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CLASSIFICATIONS, PREVALENCE AND MAJOR RISK FACTORS FOR DIABETIC RETINOPATHY (DR)

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ABSTRACT

Worldwide, Diabetic Retinopathy (DR) is the leading cause of blindness among working age adult's. It is a microvascular disorder occuring due to long term effects of diabetes, leading to vision-threatening damage to the retina, eventually leading to blindness. The DR falls into two broad categories: the earlier stage of non-proliferative diabetic retinopathy (NPDR) and the advanced stage of proliferative diabetic retinopathy (PDR) and other have diabetic molecular edema (DME) into focal and diffuse subtypes. The risk factors are mainly related to age, the duration of diabetes, blood suger level, high blood pressure, Gestational diabetes and other factors such as obesity, dyslipidemia and nephropathy were variable associated with DR. Whereas smoking, hyperlipidemia and obesity were associated with significant reduction in the risk for DR among type 2 diabetes. One of the major risk factor for diabetic retinopathy is a long duration of diabetes, the condition is caused by persistently high blood suger levels damaging the small thread-like blood vessels that supply the retina, the evidence from clinical trials has demonstrated beneficial effect of tight BP control an risk of DR patients with diabetes and hypertension. The pregnant women with gestational diabetes are at a greater risk of developing diabetic retinopathy, and the other risk factors such as body mass index (BMI), Obesity, Poor glycemic control and Nephropathy shows controversies in relation to its association with this disease.

KEYWORDS: Classifications of DR, Risk factors: Diabetes mellitus, Blood Suger level, Blood pressure, Gestational diabetes, Smoking, Dyslipidemia, Nephropathy.

INTRODUCTION

Diabetic Retinopathy (DR) is a microvascular disorder occuring due to long term effects of diabetes, leading to vision-threatening damage to the retina, eventually leading to blindness. DR is a most common couse of severe vision loss in adults of working age groups in the western world.[1] The diagnosis of DR is made by clinical manifestations of vascular abnormalities in the retina.[2] Clinically, DR is decided into two stages: non - proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR)[3], early detection and timely intervention is the key to avoid blindness due to diabetes retinopathy. The number of patients with diabetic retinopathy in America is estimated to reach 16.0 millions by 2050, with vision-threatening complications affecting around 3.4 millions of them.[4] The usefulness of strict glycemic control was clearly seen in clinical trials like the UK Prospective Diabetes study (UKPDS) and diabetes control and complication trial (DCCT).[5,6] Uncontrolled diabetes can lead to many occular dissorders like cataract, glaucoma, ocular surface dissorders, recurrent stye, non - arteritic anterior ischemic optic neuropathy, diabetic papillopathy and diabetic retinopathy, out of which diabetic retinopathy is the most common and severe occular complication.[7,8,9] Poor glycemic control, uncontrolled hypertension, dyslipidemia, nephropathy, male sex, and obesity are associated with worsening of diabetic retinopathy.[10,11]

Classification of Diabetic Retinopathy

Diabetic Retinopathy (DR) often has no early warning signs, even macular edema, which may couse vision loss mare rapidly, may not have any warning signs for some time. The diabetic retinopathy falls into two broad categories: The earlier stage of non-proliferative diabetic retinopathy (NPDR) and the advanced stage of proliferative diabetic retinopathy (PDR) and other have diabetic molecular edema (DME) into focal and diffuse subtypes.[12] Classifications of NPDR is based on clinical findings manifested by visible features, including microaneurysms, retinal hemorrhages, intraretinal microvascular abnormalities (IRMA), and venous caliber changes, while PDR is characterized by the hallmark feature of pathological preretinal neovascularization.[13,14] While these visible features of DR provide useful measures for detection and diagnosis, improving technologies has anabled the detection of more subtle pathologies such as retinal function deficits and neural layer abnormalities in patients.[15,16] An important additional categorisation in DR is diabetic molecular edema (DME). Which is an important manifestation of DR that occurs all DR severity levels of both NPDR and PDR and represents the most common couse of vision loss

in patients with diabetic retinopathy. DME arises from diabetes - induced breakdown of the blood - retinal barrier (BRB), with consequent vascular leakage of fluid and circulating proteins into the neural retina.[14,17,18]

