



# Conceptual Analysis of Diabetic Macular Edema in Ayurveda

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## ABSTRACT

In *Ayurveda*, *Prameha* describes as *Darun Gadah* because of having so many complications (*Subahuupdravada*) and involving all three *Mahamarmas*. Inclusion of *Prameha* in *Ashtamahagada* shows the importance of this disease given by our *Acharyas* in ancient time. Diabetic retinopathy (DR) is a complication of diabetes, and Diabetic macular oedema (DME) is a further complication of diabetes. It can present in eyes at all levels of DR and lead to vision impairment and blindness. The risk of development of blindness in diabetes increases by 20-25 times as compared to the healthy population. The high prevalence rate of diabetic retinopathy (35.4%), proliferative diabetic retinopathy (7.2%), diabetic macular oedema (7.4%) and vision-threatening diabetic retinopathy (11.7%) in diabetes show the importance of this disease which led to the search and analysed the disease process (*Samprapti*) according to the *Ayurvedic* aspect based on common pathogenesis and different *Timira Vyadhi* mentioned in *Ayurvedic* text. Thus, the present study endeavours to establish a possible co-relation of *Madhumeha/Pramehajanya timira* with diabetic macular oedema and its possible pathogenesis from the *Ayurvedic* perspective. The presence of *Kledata* in the *Rakta* and *Raktavaha srotas*, the involvement of all three *Doshas* and *Saptadhatu* along with four internal *Drishtipatalas* of the eye are affected in *Pramehajanya Timira* in different stages of the disease. In *Madhumeha*, two types of pathology, *Dhatukshayajanya* and *Avaranajanya* have an essential role in the development of diabetic retinopathy due to prolonged uncontrolled hyperglycaemia. In *Dhatukshaya*, *Dhatu*s are excreted from the body, which causes some pathological events and results in the development of DME. Four types of *Srotodusti*, i.e. *Attipravritti*, *Sanga*, *Siragranthi*, and *Vimarga gamana*, also plays a significant role in the development of DME.

**Key Words:** *Diabetic macular oedema, Diabetic Retinopathy, Pathogenesis, Ayurveda, Madhumeha, Pramehajanya Timira*

## INTRODUCTION

Diabetic retinopathy is a condition that implies damage to the retinal precapillary arterioles, capillaries & venules caused by the complications of diabetes, which can eventually lead to blindness. Diabetic macular oedema (DME) is the most significant cause of visual acuity loss in

diabetes. It mainly affects the central vision from early stages of retinopathy, and it is the most common sight-threatening complication of diabetic retinopathy, especially in older type 2 diabetic patient<sup>1</sup>. The prevalence rate of diabetic retinopathy, proliferative diabetic retinopathy, diabetic macular oedema and vision-threatening



diabetic retinopathy among individuals with diabetes is 35.4%, 7.2%, 7.4%, 11.7% respectively<sup>2</sup>. Estimates show that the number of people with DR will grow from 126.6 million in 2011 to 191.0 million by 2030. The number of people with VTDR will increase from 37.3 million to 56.3 million<sup>3</sup>. Visual disability from diabetes mellitus is a significant public health problem, and if managed with timely intervention, the quality of life can be preserved. Almost 90% of the diabetic retinopathy cases can be avoided if a diabetic patient can detect it and start treatment in the early stage of the disease. The longer a person has uncontrolled diabetes, the higher his or her chances of developing diabetic retinopathy. Innovative alternate therapy and treatment are needed to reduce the risk of vision loss by early diagnosis and early treatment of VTDR (vision-threatening DR).

After viewing the highness of this disease, it is essential to search and analyse all the critical literature of both modern and *Ayurveda* to establish a possible etiopathogenesis and correlation of this disease on *the Ayurvedic* perspective.

