



**SUST**

**Collage of graduate studies**

**Evaluation of Retino-vetrous pathology in diabetic  
and hypertensive patients using ultrasound**

**تقييم مشاكل الشبكية لدى مرضى الضغط والسكري بواسطة الموجات  
فوق الصوتية**

A thesis submitted for partial fulfillment of the requirement of MSc  
degree in medical diagnostic ultrasound

by:

Shaza Gareeb Allah Omer Mohammad

Supervisor :

Dr\ Mona Ahmed Mohammad

**Associate Professor**

2019

# الآية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى {وَلَا تَقْفُ مَا لَيْسَ لَكَ بِهِ عِلْمٌ إِنَّ السَّمْعَ وَالْبَصَرَ  
وَالْفُؤَادَ كُلُّ أُولَئِكَ كَانَ عَنْهُ مَسْئُولًا }

صدق الله العظيم

[الإسراء: 36]

## **Dedication**

**I dedicate this work to my father, to my father who encourages  
me to joint MSc of ultrasound.**

**for his patience, encouragement  
and continues support**

**To my lovely mother**

**To my sisters**

**who helped me a lot**

**To my beloved husband who always support and helped me all  
the time**

**To my lovely daughter .**

## **Acknowledgements**

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Special thanks to **A.Prof. Dr.Asma Ibrhim Ahmed and A.Prof. Dr.Awadia Greeb Allah** for their co-operation.

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At last I thank all the people who helped me to complete my research.

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## List of Abbreviations

U/S	Ultrasound
DM	Diabetes Mellitus
HTN	Hyper Tension
VH	Vitreous Hemorrhage
RD	Retinal Detachment
IOP	Intra Orbital Pressure
A mode	Amplitude mode
B mode	Brightness mode
DR	Diabetic retinopathy
VA	Visual acuity
EP	Emergency practitioner
ONSD	Optic Nerve Sheet diameter



## Abstract

This prospective cross sectional study was conducted between July to December 2018 on 50 of diabetic and hypertensive patients (28 Female and 22 Male) their age range between (20-77) years old presented to Makah Ophthalmology Hospital in Khartoum.

The aim of the present study is to evaluate the role of B-scan Ultrasound in diagnosing retino-vitreous pathology for diabetic and hypertensive patients .

The study found that the females were most affected by retinopathy (56%) than males (44.%).

The study found that The most affected age group were (60- 69) years ( 30 %) then (50 -59) years (26%) and last affected group was (20-29) (8%).

Regarding the patients' medical history the study illustrated that the most affected patients were diabetic (64%) ,than hypertensive (26%).

The study found a highly incidence of eye problems in ultrasound was vitreous hemorrhage (46%) then retinal detachment (34%)

It concluded that B- scan ultrasonography was the initial imaging modality opted in most of the cases as it was readily available, simple, cost effective, non ionizing, non invasive and reliable modality for the diagnosis of eye for diabetic and hypertensive patients pathologies, ultrasound must be uses routinely in the evaluation of the eyes of diabetics and hypertensive patients also this research could form a database for further research in this area in the future.

## ملخص الدراسة

أجريت هذه الدراسة المقطعية في مستشفى مكة التخصصي للعيون في الفترة ما بين يوليو 2018م إلى ديسمبر 2018م على 50 حالة من مرضى الضغط والسكري مكونة من ( 28 ) من الإناث و (22) من الذكور تتراوح أعمارهم بين (20-77) عاما.

الهدف من هذه الدراسة هو تقييم دور الموجات فوق الصوتية B-scan في تشخيص مشاكل العين لمرضى الضغط و السكري.

وجدت الدراسة أن النساء هن الأكثر عرضة لمشاكل الشبكية بنسبة ( 56 % ) من الرجال بنسبة ( 44% ). وان الفئات العمرية ما بين ( 60-69 ) عاما هي الأكثر بنسبة ( 30 % ) تليها فئة ( 50 - 59 ) بنسبة ( 26 % ) و اقلها عرضة هي ( 20 -29 ) عاما بنسبة ( 8 % ).

من حيث التاريخ المرضي فقد وجدت الدراسة أن مرضى السكري هم الأكثر تعرضا بنسبة ( 64 % ) من مرضى الضغط بنسبة ( 26% ).

