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AYURVEDIC DRUGS USED IN DIABETIC RETINOPATHY

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ABSTRACT

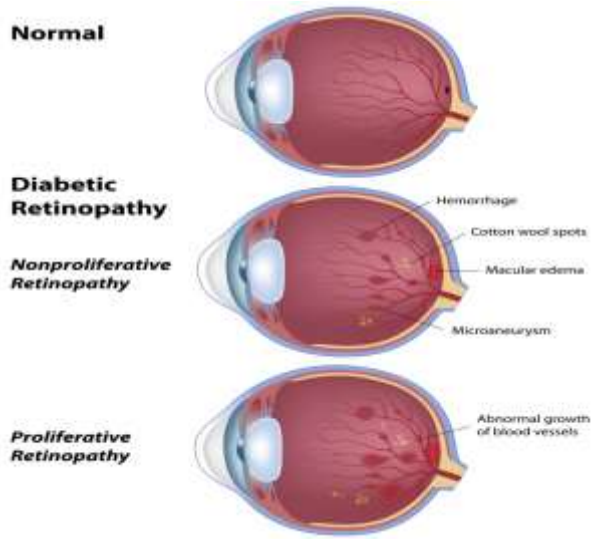
Diabetes Mellitus is a common metabolic disorder in which there is high blood sugar level over a prolonged period and occurs in one of two forms: Type1 or Insulin Dependent Diabetes Mellitus (IDDM) and Type2 or Non-Insulin Dependent Diabetes Mellitus (NIDDM). Diabetic retinopathy is most common and serious complication of Diabetes and changes in the retina are observed by 10 years of Diabetes history or even earlier due to modified lifestyle in present era. This disease results in generalized macro and micro vascular complications linked to glycaemic control and affect theses resulting in poor vision or even blindness. Despite of better understanding of its pathogenesis, satisfactory treatment is yet to be established. Ayurveda is well recognized for its role in preventing the disease, but as such no description is available in text which clarifies the progression of *Prameha* to loss of vision. So *Ayurvedic* treatment purely lies on the basis to pacify the pathological changes which occurs in eye as a result of diabetes according to modern parameters. This paper reviews the pathophysiology of diabetic retinopathy with a view to understand therapeutic target and discusses the possible role of ayurveda in its management.

KEYWORDS: Diabetic Retinopathy, Diabetic Mellitus, Exudates, Hemorrhages.

INTRODUCTION

Diabetic Retinopathy is the effect of diabetes on your eyes. In this disease, the blood vessels around the retina of eye got damaged which cause difficulty in vision and may also leads to loss of eye sight permanently. Diabetic retinopathy is a disease of eyes in which the blood

vessels of retina and vitreous become weak and fragile resulting in leakage inside retina and vitreous. This leakage inside the eyes directly blocks the vision. Sometimes there are minor leakages resulting in black spots or floaters in the field of vision. On the other hand, there can be heavy bleeding in retina or vitreous causing complete loss of vision. Today's life style and work atmosphere along with the use of modern appliances and gadgets for work and entertainment, like televisions and computers, are taking a heavy toll on the general health and well being of eyes. People tend to forget that eyes too need exercise as well as rest for its proper functioning. Working for hours before computer or watching television for a prolonged time and that too without enough blinking is very dangerous to eyes. It makes the eyes dry and scrappy. Today, a large section of children are myopic, the major culprit for this being television. The longer the patient has diabetes, higher are his or her chances of developing diabetic retinopathy.[1] The course and severity of diabetic retinopathy are also affected by the presence of nephropathy, systemic hypertension, positive family history of diabetic retinopathy, smoking, obesity and hyperlipidaemia.[2] Diabetic retinopathy is caused by prolonged high blood glucose levels. Over time, this causes damage to the small blood vessels within the retina. This may cause haemorrhages, exudates and even swelling of the retina. This then starves the retina of oxygen, and abnormal vessels may grow. Good blood glucose control helps to lower diabetes retinopathy risks.