DM can correlate with *Madhumeha*, which is a subtype of *Prameha* in *Ayurveda*. Our Acharyas have much emphasised *this disease* as it causes significant complications in other organs, including the vision. The importance has been given to maintenance and preservation of eyesight by all our *Acharyas* through the declaration “*Chakshu Pradhanam Sarveendriyanam*”<sup>4</sup>. Looking into the gravity of this problem an

alternative approach for effective control of disease is sought which takes care of disease progression so that the patient’s sight is preserved. In *Ayurveda* text, diabetic retinopathy and diabetic macular oedema are not directly described, but etiopathogenesis of the eye diseases and *Prameha* gives an idea of the possible correlation between these two diseases. In *Ayurveda*, *Timira* has been explained in detail by our *Acharyas*. Clinical manifestations of *Timira* are *Vihwal Drishti* (Blurred vision), *Makshika Mashaka Kesha Jaala Pashyati* (Floaters), *Tamasa Darshanam* (Scotoma- black spots in front of eyes) and *Nasa Akshi Yuktani Vipritani Vikshate* (Metamorphopsia or distorted vision) which has similarity with features of DME. So, DME resembles *Timira (Pramehajanya)*<sup>5</sup>.

#### **Possible etiopathogenesis of DME in *Ayurveda* (Samprapti of *Pramehajanya Timira*)**

*Madhumeha*, which is a subtype of *Prameha* can correlate with Diabetes mellitus. *Prameha* is *Kapha Pradhana Tridoshaja*<sup>6</sup> disease. According to *Acharya Charaka*, *Madhumeha* is one of the *Ashtamahagada*<sup>7</sup>, and it is a condition of *Vyadhi Sankarya* which produces many complications and is difficult to treat.

It is not possible to co-relate DR and DME to any particular disease in *Ayurveda*. However, the partial or complete loss of vision is explained under the heading of *Drishtigata Vikaras* in *Shalaky Tantra*. There is no direct reference in our classics saying *Timira* is produced as a *Upadrava* of *Prameha*. The involvement of *Trimarmas* in *Upadrava* state is the crucial



hallmark event in the progression of *Prameha*<sup>8</sup>. The *Trimarmas* namely *Shiras*, *Hridaya* and *Vasti* are severely affected, if the *Prameha* is not adequately treated and the eye is not separate from *Shiras*. It is a strong indication between *Prameha* and eye diseases.

Among etiological factors of *Prameha*, certain factors are *Achakshushya*, i.e. sleeping in the day time, overeating, excessive intake of curd etc. *Achakshushya* factors always have an affinity towards the ophthalmic tissues. In *Astanga Hridaya* regarding the aetiology of eye diseases, it is said to be the same as that of general diseases, but *Achakshushya* and *Pitta*<sup>9</sup> predominant causes are prime factors for manifestation of the eye diseases.

In the sequence of development of *Prahmehajanya Timira*, excessive intake of *Achakshushya* and *Pitta* dominant *Aahara* and *Vihara* provokes *Pitta Dosha* along with *Kapha Dosha*, which later becomes *Vimargami* and ascends to *Urdhavjatra Pradesha* through *Sira* and *Ratkavaha Srotas* and especially vitiates *Rakta*, *Mamsa* and *Medo Dhatu*. They obstruct the normal pathway of *Vata*, which leads to the aggravation of *Vata*. This *Vata* draws out vital constituents such as *Vasa*, *Majja* and *Apara Oja*, which leads to depletion of *Dhatu*s from all part of the body. Hence, *Prameha* brings out changes first

in *Sarva Sira*, then in *Dristipatalgata Sira* that leads to impairment of vision.

All four types of *Srotodushti* take place in DR- *Vimargagamana*, *Atipravriti*, *Sanga* and *Granthi*<sup>10</sup>. In diabetic retinopathy, provocative *Dosha* is *Pitta Pradhan Tridosha*. The vitiated *Pitta*, in turn, vitiates the *Pittavaha Srotas*. Due to interconnection of *Pitta* and *Rakta*, the *Raktavaha srotas* and *Rakta Dhatu* are also get vitiated and takes away the fluid (in the form of blood, plasma and tissue fluid) from all *Dhatu*s by *Ushana-Tikсна*<sup>11</sup> properties. So, the amount of fluid gets increased, and leaking of blood occurs in the form of haemorrhages in the retina. It can be considered as *Netragata Urdhwa Raktapitta* which is possible by *Atipravriti Srotodushti*, apart from that leakage of serum proteins and lipid converted into exudates through *Sanga Srotodushti*. By *Granthi Srotodushti* weakened walls of vessels get bulge out to form aneurysms.

