

Ophthalmological Problems In Diabetes

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ABSTRACT

This study reviewed the ophthalmological problems of diabetic patient, management of diabetic eye disease, current treatments of diabetic eye disease. Treatment entirely relies on the type and severity of disease, diabetic retinopathy if detected early treatment becomes easy and fast by photocoagulation, eyes vitreous injection. New medications for DR are Nogo-A Human monoclonal antibody, SYL136001v10. The two types of glaucoma that are most prevalent are primary open-angle glaucoma and primary angle-closure glaucoma. Fasting glucose levels and diabetes were linked to a slightly higher IOP, while diabetes and fasting glucose levels were linked to a considerably higher risk of glaucoma. The initial line of treatment for POAG is typically topical medicine. A variety of drops, which may be categorized into five main groups: prostaglandin analogues, beta-blockers, diuretics, cholinergic agonists, and alpha agonists, can be used to decrease IOP. Cataracts people with diabetes have high risk of cataracts and vision is distorted by cataracts, which are foggy regions in the cornea's lens. The most common reason for blindness in the world is cataract.

Keywords: Diabetic retinopathy, Management and Treatment

INTRODUCTION

Diabetic patients have group of eye problems. These conditions include diabetic retinopathy, macular edema (which usually develops along with diabetic retinopathy), cataracts, and glaucoma.[37,38] With time diabetic can damage eyes which can lead to blindness. Diabetic can affect your eyes when there is constant high blood sugar level, which can damage tiny blood vessels behind your eyes. Some of the related problems are mentioned below.[1]

Diabetic retinopathy

Damaged blood vessels can lead to retina damage which cause diabetic retinopathy Blood vessels may deteriorate, enlarge, or leak into the retina in early diabetic retinopathy.[15] Non proliferative diabetic retinopathy is the name of this stage [2,33]. As the condition worsens, certain blood vessels on the retina's surface block off, which stimulates the growth or proliferation of new blood vessels. Proliferative diabetic retinopathy is the term given to this stage.[13,36]

Diabetic eye edema

The macula is a region of the retina necessary for activities like reading, driving, and face recognition Diabetes can result in diabetic macular edema, a macula swelling. This condition may cause partial vision loss or blindness by destroying the keen eyesight in this area of the eye.[4]

Glaucoma

The optic nerve, the bundle of nerves that connects the eye to the brain, can be harmed by the group of eye illnesses known as glaucoma. Diabetes doubles the risk of developing glaucoma, which if unchecked can lead to blindness and vision loss.[21]

Cataracts

Our eyes lenses are transparent structures that contribute to clear vision, but as we get older, they often grow clouded. Cataracts, or hazy lenses, are more prone to form in people with diabetes. People with diabetes are more likely than people without diabetes to develop cataracts early in life.[40]

Diabetic Retinopathy

A microvascular consequence of diabetes called diabetic retinopathy (DR) can develop without any symptoms and endanger vision.[5,36] VTDR can cause irreparable visual loss if untreated. Therefore, to enable quick identification and treatment of VTDR, periodic retinal screening is advised for everyone with diabetes[11]. The diabetes capital of the world is expected to be established in India.[33,34] In India, 31.7 million persons had diabetes mellitus (DM) in 2000, according to the WHO. By 2030, this number is anticipated to increase to 79.4 million, making it the highest in any country in the world.[17,31,35] Over time, diabetic retinopathy (DR) is anticipated to develop in about two-thirds of Type 2 and nearly all Type 1 diabetics. In 2020, there were 103 million cases of DR worldwide. By 2045, that number is predicted to rise to 161 million.[3] Because the DR risk screening method in place is currently insufficiently effective, the disease frequently goes undiscovered until irreparable harm has been done. Diabetes-related diabetic retinopathy (DR) is transformed into proliferative diabetic retinopathy (PDR) with typical ocular characteristics such as excessive mitochondrial and retinal cell damage, chronic inflammation, neovascularization, and restricted vision field. PDR is regarded as a reliable indicator of ischemic stroke and other severe diabetic consequences. [32,36]