وجدت الدراسة أن النزيف أكثر حدوثا بنسبة ( 46 % ) من انفصال الشبكية بنسبة (34%)

وخلصت إلى أن التصوير بالموجات فوق الصوتية B- هو طريقة التصوير الأولية التي تم اختيارها في معظم الحالات لأنها كانت متوفرة وبسيطة من حيث التكلفة و آمنة و ذات دقة مكانية وزمنية أعلى لتشخيص العين لمرضى الضغط و السكري ، ويجب استخدام الموجات فوق الصوتية بشكل روتيني في تقييم عيون مرضى الضغط و السكري ويمكن أن يشكل هذا البحث قاعدة بيانات لمزيد من البحث في هذا المجال في المستقبل.

# **Chapter one**

## **Introduction**

# Chapter one

## 1.1 Introduction

Eye is fluid filled structure. It is situated in the anterior part of the orbit and embedded in the fat. The Tenon's capsule separates it from the orbital wall. The anterior segment forms 1/6th of eyeball and posterior segment forms 5/6th of eyeball. Normal axial length of eye is 22 mm.( Srivastava PK 2007 ).

Each eye has a layer of receptors, lens system for focusing light on these receptors and system of nervous for conducting impulses from the receptors of the brain these eyes convert energy in the visible spectrum to action potential the images of objects in the environment are focused on the retina. The light rays striking the retina generate potentials in the rods and cones .impulses initiated in the retina are conducted to the cerebral cortex where they produce the sensation of vision.(.queensu. /2016.)

Retinal detachment (RD) is separation of the neurosensory retina from the underlying retinal pigment epithelium with accumulation of fluid in the potential space between the two layers . The types of retinal detachment include rhegmatogenous ,tractinal , and exudative. ( Janice 2012.)

B-scan echography produced two-dimensional acoustic section operates by using both the vertical and the horizontal dimensions of the screen to indicate configuration and location. Its transducers operate at a frequency in the range of 10MHz. In the B-scan examination, the optic nerve is echographically used as an anatomic reference for the posterior fundus rather than the macula. (Britannica. 2016).

The prevalence of DR in Sudan was estimated to be around (17.2%) in 1991 .( sandra 2002)

Another study carried in out patient of 3 general hospitals in Khartoum, Sudan in 1995 for insulintreated diabetic patients revealed that the prevalence of DR was (43%), nephropathy was (22%) and neuropathy was (37%).(queensu 2016)

## **1.2 Problem of the study:**

Diabetes and hypertension are one of the common causes of retinopathy which can lead to glaucoma and later on may lead to blindness; these conditions need optimal care and management

## **1.3 Objectives**

### **1-3-1 General objectives:**

To study retina in hypertensive and diabetics patients using ultrasonography .

### **1-3-2 Specific objectives:**

To find out the relationship between retinal detachment and hypertension.

To find out the relationship between retinal detachment and diabetes mellitus.

To find out the relationship between retinal hemorrhage and hypertension.

To find out the relationship between retinal hemorrhage and diabetes mellitus.

## **Chapter two**

### **Literature Reviews and previews studies**

## Chapter two

### Literature review and Previous studies

#### 2.1 Literature review

##### 2.1.1 Ocular anatomy

The eye is a fluid-filled sphere enclosed by three layers of tissue. The outer layer is composed of the sclera and the cornea. The middle layer includes the iris, the ciliary body, and the choroid. The iris contains two sets of muscles controlling the size of the pupil. The ciliary body encircles the lens and contains a musculature that adjusts its refractive power. (queensu.2016.)

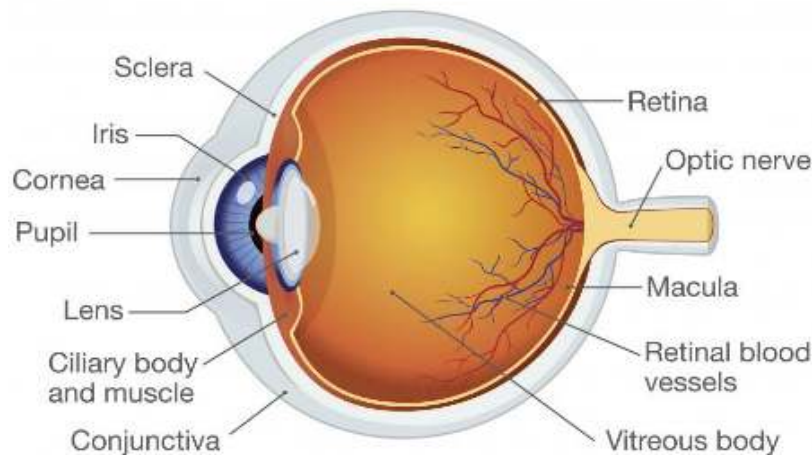


Figure (2.1) Orbital anatomy .( [www.medicinenet.com](http://www.medicinenet.com) 2019 )

##### 2.1.1.1 Landmarks

The sonographic landmarks of the eye are the lens, posterior wall of the globe, and the optic nerve. Other visible anatomy includes the orbital bone, the cornea, the iris, the pupil, the anterior chamber, and vitreous body. It is important to identify these structures at the beginning of the examination, especially in the setting of massive trauma, in which injuries such as lens



dislocation or globe rupture can distort the normal eye anatomy. (queensu.2016.)