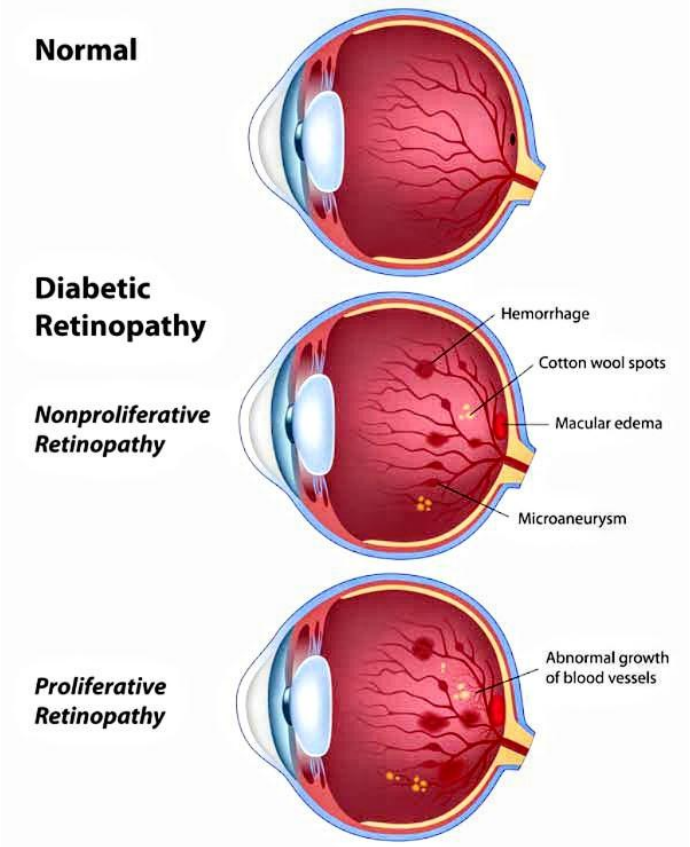

Fig 1: Hemorrhages in non-proliferative diabetic retinopathy and proliferative diabetic retinopathy.[34]

Risk Factors

Diabetic Duration

Diabetic retinopathy is a complication that is seen in diabetic patients who have suffered from the disease for a long time. One of the major risk factors for DR is a long duration of Diabetes mellitus (DM). It is one of the most prevalence diseases worldwide.[19] The kingdom of Saudi Arabia has a high prevalence of DM at 23.7%.[20], and this rate is expected to increase to 44.1% in 2022.[21] DM is a well-known cause of microvascular and macrovascular complications. Patients with diabetes often develop eye diseases as a complication. However, the most common and number one risk factor among these complications is diabetic retinopathy.[22]

Blood Suger Level

The higher a persons blood suger level is, the greater the risk of developing diabetic retinopathy. People with a persistently raised glycated hemoglobin level (which indicates blood glucose level) are at greater risk of developing diabetic retinopathy.[23]

Blood pressure

Blood pressure (BP) has been shown to be an important risk factor for DR. Evidence from clinical trials has demonstrated beneficial effect of BP control on risk of DR patients with diabetes and hypertension.[24] The 2017 Guideline for the prevention, detection, evaluation and management of high blood pressure in adults, recommend a BP goal of <130/80 mm Hg in adults with diabetes for prevention of further complication.[25]

Gestational Diabetes

Pregnancy is associated with increased risk of development and progression of DR. Several studies have shown that younger the age of onset and longer the duration of the diabetes higher the risk of progression of the disease. Progression of DR was significant in those women with an early onset disease (14±8 years) than in women with a late onset disease (19±8 years).[26] The risk of progression is again high if the duration of the diabetes is more than 15 years.[27] Longer the duration of the diabetes, higher is the chance for the development of microvascular complications, so these patients are likely to have a severe form of baseline retinopathy changes before pregnancy. Hence women with type 1 diabetes are encouraged to plan pregnancies early in life if possible. Another important risk factor for the degree of retinopathy prior to conception. Progression was more significant in women with moderate and severe forms of retinopathy at compared to women with mild or no retinopathy at conception.[27] In the diabetes in early pregnancy study (DIEP) 54.8% of women with moderate-to-severe non-proliferative retinopathy demonstrated disease progression whereas in women with mild retinopathy only 21.1% showed progression.[28] Severe form of retinopathy changes is associated with poor perinatal outcome and in women with severe proliferative changes before conception. Pregnancy has to be deferred till the disease is treated or stabilized.[29]

Smoking

Smokers are at a greater risk of blood vessel disorders, including retinopathy.[30]

Dyslipidemia

Dyslipidemia, a major systemic disorder, is one of the most important risk factor for cardiovascular diseases. Although landmark studies have shown that intensive glycemic and blood pressure control can substantially reduce the onset and progression of DR. The contribution of lipid to the pathogenesis of DR and DME is not clear.[30] Other risk factors such as Body mass index (BMI), Obesity, Poor glycemic control and Nephropathy show controversies in relation to its association with this disease.[32,33] The Aim of this review was to investigate risk factors for diabetic retinopathy.

CONCLUSION

Earlier diagnosis of diabetes and DR can help to control some of these factors and prevent further complications and vision loss. The longer duration of diabetes, blood sugar levels, Blood pressure, Gestational diabetes, Dyslipidemia and control smoking and mode of treatment were most significant independent risk factors of diabetic retinopathy. However, a population-based study is warranted to identify the risk factors, as well as the prevalence of Diabetec retinopathy.

Abbreviations

BMI - Body Mass Index
BP - Blood Pressure
BRB - Blood Retinal Barrier
DCCT - Diabetes Control and complication Trial
DIEP - Diabetes In Early Pregnancy
DME - Diabetic Molecular Edema
DR - Diabetic Retinopathy
IRMA - Intra-Retinal Microvascular Abnormalities
NPDR - Non-proliferative Diabetic Retinopathy
PDR - Proliferative Diabetic Retinopathy
UKPDS - United Kingdom Prospective Diabetes Study

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