Diabetes retinopathy is just one type of diabetic eye disease. The word prameha is derived from Pra-means excess, Meha- ksharanapassing of urine. So prameha is passing excess urine and turbid in colour (Prabhoota avil mootrata).[3] The basic causative factor for Prameha includes both Beejadusti[4] and Mithya Ahara-Vihara. Doshas will also get predominant.

Moreover a good number of Dushyas[5] also involving in the Samprapti of Prameha, making it asKrichrasadhya. The complications of Prameha is considered mainly due to the presence of Kleda in Rakta and in Raktavaha Srothas. The Kleda when combines with all the Tridoshas will initiate different Vikritis in all the Trimarmas, namely Shiras-Nabhi-Vasti which may be seriously affected if the condition of Prameha is not properly treated in time. In Prameha the major Sampraptighataka is Kleda which contributes much to the Upadrava Rogas. It has been mentioned in classics "Hrinnetra jihwa sravanopadeha.[6] which gives direct clue regarding the involvement of vital organs like eye in Prameha Samprapti. Twenty types of prameha if ignored and not treated properly in time can convert into madhumeha and become incurable. Diabetes mellitus in ayurveda is known as madhumeha. In madhumeha dosha is kapha pradhan tridosha. Dushya is meda (predominance), mansa, rakta, vasa, majja, lasika, kleda shukra, oja.[7,8] According to Acharya Charaka and Vagbhata, eye is afraid of kapha dosha.[9,10] So Samanya chikitsa sidhanta in ayurveda for diabetic retinopathy can be considered as follows: (1) Pramehahar chikitsa, (2) Kaphahar chikitsa, (3)Srotorodhhar chikitsa, (4) Urdhavraktapittahar chikitsa. In case of haemorrhages: according to.

Pratimargharan chikitsa sidhanta virechana is the main shodhan chikitsa[11], urdhavraktapittahar shamana chikitsa, bahya chikitsa includes takradhara, shirolepa or shiropichu with sheeta stambhan aushadi.[12] In case of Sanga (occulsion): Srotorodhhar chikitsa can be done. In case of Macular oedema: Shophahar chikitsa is to be done.All people with diabetes should have a dilated eye examination at least once every year to check for diabetic retinopathy.

Diabetic Retinopathy Diabetic Retinopathy has been variously classified. Presently followed classification is as follows.[13] I. Non Proliferative Diabetic Retinopathy (NPDR) • Mild NPDR • Moderate NPDR • Severe NPDR • Very severe NPDR II. Proliferative Diabetic Retinopathy (PDR) III. Diabetic Maculopathy IV. Advanced Diabetic eye diseases Diabetic Retinopathy is a microangiopathy which affects the retinal precapillary arterioles, capillaries and venules.

There are two stages of retinopathy

1. Non Proliferative retinopathy

In this type, the blood vessels in the eye become larger in certain spots (called micro aneurysms). Chances are there that the blood vessels may also get blocked. There also may be small amounts of bleeding (retinal haemorrhages), and fluid may leak into the retina. This can lead to noticeable problems with your vision.

2. Proliferative retinopathy

This condition is more advanced and severe. New blood vessels that are fragile will start to grow in the eyes. Being delicate, there are chances that the blood vessels can bleed (haemorrhage). Small scars would develop, both on the retina and in other parts of the eye eventually leading to a vision loss and other severe problems. . Neovascularization is the hallmark of proliferative diabetic retinopathy. The proliferation of fibro-vascular tissue on the surface of the retina and in the vitreous may cause formation of epiretinal membrane and irregular fibrovascular bands, respectively. The contraction of these bands may lead to tractional retinal detachment and blindness.8Gradually, diabetic retinopathy becomes more serious and progresses from 'background retinopathy' to seriously affecting vision and eventually causing blindness.

