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A SCIENTIFIC APPROACH TO DIABETIC RETINOPATHY THROUGH AYURVEDA

Ayurveda

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ABSTRACT

Diabetic retinopathy is a micro vascular complication in diabetes that affects eyes and is responsible for most visual impairment in diabetic patients. Diabetic retinopathy affects up to 80% of those who have had diabetes for 20 years or more. The longer a person has diabetes, the higher are his chances of developing diabetic retinopathy. Diabetic retinopathy is covered under *Pramehajanya timir* in Ayurveda concept. There are so many Ayurveda Herbal drugs and Ayurveda specific treatments like *Vidalak, Chakshu tarpan* etc. that have been considered as an effective therapeutic option with minimal side effects for the treatment of retinopathy by reducing the symptoms and improving visual acuity. The current review summarises the potential of leading Ayurveda herbs like *Curcuma longa, Emblica officinalis, Vitis vinifera, Centella asiatica, Crocus sativa, Adhatoda vasica and Sida cordifolia* in the management and potential reversal of DR-related pathogenesis. It also discusses the probable mechanism of actions, which are based on epidemiological, *in-vitro* and *in-vivo* studies carried out within past few years.

KEYWORDS

Diabetic Retinopathy, *Pramehajanya Timir,* Ayurveda Herbs

INTRODUCTION:

Diabetic retinopathy (DR) is a condition in which diabetes is responsible for the pathogenesis of the disease and is typically divided into non-proliferative (NPDR) and proliferative diabetic retinopathy (PDR). In the proliferative type, a high or fast rate of angiogenesis causes neovascularization, while in the non-proliferative type, abnormal blood flow to the retina occurs due to direct damage or compromise of the blood vessels themselves[1]. The main symptom of retinopathy is visual loss, which by itself is not localized and may be due to a defect at any location of the visual pathway[2]. Severity of Diabetic retinopathy increases as duration of disease increases.

Etiopathogenesis[3]:

1. Duration of diabetes is the most important determining factor-
   - Like after 10 years, 20% of Type I & 25% of type II diabetes develop retinopathy
   - after 20 years, 90% of Type I & 60% of type II diabetes develop retinopathy
   - after 30 years, 95% of both Type I & type II diabetes develop retinopathy

i.e. age of onset of diabetes is also act as risk factor.

2. Poor metabolic control is less important than duration but is nevertheless relevant to the development & progression of diabetic retinopathy.
3. Heredity, hypertension & sex are other important factors.

Convention treatment of DR is LASER photocoagulation which stops the leakage of blood & fluids in retina but does not break the root pathogenesis of Dr[4]. The use of intra-vitreal pharmacotherapies in the last decade has proven to be the landmarks in the management of diabetic macular oedema as well as proliferative diabetic retinopathy[5]. These costly procedures improve the vision & are to be used at regular intervals and are not affordable by everyone. Therefore it is the high time to address the issue of Diabetes, prevention of complications & its management with all seriousness and find affordable medical care.

In our traditional texts, Ayurveda covers Diabetic retinopathy under *Prameha janya timir* & provides a wide range of treatments for eye disorders like retinopathy & a wide range of herbs are also available to prevent from retinopathy. So this review article compiles those treatments & herbs along with their probable mechanism of actions.

Ayurvedic concept of Diabetic retinopathy

There is no direct reference available in Ayurveda texts, but with the help of creditable references, it can be correlated with *Prameha janya sannipataj timir.*

Timir is a disease of *drishtigata roga* which causes darkness or increased dumpness of eyes. *Prameha* is a *kapha* dominant disease which raises *kleda* in body.

Tejo guna dominated by *Pitta dosha* in *netra* will always have fear from *kapha dosha*[6]. The combination of *kleda* and *kapha* in *Prameha* reaches to *netra* and stimulate the process of *srotorodha* in *sukshma raktavahi srotas* which can be correlated to micro vascular occlusion due to loss of pericytes and thickening of basement membrane causes occlusion (Capillaropathy). Deformation of erythrocytes and rouleaux formation, increased platelets stickiness and aggregation of platelets (Haematological changes) causes endothelial cell damage[7].