#### **2.1.1.2 Anterior Chamber**

The anterior chamber is a fluid-filled structure bounded by the iris and cornea and appears black or anechoic on ultrasound because of its simple fluid contents.

The cornea is the first structure visualized on ultrasound because it sits most anteriorly and protects the iris, pupil, and anterior chamber. The cornea appears as a convex, thin, echogenic stripe overlying the anterior eye.

.(Slredultrasound 2016.)

#### **2.1.1.3 Posterior Chamber**

The posterior chamber is a small area that exists between the iris and the lens. It is also fluid filled, and so appears anechoic on ultrasound. The pupil appears as an oblong structure sitting in the center of the iris just anterior to the lens.(Slredultrasound 2016.)

#### **2.1.1.4 Lens**

The lens is a biconvex hyper echoic structure that sits behind the pupil and iris, attached peripherally by the ciliary body. It helps to refract light that focused onto the retina.

Normal lens creates reverberation artifact, seen as linear, repetitive, hyper echoic lines emanating from its posterior surface. .(Slredultrasound 2016.)

#### **2.1.1.5 Vitreous Body**

The vitreous body is located between the lens and the posterior wall of the eye filled with vitreous humor.

. It is normally anechoic, or black, on ultrasound .(Slredultrasound 2016.)

### 2.1.1.6 Retina

Retina comprises the posterior wall of the eye and is normally adhere to the sclera. It appears as a smooth line without disruption outlining the posterior wall of the globe. Retina is not clearly delineate from the other choroid layers on ultrasound unless it is disrupted.( Slredultrasound 2016.)

**2.1.1.7 Muscles of the Eyeball:** Extrinsic Muscles of the eye :There are six voluntary muscles that run from the posterior wall of the orbital cavity to the eyeball ,These are the superior rectus the inferior rectus,the medial rectus,the lateral rectus,and the superior and inferior oblique muscles .Intrinsic Muscles of Eyeball Smooth MuscleSphincter papillae of iris, Dilator papillae of iris and Ciliary muscle.(snell 2012)

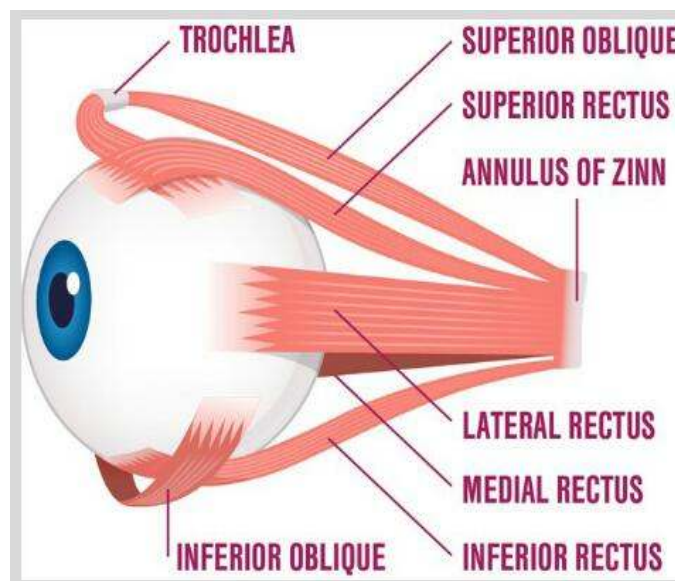


Figure ( 2.2 ) : muscles of the eye ( [www.myaware.com](http://www.myaware.com) )

### 2.1.1.8 Blood supply

The blood supply of the eye is primarily from the ophthalmic artery, which gives off its first branch, the central retinal artery.

The central retinal artery and vein are obtain within the optic nerve sheath using color Doppler.

The ONS measures 3 mm posterior from the retina and across its short axis to evaluate intracranial pressure. .(Slredultrasound 2016.)

