# Role of intravitreal triamcinolone acetonide on macula in diabetic patients without maculopathy undergoing cataract surgery

**Thesis**
Submitted for partial fulfillment of
Master Degree in **Ophthalmology**

By
**Sara Samy Mohamed**
MB. Bch.
Faculty of Medicine, Ain Shams University

**Supervised by**

# Dr. Ossama Abd El Monim Raslan

Professor of Ophthalmology
Faculty of medicine, Ain-Shams University

# Dr. Mohamed Abd El Hakim Zaki

Assistant Professor of Ophthalmology
Faculty of medicine, Ain-Shams University

# Dr. Tamer Fahmy Eliwa

Lecturer of Ophthalmology
Faculty of medicine, Ain-Shams University

**Ophthalmology department**
**Faculty of Medicine**
**Ain Shams University**
**Cairo, Egypt,**
**2016**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ

صَدَقَ اللَّهُ الْعَظِيمُ

سورة التوبة آية (١٠٥)

## Acknowledgement

*First, thanks are all due to Allah for Blessing this work until it has reached its end, as a part of his generous help throughout our life.*

*My profound thanks and deep appreciation to Dr. Ossama Abd El Monim Raslan, Professor of Ophthalmology, Faculty of medicine, Ain-Shams University for his great support and advice, his valuable remarks that gave me the confidence and encouragement to fulfill this work.*

*I am deeply grateful to Dr. Mohamed Abd El Hakim Zaki, Assistant Professor of Ophthalmology, Faculty of medicine, Ain-Shams University for adding a lot to this work by his experience and for his keen supervision.*

*I am also thankful to Dr. Tamer Fahmy Eliwa, Lecturer of Ophthalmology, Faculty of medicine, Ain-Shams University for his valuable supervision, co-operation and direction that extended throughout this work.*

*I am extremely sincere to my family who stood beside me throughout this work giving me their support.*

*Sara Samy Mohamed*

# List of Contents

# List of Abbreviations

Ang-2          :  Angiotensin 2

Anti VEGF : Anti vascular endothelial growth factor.

BCVA          : Best corrected visual acuity.

CMT          : Central macular thickness.

COX-2          : Cyclooxygenase 2

CSME          : Clinically significant macular edema.

DME          : Diabetic macular edema.

DR          : Diabetic retinopathy.

DRCR          : Diabetic Retinopathy Clinical Research.

ERM          : Epi-retinal membrane.

ETDRS          : Early treatment of diabetic retinopathy study.

FA          : Fluorescein angiography.

FDA          : Food and drug administration.

GAT          : Goldmann applanation tonometer.

HbA1C          : Hemoglobin A1c.

ICAM-1          : Intercellular Adhesion Molecule 1.

IL 1$\beta$          : Interleukin –one beta.

iNOS          : Inducible nitric oxide synthase

IOP          : Intraocular pressure (tension).

IVTA          : Intravitreal triamcinolone acetenoide.

MICS          : Micro incisional cataract surgery.

OCT          : Optical coherence tomography.

PC IOL          : Posterior chamber intra ocular lens.

PGF1          : Platelet growth factor one

PVD          : Posterior vitreous detachment.

RMG        : Retinal microglial cells.

RPE         : Retinal pigment epithelium.

TNF-α      : Tumor necrosis factor-alpha.

VCAM-1     : Vascular cell adhesion molecule 1

# List of Figures

# List of Tables

# List of Graphs

# Introduction

There has been a significant increase in the number of people with diabetes all over the world, and about 360 million people are estimated to be diabetic. By 2030, that number is expected to double, and this global increase will have a dramatic impact on the prevalence of diabetic complications.[1]

Diabetic eye disease is becoming an increasing problem due to longer life expectancy and a higher incidence of diabetes. Previous studies have mostly concentrated on diabetic retinopathy (DR), but diabetes can affect virtually every part of the eye from the orbit, and lids, to the anterior and posterior segments, and occasionally it can significantly affect vision. Diabetes also influences lens transparency and pharmacological pupil dilatation.[2][3]

Cataract in diabetic patients can be due to the diabetes itself or due to an accelerated senile cataract, in which the cataract occurs earlier than normal. As with retinopathy, the duration and control of the diabetes are important factors in cataract development and management.[4][5]

phacoemulsification (phaco) is one of the most widely used cataract surgrical techniques nowadays. The issue of whether phacoemulsification surgery causes progression of diabetic retinopathy or maculopathy has been controversial.