Srotorodha causes *atipravritti* of *utkleshita doshas* which can be neovascularisations caused by vasoformative substances (growth factors). It is an attempt to revascularise hypoxic retina by retinal tissues. Further formation of *siragranthi* takes place which can be justified to formation of aneurysms where there will be localised saccular out-pouchings due to physical weakening of the retinal vessels. The *utkleshana* of *doshas* deranges the vasculature and permeability of retinal vessels causing *srotoabhisyanda* and giving rise to hard exudates.

Due to increased *kapha* and *kleda* in *Prameha* it incresaes *sara guna* and *drava guna* of *pitta* and *rakta* in *srotas* which leads *abhisyandi srotas* to cause leakage of the blood vessels producing dot and blot haemorrhages, which simulates *raktapitta samprapti*.

The *srotorodha* in *siras* resulting in *agnimandya* at the level of *dhatwagni* and *bhutagni* causes lack of circulation of *pitta* and *rakta* in those areas showing best *sthanik pandu lakshana* which represents as cotton wool spots of the ischaemic area of the retinal nerve fibre layer.
The treatment planned in Diabetic retinopathy patients should possess properties like *madhumeha hara* properties, *shothagna* properties, *shonitasthapana, ropana, kaphanihsaraka, raktaprasadana, srotodushti nirharana, chakshushya and balya* properties.

Ayurveda approach in Diabetic retinopathy

The treatment modalities which are required in DR, are to control *raktasrava*, to subside *vedna* and *shotha*, promoting resorption, improving visual perception, clearing *kleda* & exudates form eyes. For this purpose, various herbs like *aamlaki, vasa, bala, haridra, kumkum, draksha, mandukparni* etc. can be used.

Panchkarma therapy like *virechan karma* can be performed for removing *vikrita pitta* & *kapha* from body. *Netrakalp* like *bidalak, seka, trapan, putpak* etc. can also be used in patients for controlling haemorrhage, inflammation & oedema.

DISCUSSION

Ayurveda herbs in retinopathy & their probable mechanism of action

Aamalaki **-** *Emblica officinalis* Gareth
It has *kaphahar* property because of *ruksh guna & kashaya ras*. Due to its *kaphahar* property, it will destroy *kleda* in eyes. It also has *chakshushya, raktapitta har & Prameha har* property[8], therefore will help in both bleeding of eyes, in diabetes & strengthen eye muscles.

Fruits of *Aamalaki* are rich in tannins & flavonoids. Tannins help to reduce the exudates and haemorrhages. Flavonoids have good effect on permeability of vascular capillaries and inhibit the formation of hard exudates. They help to improve circulation in the retina by reducing microvascular and capillary blockages. Fruits are rich in Vitamin C has superoxide dismutase which prevents oxidation of lipids. Their antioxidant property scavenges free radicals and releases prostacyclin from the endothelium which releases the blockages and inhibits platelet aggregation.

Draksha **–** *Vitis vinifera* Linn.
Due to *madhur ras*, it has *balya & jivaniya* property. It has *rakta prasadak, rakta-pitta shamak & kapha-nihsarak* property[9] which will help in stopping bleeding of eyes & will destroy *kleda* in eyes. It has *Chakshushya* property also which will strengthen eye muscles. It has tannins which help to reduce the exudates and haemorrhages.

Haridra **-** *Curcuma longa* Linn.
Due to its *tikta ras, ushna veerya* property, it exhibits *kaph vaat nashak karma* which helps is destruction of *kleda* from eyes. It exhibits *raktaprasadan & rakta stambhan karma*[10] which will help in controlling haemorrhage. It is a drug of choice in diabetes. Its *shoth har* property will improve retinal oedema. Cucurminoids present in turmeric help to oxygenate vessels there by reducing localised ischaemia and endothelial cell damage.

Curcumin targets inflammation and oedema with pleiotropic anti-inflammatory activity. It also inhibits the local effect of vascular endothelial growth factor. This helps in treating diabetes and diabetes induced eye diseases.[11]

Kumkum **–** *Crocus sativa* Linn.
It exhibits *kapaha har karma* due to its *ushna veerya, katu ras* which will help in removing *kleda* from eyes. It also exhibits *shoth har , chakshushya, rakta prasadan*[12] *karma* which will help in strengthening eye muscles.

Picrocrocin, an Alkaloid will oxegenate vessels & will reduce localised ischaemia and endothelial cell damage.