**2.1.1.9 Nerve supply** The optic nerve enters the orbit from the middle cranial fossa by passing through the optic canal. It is accompanied by the ophthalmic artery, which lies on its lower lateral side. The nerve is surrounded by sheaths of pia mater, arachnoid mater and dura mater. It runs forward and laterally within the cone of the recti muscles and pierces the sclera at a point medial to the posterior pole of the eyeball. Here, the meninges fuse with the sclera so that the subarachnoid space with its contained cerebrospinal fluid extends forward from the middle cranial foramen around the optic nerve and through the optic canal as far as the eyeball. A rise in pressure of the cerebrospinal fluid fossa within the cranial cavity therefore is transmitted to the back of the eyeball. ( Snell 2012)

## **2.1. 2 Ocular physiology:**

The eye is a complex sense organ, evolved from primitive light sensitive spots on the surface of invertebrates within its protective casing.

each eye has a layer of receptors, lens system for focusing light on these receptors and system of nervous for conducting impulses from the receptors of the brain these eyes convert energy in the visible spectrum to action potential the images of objects in the environment are focused on the retina. The light rays striking the retina generate potentials in the rods and cones .impulses initiated in the retina are conducted to the cerebral cortex where they produce the sensation of vision. (queensu/2016.)

### **2.1.2.1 Retinal image formation**

The formation of focused images on the photoreceptors depends on the refraction of light by the cornea and the lens. The refractive power of the former is unvarying but that of the latter is adjustable. The dynamic changes

in the refractive power of the lens are referred to as accommodation. The ability to focus an image on the retina also depends on the shape of the eye globe. Adjustments in the size of the pupil also contribute to the retinal image formation. Narrowing the pupil reduces both spherical and chromatic aberrations. It also increases the depth of field, i.e. the distance within which objects are seen without blurring. (queensu/2016.)

## **2. 1.3 Ocular pathology**

### **2.1.3.1 Cataract:**

Degeneration of the biochemical composition of the aqueous fluid result in formation of abnormal (opaque) proteins in the damaged lens cells, thus opacities may occur after the trauma, in uveitis and in metabolic disease. (slredultrasound2016.)

### **2.1.3.2 Glaucoma:**

Glaucoma is generic name for group diseases in which the intraocular pressure increases causes blindness. The rise in pressure is due to obstruction so the outflow of aqueous, which occurs either as the result of closure of the chamber angle or as the result of an abnormality within the outflow system. <http://www.slredultrasound.com/2016>.

**2.2.1.3 TRACHOMA** It is a chronic keratoconjunctivitis caused by infection with *Chlamydia trachomatis* and is characterized by inflammatory changes in the conjunctiva in children with subsequent scarring, corneal opacity and blindness in adults . .( Herranz-Corrales 2013 )

#### **2.2.1.4 Eye tumors:**

The tumor of the eyelid, conjunctiva and orbital tissues do not differ significantly in morphology and behavior from those occurring. Intraocular tumors are rare , but important because the serious effect on vision and their unusual patterns of behavior. (slredultrasound2016).



Figure (2.3) Retinoblastoma (Singh-Hayden 2008)

#### **2.2.1.5 Vitreous hemorrhage**

Is the extravasation of blood into the spaces formed within and around the vitreous body, It may occur because of blunt trauma and direct retinal tear or from any condition that causes neovascularization, including diabetes.

This bleeding can result in acute visual changes depending on the amount of opaque blood within the vitreous.

In ultrasound, vitreous hemorrhage appears as a bright echogenic layer within the posterior eye. If the vitreous hemorrhage is large enough, as sometimes seen with blunt trauma, the entire body can be obscure.( Ustymowicz A 2002)



Figure (2.4) Vitreous hemorrhage (Coleman2008)

### **2.2.1.7 Retinal Detachment**

Separation of the sensory retina from the retinal pigment epithelium (RPE), has two types:

Rhegmatogenous retinal detachment causes by mechanical force from vitreoretinal adhesions.

Nonrhegmatogenous serous retinal detachment that results from an accumulation of subretinal fluid. Myron Yanoff MD.:2014.

Larger retinal detachment appears as hyperechoic lines within the vitreous that appear mobile with eye movements when they are acute . Vitreous detachments often appear as V-shaped lines that are adherent to the posterior wall, whereas retinal detachments are more free-flowing and can be seen extending farther into the center of the globe when imaged on ultrasound. (Ustymowicz A 2002)



Figure (2.5) Axial scan showing total retinal detachment .( dibernardo 2007 )

## 2.2 Previous studies

A study Published in American Journal of Roentgenology. 2006 shows sonography can reveal pathology of the eye and to highlight its usefulness as a simple and cost-effective tool in investigating eye symptoms. The cystic nature of the eye, its superficial location, and high-frequency transducers make it possible to clearly show normal anatomy and pathology such as tumors, retinal detachment, vitreous hemorrhage, foreign bodies, and vascular malformations. Sonography is useful as a treatment follow-up technique because it has no adverse effects. Sonography is well tolerated by patients and relatively easy to perform for those familiar with real-time sonography. <http://www.ajronline.org/2016>.