In diabetic patients, declination of all *Dhatu*s occurs because of *Dhatu*s excretion from the body in the form of urine that is why some pathological events take place in the whole-body tissues. *Acharya Sushruta* explained these pathological changes decline in detail as *Dhatu Kshaya*<sup>12</sup>. Hence in the reference of DR and DME, these pathological events can be correlated with retinal changes as below mentioned in Table 1.

**Table 1** Possible correlation of *Dhatu Kshaya Avastha* with occurring Retinal changes

SN.	<i>Dhatu Avastha</i>	<i>Lakshana</i>	The occurring event in the retina	Results
1.	<i>Rakta Kshaya</i>	<i>Sira Shaithilya</i>	Loss of endothelial cells and pericytes of vessels which leads to increased permeability	Haemorrhages
2.	<i>Mams Kshaya</i>	<i>Dhamni Shaithilya</i>	The weakening of capillary wall which bulge out	Micro aneurysms



3.	<i>Meda Kshaya</i>	<i>Sandhi Shoonyata</i>	Breakdown of cell junction retinal pigmented epithelium and retinal vessel wall cells (the breakdown of the blood-retinal barrier)	Exudative macular oedema
4.	<i>Majja Pradoshaja Vikara</i> <sup>13</sup>	<i>Tamah Pravesha</i>	Anaemia and hypoxia in retinal tissue and development of new vessels	Haemorrhage and oedema
5.	<i>Shukra Kshaya</i>	<i>Padutvam</i>	The hereditary course of the disease	<i>Asadhyata</i> (not curable)
6.	<i>Oja Kshaya</i> <sup>14</sup>	<i>Vyathitendriya</i>	The diminished function of <i>Chakshurendriya</i>	Loss of vision

Thus, by the above description, it can be concluded that in DME formation, there are multiple disease pathological events taking place such as; *Prameha Samprapti*, *Raktapitta Samprapti* and *Shotha Samprati*.

### **Timira with different Dosha predominance shows involvement in various stages of DR**

- *Vataja Timira lakshanas* like *Vyaviddamiva Pashyati*<sup>15</sup>, which gives the meaning of the blurry vision which is seen in the proliferative stage of DR as blurry vision.
- *Vataja Timir lakshanas* like *JalanikeshanmashaRashminchopekshite*<sup>16</sup> *Jalani Keshan Mashakan Rashminchopekshite* seen in the proliferative stage of DR as floaters & flashes.
- *Pittaja Timira lakshanas* like *Aditya khadyota Pasyati*<sup>17</sup> are also the signs in the advanced stage of DR as flashes of light.

- *Kaphaja Timira lakshanas* like *Pasyed Sukshmapytrthaha*<sup>18</sup> (difficulty in seeing close up or reading) is also a symptom seen in DR with macular oedema.

- *Raktaja Timira Lakshana* like *Dhoomadhoomranichekshathe*<sup>19</sup> appears as the blackish and smoky vision in DR.

- *Raktaja Timira Lakshana* like *Raktani Tamansi Vividhani ...Chekshate*<sup>19</sup> (seeing reddish, variegated colours) is also symptom seen as erythrospia in DR with vitreous or pre retinal haemorrhage.

These all *Dosha* predominance *Timira lakshanas* correlate with symptoms of DR as mentioned in Table 2.

**Table 2** Different predominance Timira lakshanas correlate with Symptoms of Diabetic Retinopathy

DOSHA PREDOMINANCE TIMIRA	TIMIRA LAKSHANAS	DR SYMPTOMS
1. <i>Vataja Timira</i>	<i>Vyaviddamiva Pashyati</i> <i>Jalani Keshan Mashakan Rashminchopekshite</i>	Hazy, spotty, blurry vision. Spider web appearance caused by floaters.
2. <i>Pittaja Timira</i>	<i>Aditya Khadyotha Pasyati</i>	Flashes of light.
3. <i>Kaphaja Timira</i>	<i>Pasyed Sukshmapytrthaha</i>	Difficulty in reading or seeing close up.
4. <i>Raktaja Timira</i>	<i>Dhoomadhoomranichekshathe</i> <i>Raktani Tamansi Vividhani .... Chekshate</i>	Blackish and smoky vision. Erythrospia.

