بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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Optical Coherence Tomography Angiography Features in Diabetic Patients with Unexplained Visual Loss

Thesis

Submitted for Partial Fulfillment
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List of Abbreviations

Abb.	Full term
AMN	*Acute macular neuroretinopathy*
DCP	*Deep capillary plexus*
DM	*Diabetes mellitus*
DME	*Diabetic macular edema*
DMI	*Diabetic macular ischemia*
DR	*Diabetic retinopathy*
ETDRS	*Early Treatment Diabetic Retinopathy Study*
FAZ	*Fovea avascular zone*
FFA	*Fundus fluorescein angiography*
GCL	*Ganglion cell layer*
ICP	*Intermediate capillary plexus*
ILM	*Internal limiting membrane*
INL	*Inner nuclear layer*
IR	*Infrared*
MacTel	*Macular telangiectasia*
NFL	*Nerve fiber layer*
NPDR	*Non-proliferative diabetic retinopathy*
OCT	*Optical coherence tomography*
OCTA	*Optical coherence tomography angiography*
PDR	*Proliferative diabetic retinopathy*
RPCP	*Radial peripapillary capillary plexus*
RPE	*Retinal pigment epithelium*
SPSS	*Statistical Package of Social Science*
SSADA	*Split-spectrum amplitude decorrelation angiography*
SVP	*Superficial vascular plexus*

INTRODUCTION

Diabetes mellitus (DM) is a chronic disorder characterized by impaired metabolism of glucose due to insulin deficiency or its resistance, leading to hyperglycemia and late development of vascular and neuropathic complications. which causes multi-organ ischemic effects including diabetic retinopathy. Approximately one-third of diabetics suffer from diabetic retinopathy (DR), and one-third of DR patients have vision-threatening disease ***(Lee et al., 2015).***

As a result, Diabetic retinopathy (DR) is the one of the leading causes of blindness in the working-age population in developed countries ***(Cheung, 2010)***. By 2035, estimates are that 592 million people will be affected by diabetes mellitus ***(IDF Diabetes Atlas, 2013).*** Early detection of its first signs plays a pivotal role in the management of DR, playing an important role in this significant public health issue ***(Geiss et al., 2014).***

Patients with type 1 diabetes may show evidence of retinopathy as early as 5 years after the onset of diabetes and almost all patients will show varying degrees of retinopathy 20 years after the onset of diabetes. Background retinopathy may even be present at the time of diagnosis of type 2 diabetic patients, consistent with the usually long duration of subclinical hyperglycemia in such patients and more than 60% of type 2

diabetic patients will have some degree of retinopathy after 20 years of onset of diabetes.

The Early Treatment Diabetic Retinopathy Study (ETDRS) group was used to assess the severity of diabetic retinopathy. Diagnosis of DR is based on clinical findings and can be classified into early non-proliferative diabetic retinopathy (NPDR) and more advanced proliferative diabetic retinopathy (PDR) associated with retinal ischemia and development of neovascularization ***(Kumar et al., 2007).***

The main sight-threatening complications of DR are diabetic maculopathy, which include diabetic macular edema (DME) and diabetic macular ischemia (DMI) ***(Mohamed et al., 2007),*** and complications from PDR - vitreous hemorrhage and retinal detachment ***(Nentwich et al., 2015)*** Digital retinal fundus image analysis has been shown to be able to detect early DR and DME in routine DR screening ***(Saari et al., 2004)*** while it has high sensitivity and specificity, it has been shown to have a low negative predictive value ***(D'Aloisio et al., 2019).***

Diabetic macular ischemia (DMI) may occur exclusively or in association with DME. leading to visual acuity loss in diabetic patients. One study demonstrated that about 41% of DR patients had some degree of DMI **(*Sim et al., 2013a)*.**

A lot of studies have discussed the impact the of DMI on the visual acuity function ***(Tyrberg, 2008).*** Furthermore, other

studies suggest that in patients receiving treatment for diabetic macular edema (DME) the coexistence of DMI may have an adverse effect on outcomes, or limits the benefits of treatments, regardless of whether the treatment consists of laser photocoagulation or intravitreal pharmacotherapies as bevacizumab ***(Chung et al., 2008)*** and triamcinolone **(*Jonas et al., 2005).*** so, patients with DMI under treatment were reported to develop neovascularization earlier than patients without DMI ***(Ip et al., 2015).***

Larger prospective studies, such as ETDRS and the RESTORE study, have not demonstrated clear associations between decreased treatment benefit and increased macular ischemia ***(Babiuch et al., 2019; Mitchell et al., 2011).***

These contrasting results may be related, in part, to the adoption in many studies of simplified DMI grading schemes, commonly eschewing detailed quantitative analyses of capillary loss for qualitative analysis of the FAZ ***(Chung et al., 2008; Conrath et al., 2005).***

The requirement for angiography for DMI evaluation is because it has not been studied in the pivotal epidemiological studies of diabetic retinopathy ***(Varma et al., 2004; Klein et al., 1992)*** and, the prevalence and natural history of this condition remains unknown.