A study done by Shinar Z. Chan L. Orlinsky M. to evaluate the retinal detachment by ultrasound. Retinal detachment is an ocular emergency posing diagnostic difficulty for the emergency practitioner. Direct fundoscopy and visual field testing are difficult to perform and do not completely rule out retinal detachment. Ophthalmologists use ocular ultrasound to enhance their clinical acumen in detecting retinal detachments (RD), and bedside ultrasound capability is readily available to many emergency practitioners (EP). Our study sought to assess whether ocular ultrasound would be a helpful adjunct for the diagnosis of RD for the practicing EP. This was a prospective observational study with a convenience sample of patients. As part of a general course on emergency ultrasonography, practitioners received a 30-min training session on ocular ultrasound before beginning the study. Trained practitioners submitted ultrasound scans with interpretation on patients with signs and symptoms consistent with retinal detachment. Thirty-one of the 72 practitioners trained submitted ocular ultrasound reports on patients presenting to the Emergency Department with concerns for retinal detachments. EPs achieved a 97% sensitivity (95% confidence interval [CI]



82-100%) and 92% specificity (95% CI 82-97%) on 92 examinations (29 retinal detachments). Disc edema and vitreous hemorrhage accounted for false positives, and a subacute retinal detachment accounted for the only false negative.

These data show that trained emergency practitioners can use ocular ultrasound as an adjunct to their clinical assessment for retinal detachment. .  
<http://www.ncbi.nlm.nih.gov/2016>

A study done by K K Nischal. J N James. J McAllister about The use of dynamic ultrasound B-scan to detect retinal tears in spontaneous vitreous haemorrhage is described. A 6-month prospective study was undertaken of non-diabetic patients who presented with spontaneous vitreous haemorrhage, in whom the fundus could not be visualised and in whom a rhegmatogenous aetiology was suspected. Patients were followed up at least weekly with repeat B-scans until adequate fundus visualisation was possible. Eight patients in total were included in the study; of these, 4 were thought to have retinal tear at initial ultrasound examination and this was confirmed later when the haemorrhage cleared. A scanning protocol is suggested.  
<http://www.nature.com2016>.

A Study done by Mariam Khogaly Elamin Supaire about assessment of ophthalmic pathologies by ultrasound The study found that ocular ultrasound is the most effective method in diagnosis of eye pathologies. The study found that the females are more affected than males. Age groups more than 60 years are the most affected by eye pathologies. Cataract is a highest ratio comparing to other diseases then the hemorrhage, retinal detachment, vitreous changes and the least ratio is glaucoma.

The right and left eye were near equally to be affected right (44.63%), left (45.45%), the both eye were affected in (9.92%) of the patients.

The correlation between final diagnosis and gender under study for retinal detachment 11 out of 20 (55%) were males, 10 out of 20 (45%) were females.

For retinal detachment 11 out of 20 (55%) had diabetic, 1 out of 20 (5%) had hypertension, 2 out of 20 (10%) had both diabetic and hypertension, and 6 out of 20 (30%) had not have one of the both diseases. . Mariam KhogaliAlamin 2014.

A Study done by Ray f. Gariano. Chang-Heekim about Evaluation and Management of Suspected Retinal Detachment The study illustrate that retinal detachment often is a preventable cause of vision loss. Risk factors for retinal detachment include advancing age, previous cataract surgery, and trauma. Early intervention facilitates prevention of retinal detachment after formation of retinal breaks and improves visual outcomes of retinal detachment surgery.

<http://www.aafp.org> /2016

A Study done by Jamil Ahmed. Fahad Feroz Shaikh. Abdullah Rizwan .Mohammad Feroz Memon .about Evaluation of Vitreo-Retinal Pathologies Using B-Scan In this study 68 patients (73 eyes) with vitreous opacities and poor retinal visualization were investi-b gated with B-Scan ultrasound. There were 45 male (66%) and 23 female (34%) patients. Age range was 5-69 (mean = 39) years. Vitreous opacification was due to vitreous hemorrhage in 48 (65%) eyes, intraocular inflammation in 22 (30%) eyes and dense asteroid n hyalosis in 3 (5%) eyes. Jamil Ahmed, 2009.