Diabetic retinopathy includes 3 different types, each of which is profiled below

- Background retinopathy
- Diabetic maculopathy
- Proliferative retinopathy

Background retinopathy

Background retinopathy, also known as simple retinopathy, involves tiny swellings in the walls of the blood vessels. Known as blebs, they show up as small dots on the retina and are usually accompanied by yellow patches of exudates (blood proteins). Background diabetic retinopathy needs monitoring by an ophthalmologist.

Diabetic maculopathy

The macula is the most well used area of the retina, and this stage refers to the progression of background retinopathy into the macular. This can cause vision problems.

Proliferative retinopathy

Proliferative retinopathy is an advanced stage of diabetic retinopathy in which the retina becomes blocked causing the growth of abnormal blood vessels. These can then bleed into the eyes, cause the retina to detach, and seriously damage vision. If left untreated, this can cause blindness. In the case of a vitreous haemorrhage, this loss of vision can be instant. The only ocular treatment available for macular diabetic retinopathy and proliferative diabetic retinopathy is photocoagulation.[14]

The severity of disease increases with the advancement of stage. Diabetic retinopathy is a condition that implies damage to the retina caused by complications of diabetes that can eventually lead to blindness. Some patients with long history of uncontrolled diabetes may suffer from diabetic retinopathy sooner or later. In this condition the blood vessels around the retina of the eye will get damaged due to the high sugar levels in the body leading to difficulty in vision and in worst cases loss of eye sight permanently. Almost 90% of the diabetic retinopathy cases can be avoided if a diabetic patient is able to detect it and start treatment in the early stages of the condition itself. The longer a person has unmanaged diabetes, the higher his or her chances of developing diabetic retinopathy.

Diabetic Retinopathy can affect up to 80% of patients with diabetes for 10 years or more. Almost 90% of diabetic retinopathy cases can be avoided if a diabetic patient is able to detect it and start treatment in the early stages of the disease itself. The longer a person suffers from diabetes, higher are his chances of having diabetic retinopathy. The worst part is that diabetic retinopathy does not give any signs or symptoms that the patient can understand, until it reaches a stage where vision loss begins. The most important task in successful management of diabetic retinopathy is to identify the disease at its early stage. Neovascularisation, Retinal detachment etc. may happen eventually leading to complete blindness. In its initial stage, there are small dots hemorrhages in the vitreous or retina.In the advanced stage, that is proliferation & neo-vascularization there is multiple hemorrhages that finally leads to blindness and it become irreversible to get it back to normal. Diabetic Retinopathy is a microangiopathy which affects the retinal precapillary arterioles, capillaries and venules.

This microangiopathy causes: (1) Microvascular leakage (2) Microvascular occlusion.

1. Microvascular leakage

Normally capillaries are lined by single layer of endothelial cells and basement membrane. But in retinal capillaries, they are also lined by Pericytes. These pericytes are responsible for structural integrity of vessel wall. These pericytes are specifically lost early in diabetic retinopathy.[15,16] Physical weakening of capillary walls due to loss of pericyte result in localized saccular outpouching of vessel wall, termed microaneurysm. It appear as a small red spot. Some of the thin walled microaneurysms and fragile retinal capillaries may rupture and cause retinal haemorrhages, results in deep haemorrhages (dot and blot haemorrhages) and superficial haemorrhages (flame shaped). In addition there is breakdown of blood retinal barrier due to many factors, especially as a result of opening of tight junction between

adjacent microvascular endothelial cell processes. Breakdown of blood retinal barrier causes leakage of plasma constituents in the retina and form hard exudates and retinal oedema. Hard exudates are deposits of plasma proteins and lipids. All the lesions often occur more near macula and optic disc.[17]

2. Microvascular occlusion

Due to prolonged diabetes mellitus there occurs thickening of capillary basement membrane, capillary endothelial cell damage and proliferation, changes in R.B.C's (i.e elasticity of R.B.C reduced) and increased stickiness and aggregation of platelets. All together leads to microvascular occlusion which in turn lead to retinal hypoxia, results in retinal ischaemia, which initially develops in the mid retinal periphery. Appearance of ischaemic areas due to occlusion of capillaries may manifest as "cotton wool spots" or soft exudates. These are microinfarct of nerve fibre layer of retina. Venous dilation, beading and looping of the veins occurs secondary to ischaemia. The two main effects of retinal hypoxia are 1) Arteriovenous shunts