Crocin, the active ingredient in saffron, is known as antioxidant supplement, which can reduce the sensitivity of retinal cells to the dangers of inflammation induced by oxidative stress. Crocin removes inflammation and reduces macular thicknessin diabetic macular oedema patients. Crocin prevents ischaemia by inhibiting apoptosis through PI3K/AKT signalling pathway in retinal ganglion cells[13].

Mandukparni *– Centella asiatica Linn.*
It is a *kaphashamak* drug due to *tikta ras*. It is a *medhya & raktapitta shamak* drug. Its chemical constituent is hydrocotylline, an alkaloid, which will help in oxegenation of vessels & will reduce localised ischaemia and endothelial cell damage.

Due to the presence of flavonoids like rutin, kaempferol etc. in *Centella asiatica*, it decreases endothelial permeability and capillary filtration, which is active in diabetic microangiopathy. It also reduces fascial edema in patients[13].

Vasa *– Adhatoda vasica* Nees.
It has *laghu, ruksh, tikta, kashaya* property, so it pacifies *kapha*. It is a *shoth har & vedna sthapan* drug so it act as anti-inflammatory agent. It is a drug of choice in bleeding disorders, so it will help in reducing retinal bleeding[14]. Vasicine , vasicinone help in reducing exudates & haemorrhages. These alkaloids also help in oxegenation of vessels thereby reducing ischaemia.

Bala *– Sida cordifolia* Linn.
It is a good *shothahar, rakta pitta nashak & balya* drug[15], so act as anti-inflammatory agent and strengthens eye muscles. Its powerful alkaloid, ephedrine helps in oxegenation of vessels, reduces ischaemia & prevents endothelial cell damage.

Panchkarma therapy for diabetic retinopathy

Therapeutic interventions which can be given during this therapy are of great help in retinopathy as all therapies do *srotoshuddhi* & removes *kleda* and other exudates from eyes.

It is a *pitta pradhan vikriti*, so *virechan karma* is the best *panchkarma*. Before doing *virechan karma, poorva karma* are to be done like *Amapachan* with *trikatu churna*, then *snehapan* with *Dhanwantar taila* and then *nadi sweda* should be done.

On third day, *virechan karma* with *Avipattikar churna* should be done with proper *sansarjan karma* to be followed after *virechan karma*. This *koshtha shodhan* expels out *kleda* from the body & helps in reducing macular oedema.

After *koshtha shodhan, shirovirechan* with *anu tail* should be done. Then *nasya karma* with *durvaadi ghrita* should be done for next 7 days. Both *nasya & shirovirechan* are considered good therapies for *urdhwajatrugata vikar*[16], so these are very helpful in retinopathy. *Shirovirechan* purifies all channels, removes exudates from eyes. *Nasya karma* with *durvaadi ghrita* will control bleeding from eyes.

Netra kalpa for retinopathy

Netra seka with *kwatha* of *Triphala, Yastimadhu, Lodhra and Musta*. Warm decoction of these drugs is dropped on eyes for 6 days. *Netra seka* helps in removing pain & inflammation from eyes[17]. *Bidalaka* with *Triphalachoorna* and *Rasanjana* should be performed for 3 days. This *kalpa* strengthens eye muscles and subsides inflammation of eyes[17].

Tarpana with *Mahatriphala ghrita* should be performed for 3 days then *Prasadana Putapaka* of *Ajamamsa, Yastimadhu, Triphala, Dadima* should be done for 3 days. In both of these procedures, eyes are filled with *ghrita (tarpan)* and *swarasa (putpaka)*. Inflammation, pain of eyes & macular oedema get subsided with *tarpan* and *putpaak*. It also helps in controlling bleeding from eyes[17].

CONCLUSION

Restoration of structural and functional integrity in disease of *drishtipatala* caused due to *Prameha*, are the objectives of treatment. Ayurveda treatment not only helps in arresting the progression of the disease but also provides relief in existing sign and symptoms of diabetic retinopathy. The treatment modalities are efficacious enough in controlling *raktasrava andshotha*, promoting resorption, improving visual perception, clearing *sthanika pandu lakshana*. *Madhumehahara* properties of the drugs help in holding insulin and reduce the dosage of Oral Hypoglycemic Agents.

So a proper traditional Ayurveda treatment with proper intervention of *kriyakalpa*, life style modifications, *pathyapathya* along with oral medicines at appropriate time can definitely retard the progression of the disease and maintains the retinal function.

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