# **Chapter three**

## **Material and method**

## **Chapter Three**

### **materials and Methods**

#### **3.1 materials**

##### **3.1.1 Type of the study**

descriptive , analytical study deal with ultrasound findings in patients with diabetes hypertension.

##### **3.1.2 Population of the study**

All patients who presented with diabetes and hypertension, were investigated by U/S

##### **3.1.3 Study area and duration :**

The study was conducted in Sudan-Khartoum in ultrasound department in makaah hospital , during the period from July to December 2018

##### **3.1.4 Sample size**

The sample size consist of 50 Sudanese patients were selected randomly

##### **3.1.5 Inclusion criteria**

All diabetic and hypertension Patients.

##### **3.1.6 Exclusion criteria**

Children Patients .

##### **3.1.7 Study variables**

a- Patient age, gender and medical history

#### **3.2 Method:**

##### **3.2.1 ultrasound technique:**

Ultrasound evaluation of the eye and orbit was performed in the supine or sitting position. The probe placed directly over closed lids.

A coupling solution is used to provide standoff and avoid attenuation caused by air.

### **3.2.2 Method of data collection**

1- Data collection sheet which was designed to include all variables to satisfy the study.

#### **3.1.2.2 Ultrasound machines :**

1-NIDEC echo scan model US-4000

High frequency (10MHz). Two probes

A-mode probe (for axial length measurement)

B-mode probe (for imaging the eye in different positions and angles)

#### **3.2.1 Ultrasound technique:**

Imaging Protocol performed in two planes using coupling gel to ensure a complete evaluation of the orbit and adjacent structures.

the probe was turned 90\_ into a sagittal position and the probe rocked medially and laterally to evaluate all structures.

#### **3.2.2 data analysis:**

Data collection sheets designed especially for this study, and was present in tables and figures

The data analyzed by using SPSS (statistic package for social sciences).