2) Neovascularisation. All these occur in an attempt to revasclularise the hypoxic areas of retina. Formation of arteriovenous shunts from arterioles to venules associated with significant capillary occlusion are reffered as intraretinalmicrovascular abnormalities (IRMA). Retinal hypoxia leads to release of vasoproliferative substance such as vascular endothelial growth factor (VEGF). It results in development of neovascularisation i.e. proliferation of new vessels from the capillaries in the form of neovascularisation at the optic disc (NVD*)* or elsewhere (NVE*)* in the fundus along the course of major temporal retinal vessel and occasionally on the iris (rubeosis iridis) and angle of anterior chamber (neovascular glaucoma). This neovascular tissue is more fragile, bleed easily and incites a fibroblastic response. These new vessels may proliferate in the plane of retina or spread into the vitreous as vascular fronds. Later on condensation of connective tissue around the new vessels result in formation of fibro vascular epiretinal membrane. Vitreous detachment and vitreous haemorrhage may occur in this stage. Later fibrovascular and gliotic tissue contracts to cause retinal detachment and blindness.[18]

Along with blood sugar levels, controlling blood pressure is important, as long-term studies have shown that retinopathy in people with high blood pressure is likely to progress to macula edema. While there are no clear studies that show how treating high blood pressure levels can reduce the risk of vision problems, it is known that controlling the blood pressure

will reduce the risk of other diabetes-related complications. Having annual eye examinations by an ophthalmologist is important to screen for Diabetic Retinopathy and other problems. While it will not result in preventing the condition, it will help with avoiding vision loss through early detection and treatment.Smoking has been shown to aggravate other health problems in people with diabetes, including diseases of the small blood vessels, so stopping smoking is suggested, as well as avoiding second-hand smoke.

By Ayurvedic methods, this first stage of diabetic retinopathy is treatable. Diabetic patients suffering from Heaviness of the head (especially in the morning), watering of the eyes, occasional blurring of the vision, watering of the eyes while straining with eyes, redness of the eyes after bath etc. need to check for onset of diabetic retinopathy and can be considered as a warning to consult an ophthalmologist.

The second stage of diabetic retinopathy can be associated with symptoms such as sudden decrease in vision, flashes of light, blurring of vision, and difficulty to face bright light. These happen due to leakages/haemorrhage from blood vessels of the eye. Only an experienced doctor should manage if the disease has reached this condition. According to Ayurvedic treatment, re-absorption chances are there if the leakage is mild. Also, the patient has to be extremely careful since there is a very high risk of recurrence of leakage or leakage from a different point. The main objective of treatment at this point would be to preserve the existing vision.

The third stage of diabetic retinopathy is not completely curable by ayurvedic treatment.

Symptoms

- Seeing floaters and black spots
- Progressive loss of vision.
- Photophobia
- Pain in eyes.
- Watering and dryness of eyes.
- Sharp loss of vision can also occur in acute stages.
- Difficulty in color recognition.

In the early, most treatable stages of diabetic retinopathy, you usually experience no visual symptoms or pain. The disease can even progress to an advanced stage without any

noticeable change in your vision.Some common symptoms of diabetic retinopathy are listed below, however, diabetes may cause other eye symptoms. Spiders, cobwebs or tiny specks floating in vision Dark streaks or a red film that vision Vision loss or blurred vision A dark or empty spot in the center of your vision Poor night vision Difficulty adjusting from bright light to dim light. Like many conditions of this nature, the early stages of diabetic retinopathy may occur without symptoms and without pain. An actual influence on the vision will not occur until the disease advances. Macular Oedema occurs when leaking fluid caused the macular to swell. New vessels on the retina can prompt bleeding, and hence block the vision. As the Diabetic Retinopathy Symptoms gets worse and more fluid and proteins leak it will cause the retina to swell. This causes mild to severe vision loss. If the swelling affects the macula the vision loss can be severe. The condition worsens as years go by, and the patient won't look for Diabetic Retinopathy Treatment. When scar tissue develops that can lead to retinal detachment. There can also be bleeding inside the eye. Growth of new blood vessels on the surface of the iris may lead to severe glaucoma, a condition called neovascular glaucoma.