**Squirrell and his associates in 2002** showed that uncomplicated phacoemulsification did not cause progression of diabetic retinopathy postoperatively and that any progression observed probably represents the natural history of the disease.[6]

Also, **Shah and Chen in 2010** suggested that there is no clear evidence that phacoemulsification surgery causes progression of diabetic macular edema(DME), particularly in patients with low-risk or absent diabetic retinopathy or in those with controlled retinal disease.[7]

However, it has been documented that the degree of diabetic macular edema increases up to 3 months after cataract surgery, but thereafter decreases gradually and resolves spontaneously. These changes are more prominent in eyes with DR than in eyes with no DR.[8]

Also, **Kim and his colleagues in 2007** suggested that 22% of diabetic patients developed increase >30% in central retinal thickness measured by optical coherence

tomography (OCT) after uncomplicated phacoemulsification.[9]

So, if clinically significant macular edema (CSME) is identified before surgery, the Royal College of Ophthalmologists' guidelines for cataract surgery in diabetics state that it should be treated at least 12 weeks prior to surgery.[10]

But, it had been settled that combined phaco-emulsification with intravitral bevacizumab or triamcinolone acetonide safely reduces macular edema and improves visual acuity for cataract and CSME in diabetics.[11]

# Aim of The Work

The aim of the study was to compare central macular thickness between diabetic patients undergoing phaco surgery and diabetic patients undergoing phaco surgery with intravitreal triamcinolone acetonide injection and assess efficacy of triamcinolone acetonide in protection against postphaco macular edema in diabetic patients.

# Diabetic Maculopathy

The term diabetes mellitus describes a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, action, or both (figure 1). The effects of diabetes mellitus include long-term dysfunction and failure of various organs. [12]
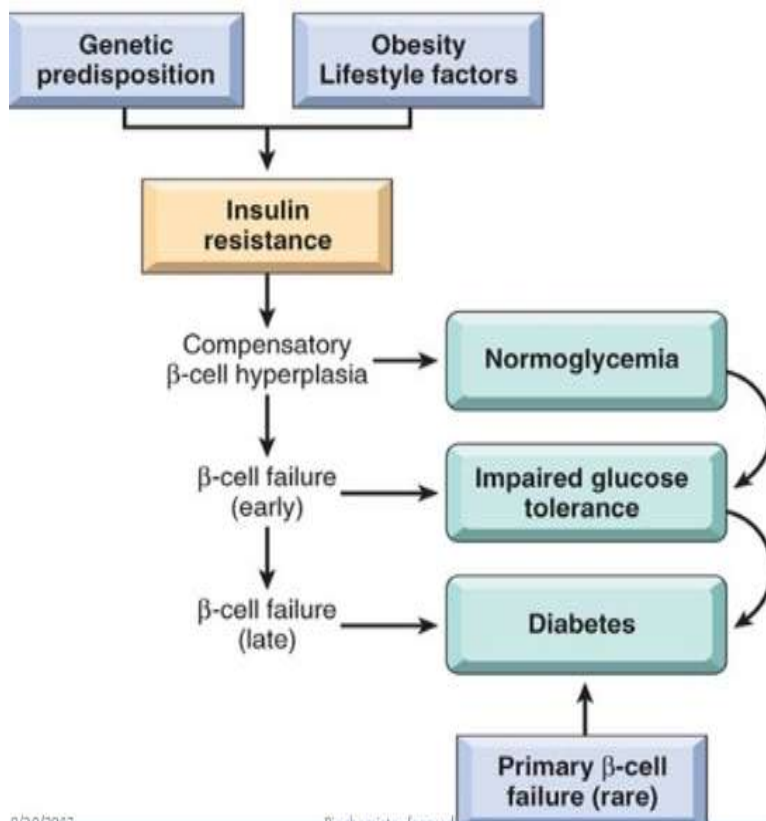
**Figure (1):** Pathogenesis of Diabetes Mellitus.[13]

All patients with diabetes are at risk of developing DME.The onset is usually slow and painless, and manifests with blurred central vision. The severity may range from mild and asymptomatic to profound loss of vision.[14]

DME is a general term defined as increased retinal thickness within two disc diameters of the foveal center; it can be either focal or diffuse in distribution. Focal edema (figure 2) is often associated with circinate rings of hard exudates (lipoprotein deposits) resulting from leakage from microaneurysms.[14]

Diffuse edema (figure 3) represents more extensive breakdown of the blood-retinal barrier, with leakage from both microaneurysms and retinal capillaries. Cystic changes may appear within the macula, representing focal coalescence of exudative fluid.[14]