# **Chapter four**

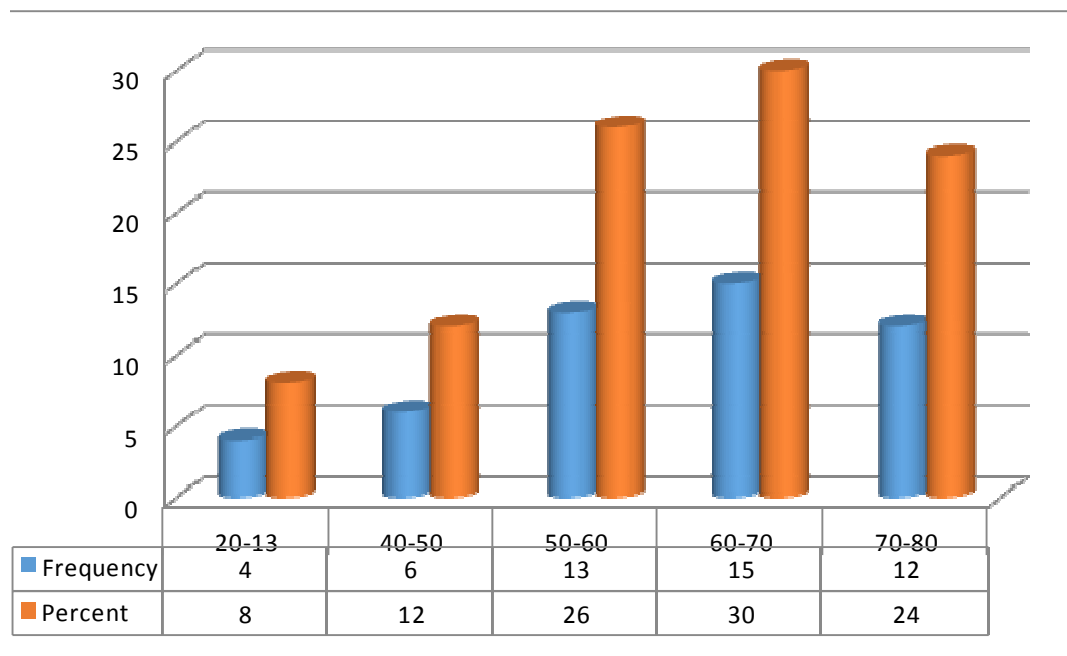
## **Results**

## Chapter Four

### result

**Table(4. 1): Distribution according to age**

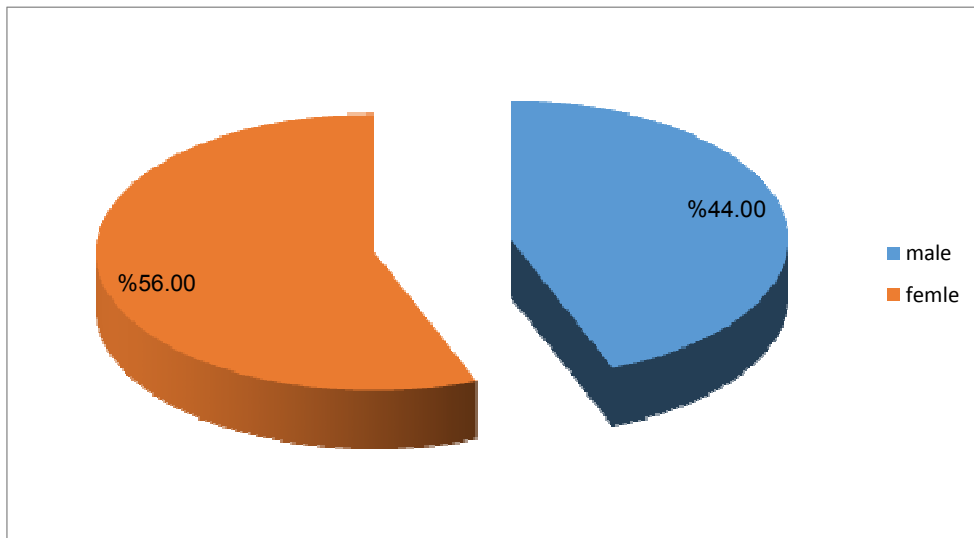
Decryption	Frequency	Percent
20-30	4	8
40-49	6	12
50-59	13	26
60-69	15	30
70-79	12	24
Total	50	100