Risk factors

Diabetic retinopathy risk factors include the following.

If any of the below affect you it's worth having an retinopathy screening examination as quickly as possible.

- Poor blood glucose control.
- Protein in urine.
- High blood pressure.
- Prolonged diabetes.
- Raised fats (triglycerides) in the blood.
- Increased swellings.
- Pregnancy (not gestational diabetes).

Anyone suffering from diabetes faces the risk of developing diabetic retinopathy and other diabetes complications.The longer a person has diabetes, the greater the risk of developing diabetic retinopathy becomes. Long-term good blood glucose level management helps to prevent diabetes retinopathy and lower the risk of developing it. Heart disease risk factors also affect retinopathy risk and include stopping smoking, having regular blood pressure and cholesterol checks and having regular eye check-ups.

Also, there are other below cited factors that act as a base to the condition –

1. Hereditary factor.
2. Body constitution – Dosha Prakrithi.
3. Stress and strain.
4. Dietary and other habitual factors.

Prevention

By Proper Ayurvedic management, we can prevent the onset of diabetic retinopahty in diabetic patients. "Prevention of diabetic retinopathy" is the only effective solution for diabetic patients. There are highly effective preventive methods such as, but not limited to oil applications, specific ophthalmic medications, dietary modifications and systematic external treatment procedures on the eye. These methods will vary from individual to individual, because body constitution, etiological factors, and subjective symptoms are to be considered

Taking a dilated eye examination once a year.

Managing diabetes strictly through medicine, insulin, diet and exercise.

Test for blood sugar levels regularly.

Test urine for ketone levels regularly.

There are certain herbs that will strengthen blood vessels and prevent the deterioration and leakage of blood into the eye.

- Bilberry is rich in vitamins A and C which protect and strengthen the eye.
- Ginkgo Biloba increases the diameter of blood vessels and allows the flow of more blood to nourish the retina.
- Quercitin is a flavonoid that helps prevent blood clots by reducing histamine formation. It also slows the formation of insulin growth factors, as well as reducing high blood pressure resulting in the reduction of stress on the walls of blood vessels.
- Grape seed extract is effective in preventing blood leakage from damaged vessels.

Other herbs include parsley, which contains strong anti-oxidants, vitamin C, and lutein. This helps protect the macula from oxidation damage. Shark Cartilege stops the progression of the condition, as it slows down the growth of the tiny blood vessels that could potentially affect the eye sight.

Prevention can be the best Diabetic Retinopathy Treatment. Leading a healthly lifestyle, reducing stress, managing diabetic blood levels and controling high blood pressure are key to controlling the severity of the degeneration on retinopathy.

Treatment according to modern

Laser surgery is often used in the treatment of diabetic eye diseases, but each stage of diabetic retinopathy may be treated in a different way. Backround retinopathy has no treatment but patients will need regular eye examinations. Maculopathy is usually treated with laser treatment (tiny burns that destroy small areas of retina).This is usually painless and has no side effects, but can influence night driving and peripheral vision. This type of laser treatment for diabetic retinopathy will not improve vision, but it can prevent deterioration. Proliferative retinopathy is also treated with lasers, with a scattering over the whole retina. This destroys the starved area of the retina. Serious diabetes retinopathy cases may require eye surgery. This is usually diagnosed due to bleeding in the eye, late-stage proliferative retinopathy or ineffective laser treatment. This type of diabetic retinopathy eye surgery is called vitrectomy.