COMPLICATIONS IN DIABETIC RETINOPATHY

DR with other diabetes related complications

➤ DR with cardiovascular disease

DR was found to be comparable to known risk factors like smoking, hypertension, and dyslipidemia. It is thought to be a contributing factor to cardiovascular events and all-cause mortality. Vascular abnormalities in the eyes associated with DR may be indicative of comparable degenerative disease mechanisms affecting the brain microcirculation.[6,36] Since the myocardial and the brain are affected by more widespread microangiopathic processes, having microvascular illness in the eyes is concerning. Heart failure (HF) and DR are related. How DR might influence the pathophysiology of HF in DM is still a mystery. Lack of compensatory angiogenesis in response to myocardial remodelling results in diminished coronary microcirculation, which in turn causes chronic myocardial ischemia. Furthermore, people with DR are more prone to suffer HF-related left ventricular concentric remodelling. Many publications claim that DR is an indicator of HF and the main reason is diastolic cardiac dysfunction. Therefore, DR could be seen in the development of the many illness which eventually results in macrovascular damage and HF.[4,34]

➤ DR with stroke

A well-known risk factor for the macrovascular aftereffects of stroke is diabetes-related microvascular problems[10]. Furthermore, it should be highlighted that people with diabetes who have DR had an increased risk of stroke, according to a meta-analysis of 19 studies involving 45,495 patients[9]. This link was significant for patients with T2D but inconclusive for patients with T1D. Hu et al.'s analysis of the literature found that as DR stage and lesion severity rise, so does the risk of stroke.[5,8]

➤ DR and neuropathy

Diabetes and chronically elevated blood sugar both induce diabetic peripheral neuropathy, or DPN. It has also been demonstrated that nearly all PDR patients have DPN, making individuals with DPN 4.88 times more likely to have DR than those without. In the study, Abougambou found that DR is one of the major risk factors for DPN, with DR being 2.85 times more prevalent in DPN patients. Similar to this, a study of the Korean population discovered that DPN had DR 1.78 times more frequently than people without DPN.[42]

➤ DR with nephropathy

Chronic proteinuria, hypertension, and a reduced glomerular filtration rate are the hallmarks of diabetic nephropathy (DN). Microvascular illnesses like DR and DN are caused by chronic hyperglycemia through nearly comparable pathways, making their onset and progression closely related. In conclusion, using the severity of the DR, we may predict the presence/absence and severity of DN in diabetics[7].

➤ DR with diabetic foot syndrome

90% of DP with DFU had DR, and more than half of them had PDR. In the later stages of diabetes, they proposed that it might be caused by an increase in oxidative stress and endothelial damage that occurs in vascular disease.[41]

CURRENT TRENDS IN DIABETORETINOPHTHY MANAGEMENT

Treatment entirely relies on the type of diabetic retinopathy present. If detected early, blood glucose control can halt the progression of the disease[11,29,32]. When the condition is advanced, adequate care is needed, which involves administering ocular injections with drugs.[14] The eye's vitreous receives an injection of these drugs, which are also known as vascular endothelial growth factor inhibitors[12]. The USFDA has authorized these medications. DR and macular edema can be treated with ranibizumab (Lucentis), aflibercept (Eylea), and bevacizumab (Avastin). These injections are frequently administered, and occasionally photocoagulation is used.[13]

Photocoagulation: The leakage of blood and fluid into the eye can be stopped or reduced by this laser procedure, sometimes referred to as a focused laser treatment. coagulation of the entire retina. The aberrant blood arteries may contract after receiving this laser therapy, also referred to as scatter laser therapy.[16]

New medications for DR

i. Nogo-A Human monoclonal antibody

A new paradigm in central nervous system research has emerged as a result of stopping the action of Nogo -A, a potent inhibitor of blood vessel and neuron growth. The retinal vasculature of animals with retinopathy has a configuration that is strikingly comparable to that of healthy animals after treatment with NG004, according to pre-clinical investigations. Recent findings further demonstrate that Nogo-A is up-regulated in diabetes patients' retinas when compared to controls, further supporting Nogo-A's role in the pathophysiology of DR and the case for Nogo-A targeting. Novago Therapeutics conducted this study.[43]

ii. SYL136001v10

By using ocular drops, a novel substance created by the biotechnology company Sylentis can penetrate the retina and treat age-related macular degeneration and diabetic retinopathy.[18] Medications SYL136001v10 Trials on humans will start at the end of 2018 after its efficacy was demonstrated in animal models, according to a report published in Spanish foundation for science and technology.[64][19]

