in...
patients of Chronic POAG.

4. The Drishti nasha i.e. loss of vision is the end result of Adhimantha and permanent irreversible blindness is the end result of POAG.

5. Pitta & Rakta doshas are the main doshas involved in the pathogenesis of Adhimantha. Similarly blood has the important role in the pathogenesis of Glaucoma either by hypoperfusion & by causing inflammation or impairment in the local immunity.

6. Only Kaphaja Adhimanth has maximum signs and symptoms of POAG other types of Adhimanth have various types of pain.

**PRIMARY OPEN ANGLE GLAUCOMA VIS-À-VIS PATALAGATHA TIMIRA:**

The word Timira has dual meaning, it is explained as symptom or sequel (Upadrava) of some disease (Anubandha vyadhi) or an independently established disease (Pradhana vyadhi) due to samanya netra nidana sevana as explained in Ayurvedic texts. The line of management of Timira roga varies depending upon its presentation. The following points will help in considering POAG under the heading of Patalagatha timira -

1. Increased Kledata is the characteristic feature of the disease Timira. GON is also characterized by the pathology of having increased dampness, in the angle of the anterior chamber & accumulation of abnormal material deposition in the filtering apparatus results in the raised IOP. Some Samanya nidana of netra rogas are directly the cause for POAG for example-exposure to sunlight for long duration causes raise in IOP. Constant staring at some objects causes raised IOP. Anxiety & depression is believed to be the cause for POAG, constipation & retention in urine causes raise in IOP.

2. There are no prodromal symptoms seen in POAG, Timira also sometimes do not produces any prodromal symptoms.

3. POAG in early stage is asymptomatic, but as the disease progress the earliest manifestation of the symptom is blurred vision as seen in Prathama patalagatha timira.

4. The visualization of hallows or abnormal images is the feature of Dwitiya patalagatha timira. In POAG especially when IOP is raised and in the morning time such symptoms are complained by the Glaucoma patient.

5. The typical visual disturbances explained in the Tritiya Patalagatha Timira are the Pathognomic features seen in (Visual field defects/Scotomas) advanced Glaucomatous Optic Neuropathy.

6. Linganasha or Chakshurindriya
nasha is the characteristic feature of Chaturtha patalagatha timira. Permanent irreversible blindness is also the result of end stage POAG which is then termed as Glaucomatous optic atrophy.

7. Timira is a progressive disorder; similarly POAG is also progressive in nature.
8. Timira may be associated or produced secondary to some other systemic disorder like Pandu (hypoperfusion), GON is having its main pathology of hypoperfusion of the functional unit of the eye i.e. ONH.

Sadhy/Asadhya/Updrava -:
Kaphaja adhimanth is described as Vedhana sadhaya disease in Ayurveda. In modern it is considered that the symptoms of POAG can be improved but the disease can’t be cured. According to Sushrut if Adhimanth is not treated than it can destroy the Drishti( vision) of Vataja adhimanth in 6 days, Pittaja adhimanth in 0 days, Kaphaja adhimanth in 7 days and Raktaja adhimanth in 5 days.

CHIKITSA (MANAGEMENT) OF ADHIMANTH –
Nidana parivarjana:
Ayurvedic literature lays great stress on the preventive aspect of treatment, more so in ophthalmology because inadequate prophylaxis of the ocular diseases may even lead to blindness. Therefore, the first step in treating a disease should be aimed towards withdrawal of the disease contributing factors.

Principles of treatment
As Abhisyanda is a causative factor for most of the eye disease its principle of treatment is applicable to all the eye disease. According to Chakradutta general principal treatment of Adhimanth are:
- Vataja adhimanth with unctuous and hot drugs (Singdha/Usna).
- Pittaja with soft and cold (Mrdu/Sitala).
- Kaphaja with irritant, rough, hot and non slimy drugs (Tiksna, Ruksa, Ushna, Vishada).
- Raktaja adhimanth treated as Pittaja adhimanth and rakta shamak chikitsa.

In the Purva rupa stage of Abhisyanda and Adhimanth, tiksna gandusha and Nasya are advised: Vataja abhisyanda and Adhimanth are exception to the above rule, as these Apatarpana measures of Siro Virecana, Kavala, Dhumapana and Upavasa may aggrevate Vata. Acharya Indu however, feels that these measures are beneficial in all types of Abhisyanda, otherwise there is a risk of Vata prakopa.

CONCLUSION
Primary Open Angle Glaucoma appears to be similar disease entity to *Kaphaja adhimanth* when optic atrophy does not occur. The etymology, aetiology, pathogenesis and clinical features of both correlate immensely. In late stage of POAG when Ganglion cell optic neuropathy is developed it can be correlate with 4th *Patalgat timir*. Generally Glaucoma has been correlated to the *Adhimantha*; this is true in Angle Closure Glaucoma (ACG) where, Eye Pain is the important presenting feature similar to a pathognomic feature of *Adhimantha*. But POAG do not fully fit to this, since pain is not at all an important criteria.
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