Treatment according to ayurveda

According to Ayurveda, it is a vitiation of vata and pitta doshas. Blood being the site of pitta dosha is a major factor in this disease. Increased pitta level in blood causes its oozing from the blood vessels in retina and vitreous. Vata, being the controlling dosha and responsible for neurological connections, also gets disturbed because of pitta vitiation. The aim of Ayurvedic treatment for diabetic retinopathy is to pacify vata and pitta dosha. Treatment of Diabetic Retinopathy in Ayurveda This disease is caused by the imbalance of vita, kapha and pitta dosh. Ayurveda medicine stops the clotted blood in the retina and vitreous. It also provides strength to the metabolic functions so that further blood leakage is minimized. All these steps can be taken under action only if blood sugar level of an individual is in control. It is the first and foremost step taken with a Diabetic Retinopathy patient. Panchkarma technique used for the treatment of Diabetic Retinopathy in Ayurveda.

Along with this, Panchakarma Services **and different** Nethra kriya kalpas **like as**

- Tharpanam
- Anjanam
- Thalam
- Thalapothichil

- Thakradhara
- Nethradhara
- Putapakam
- Lepa on eyes
- Nethradhara
- Tharpana (if no bleeding is active)

And many others are available in ayurveda to cure you from Diabetic Retinopathy Eye Disorder.

Ayurvedic medicines are taken to improve the blood circulation and control the diabetic level during the treatment period.

There are Ayurveda procedures like thakradhara, nethradhara, tharpanam and many others which are potent enough to provide strength in blood vessels of retina so that there will not be any further hemorrhage. Any leakage from the blood vessels also gets reabsorbed. The nourishing Ayurveda medicines provide strength to retina and optic nerves thus clearing the vision. For these procedures to be done, patient has to be hospitalized for a duration of 3 weeks under the supervision of an Ayurveda eye specialist. Controlling Diabetes is the first line of treatment in Diabetic Retinopathy. Initially, detoxification of the body is recommended so as to clear the channels and stop the perfusion. Along with this steps should be taken to control the level of diabetes. After this, appropriate treatments for preventing/stopping the congestion or haemorrhage in retinal blood vessels and for the degeneration of the retinal nerves has to be done. Ayurvedic treatments such as Thalam, Thalapothichil, Putapakam, Anjanam, Thakradhara, Nethradhara are generally advised by the Ayurvedic doctor depending upon the condition of the patient. Also, Panchakarma Ayurvedic therapies play a vital role in the treatment of Diabetic Retinopathy. The main aim of the treatment is to clear the passage of blood vessels in the most macro levels and improve the blood circulation on the Retina.

According to Ayurveda, channelling the treatments in a systematic way can control diabetic retinopathy to a great extent and can lead to incredible improvement in the vision. Ayurveda also recommends, regular check-up of the eyes – Every person suffering from diabetes must get his or her eyes examined through an eye specialist at least once in a year even if he doesn't have any symptoms. Retinopathy can affect all diabetics and becomes

particularly dangerous when it is left untreated. Oral medicines e.g. Saptamrita lauh, Triphla ghrita, Mahatriphla ghrita, Patoladi ghrita, Jivantyadighrita, Triphla churan, Shatavari churan, Rasayan chikitsa.[19,20,21] The disease cannot be cured 100% but can keep stable in thatcondition. Many patients suffering from diabetic retinopathy become blind by other means of treatment whereas ayurveda controls this disease and increases blood circulation and nourishes retina.

CONCLUSION

Prameha janya Netra Roga or diabetic retinopathy can be controlled or aggravated according to one's life style and control over blood sugar levels It is the leading cause of blindness in elderly subjects.As no satisfactory treatment is available for diabetic retinopathy, new approaches are needed to slow the progression and limit the damage caused by this disease. Ayurveda provides a better management for diabetic retinopathy compared to modern medicine. Ayurvedic treatment helps to manage blood sugar levels and the same time Chakshushya in nature helps to maintain the vision which detoriates according to the stages of diabetic retinopathy. Ayurvedic drugs and therapy controls the disease and increases blood circulation and nourishes retina.

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