### **Prameha and Diabetic macular oedema**

Main pathological features of *Prameha* are: *Prabhutta avilmutrata*<sup>20</sup>. It means that patients

with *Prameha*, are present with the symptom of increased in quantity of turbid urine. *Prabhutta Avilmutrata* can be correlated with Proteinuria. As



in the long run; *Prameha* is converted to *Madhumeha* stage, these nephropathy signs are mostly associated with a chronic case of diabetes. Proteinuria leads to hypoalbuminemia, and this decreases serum osmolarity<sup>21</sup>, which again leads to salt and water retention in the extracellular space of retina. This may be another cause of Diabetic macular oedema specifically as well as retinal oedema in general.

### Management of Diabetic retinopathy in Ayurveda

Analysis of *Samprapti* of DR and DME based on Ayurvedic concepts, clearly explains the need for *Samprapti Vighatana* at various levels to manage DR and DME. Hence the motto of the treatment should be along with doing *Prameha Sampraptibhanga*, incorporation of *Kaphaja-Pittaja Timira* line of management in different stages will help in reversing the retinopathy.

Based on *Samprapti*, DR and DME can be managed by exploring the following treatment principles-

1. *Pramehahara*
2. *Kledahara*
3. *Raktavahasrothodustiharana*
4. *Rakta-Pittahara*
5. *Shophahara*
6. *Vatanulomana*
7. *Rasayana chikitsa*

Management of *Timira* can be broadly classified into two ways-

- 1) Prophylactic
- 2) Curative- a) Local b) Systemic.

#### 1) Prophylactic measures

One who takes regularly old *Ghee*, *Triphala*, *Shatavari*, *Patola*, *Mudga*, *Amalaka* and barely should not be afraid of severe *Timira*. Simply *Payasa* made of *Shatavari* or *Amalaka* or barely boiled with the plentiful decoction of *Triphala* and added with profuse quality of *Ghee* alleviates *Timira*<sup>22</sup>.

#### 2) Curative

a) **Local:** local measures include *Tarpana*, *Putapaka*, *Seka*, *Ascyotana* and *Anjana*.

b) **Systemic:** *Shodana Chikitsa- Virechana* is said to be ideal for *Anulomana* of *Doshas* specially vitiated *Pitta*, as the eye is the sight of *Alochaka Pitta Dosha* predominant.

#### *Samanya Chikitsa of Timira*

Generally, all disorders of eye produced by *Abhishyanda*<sup>23</sup>. Hence the general line of management of *Abhishyanda* can also be incorporated in the treatment of *Timira*.

According to *Ashtanga Hridaya*; Oleation, Bloodletting, Purgation, application of *Colleryium*, *Murdha Basti*, *Basti Kriya*, *Tarpana*, *Lepa* and *Seka*, administrated according to *Doshas*, is the general treatment of *Timira*<sup>24</sup>.

### CONCLUSION

Diabetes mellitus is a severe metabolic disorder, with a significant impact on the lives and well-being of individuals, families and societies worldwide. The eye is considered as the primary target of hyperglycaemia. Hyperglycaemia develops diabetic retinopathy under the influence of prolonged hyperglycaemia. Diabetic retinopathy is a complication of diabetes that may



be unnoticeable in its early stages, but which can lead to vision impairment and blindness. The presence of *kledatva* in the *Rakta* and *Raktavaha Srotas*, the involvement of all three *Doshas* and *Saptadhatu* with four internal *Drishtipatalas* of the eye are affected in *Pramahajanya Timira* in different stages of the disease. All four types of *Srotodushti* take place in DR as *Sanga* is manifested by the retinal vessels occlusion, *Siragranthi* is nothing other than development of microaneurysms, *Vimargagamana* is the retinal haemorrhages, and *Atipravritti* can be correlated to the Neovascularisation where new vessels are formed. Based on *Samprapti*, DR, and DME can be managed by exploring the following treatment principles- *Pramehahara*, *Kledahara*, *Raktavahasroto dustiharana*, *Rakta-Pittahara*, *Sophahara*, *Vatanulomana*, *Rasayana chikitsa*.



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