Glaucoma

A group of irreversible, progressive optic neuropathies known as glaucoma can cause blindness and significant vision field loss.[38] Primary open-angle glaucoma and primary angle-closure glaucoma are the two types of glaucoma that are most prevalent[20,21]. The most prevalent form of glaucoma among diabetics is primary open angle glaucoma (POAG), which affects over 70 million people worldwide.[23,30] So that strategies to lower its prevalence may be devised, potential risk factors for POAG must be identified. Fasting glucose levels and diabetes were linked to a slightly higher IOP, while diabetes and fasting glucose levels were linked to a considerably precarious risk of glaucoma. Women who have type 2 diabetes mellitus have a higher risk of POAG[24]. In the aging population, glaucoma and diabetes both pose serious public health concerns[39]. Numerous epidemiological studies indicate that people with diabetes are more likely to develop glaucoma, and there may be some pathophysiologic connections to support this association. As we continue to learn more about the relationship between these two blinding conditions, the potential role of routine glaucoma evaluation in diabetic persons warrants further consideration[27,28]. This is because early detection and treatment efforts have the potential to significantly decreased vision loss from both glaucoma and diabetic retinopathy in at-risk individuals. The initial line of treatment for POAG is typically topical medicine. A variety of drops, which may be categorized into five main groups: prostaglandin analogues, beta-blockers, diuretics, cholinergic agonists, and alpha agonists, can be used to decrease IOP[25]. The first line of treatment is frequently either beta-blockers or prostaglandin analogue monotherapy. By lowering outflow resistance and enhancing aqueous humour flow via the uveoscleral, prostaglandin analogues lower IOP. Trabeculectomy and laser therapy are further options.[26]

Cataract

The risk of developing cataracts in people with diabetes may be double that of people without the disease[22]. Vision is distorted by cataracts, which are foggy regions in the cornea's lens[52]. Age, the length of diabetes, and impaired metabolic control are the key Trusted Source risk factors for diabetics having cataracts. 32% of persons aged 45 and older with diabetes also have cataracts, according to the centre for Disease control and prevention (CDC)Trusted Source. All ocular tissues may be impacted by DM, with cataract being the most prevalent ocular consequence. The most common reason for blindness in the world is cataract. The incidence of cataract formation is higher in the diabetic population due to a number of causes. Now that technology has advanced, cataract surgery is a routine and safe treatment. However, diabetics are still at risk for problems that might impair vision, including posterior capsular opacification, diabetic retinopathy development, diabetic macular edema (ME), postoperative ME, and diabetic retinopathy.

CONCLUSION

This study reviewed the ophthalmological problems of diabetic patient, management of diabetic eye disease, current treatments of diabetic eye disease, epidemiological studies. As for search strategy, this paper use keywords such as, VTRD, DR, DPN, DN.

Diabetic Retinopathy cases are increasing with increasing cases of uncontrolled diabetic patients, but very limited drugs are available for management while negligible drugs are available for totally eradication of the disease. Many clinical trials are undergoing for diabetic retinopathy medication among them one is being carried out by Sylentis. Similarly, glaucoma, cataracts, macular edema is also at increasing rate with diabetic patients. Controlling a diabetic patient's rising blood sugar level is currently the recommended management.

In conclusion, diabetic patients are susceptible to various ophthalmological problems that can significantly impact their vision and overall quality of life. Diabetic retinopathy, macular edema, glaucoma, and cataracts are common conditions associated with diabetes. Early detection and proper management of these eye diseases are crucial to prevent irreversible vision loss.

Regular retinal screening is essential for all individuals with diabetes to detect and treat diabetic retinopathy promptly. New medications and treatment approaches, such as Nogo-A Human monoclonal antibody and SYL136001v10, show promise in effectively managing diabetic retinopathy.

Glaucoma, especially primary open-angle glaucoma, poses a significant risk for individuals with diabetes. Routine glaucoma evaluations should be considered for diabetic patients to detect and treat the condition early, as appropriate treatment can help prevent further vision loss.

Cataracts are more prevalent in people with diabetes, and cataract surgery is a common procedure to restore vision. However, individuals with diabetes should be aware of potential complications and follow-up care to ensure optimal outcomes.

Overall, managing ophthalmological problems in diabetes requires a multidisciplinary approach involving regular eye examinations, blood glucose control, and appropriate treatment interventions. By prioritizing eye health and working closely with healthcare professionals, individuals with diabetes can minimize the impact of these eye conditions and preserve their vision for a better quality of life.

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