**Figure( 4.1) Distribution according to age**

**Table( 4.2): Distribution according to gender**

	Frequency	Percent
male	22	44
Female	28	56
Total	50	100

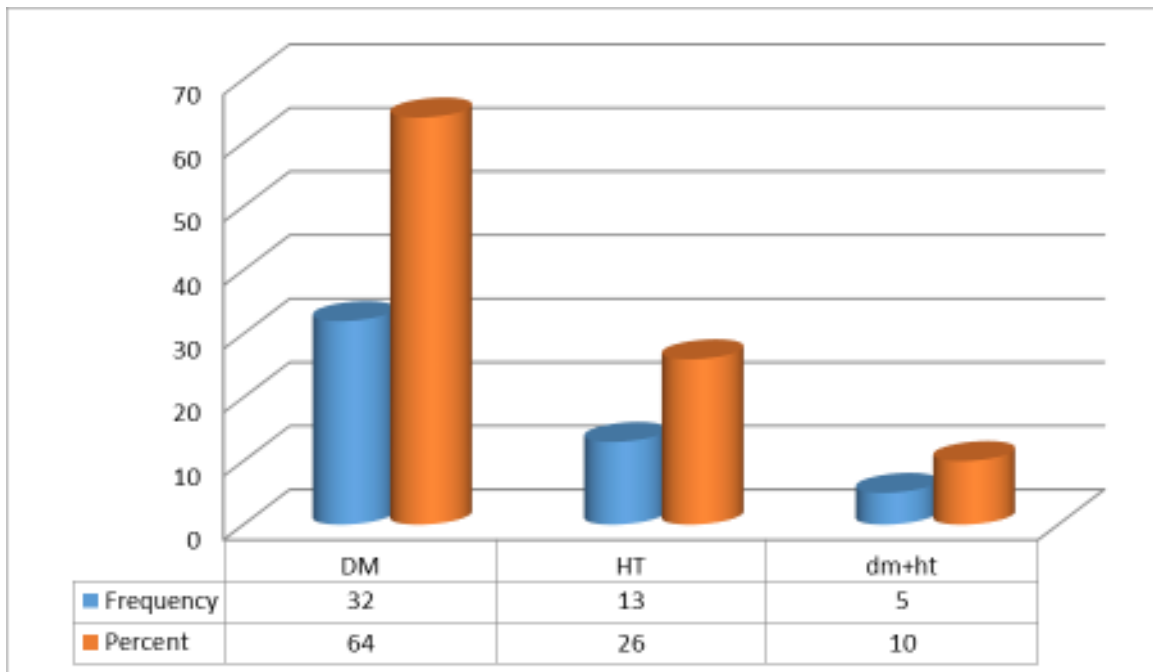


**Figure( 4.2) Distribution according to gender**



**Table(4. 3): Distribution according to medical history**

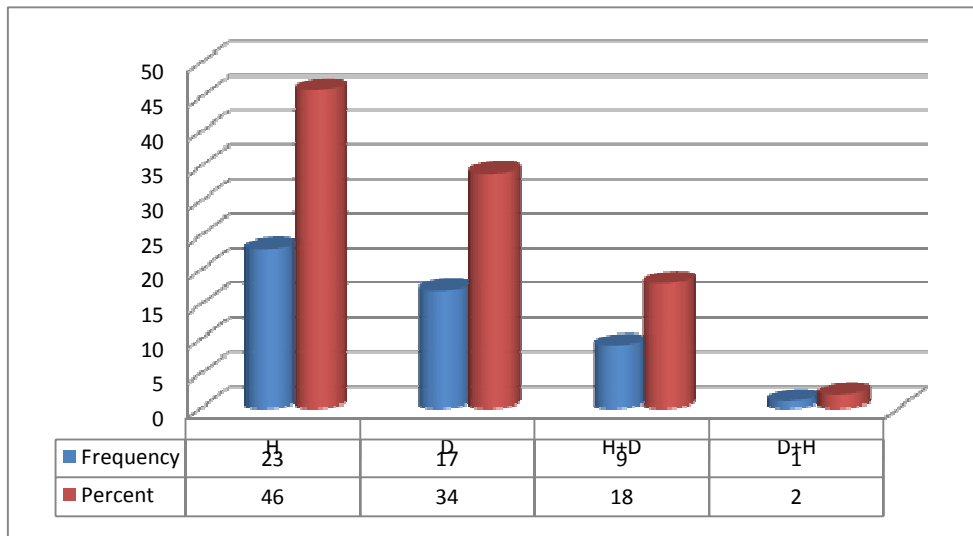
	Frequency	Percent
Diabetics	32	64
Hypertensive	13	26
Diabetics + Hypertensive	5	10
Total	50	100



**Figure( 4.3) Distribution according to medical history**

**Table(4.4): Distribution according to sonographic findings**

	Frequency	Percent
Hemorrhage	23	46
Detachment	17	34
Hemorrhage+D	10	20
Total	50	100

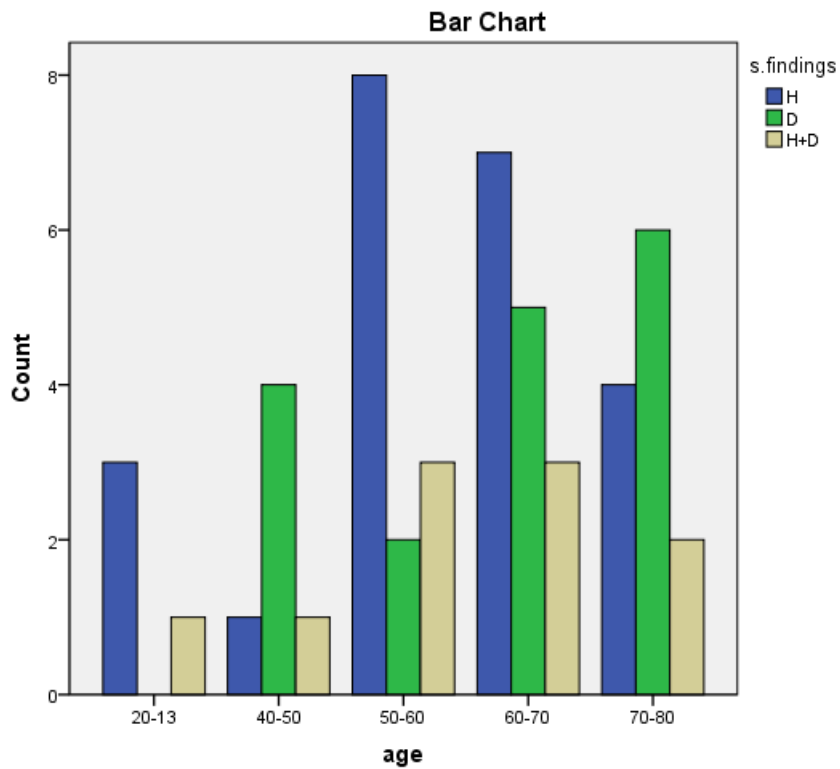


**Figure( 4.4) Distribution according to sonographic findings**

**Table (4-5) Crosstabulation between sonographic findings and age**

Age	Vitreous hemorrhage	retinal detachment	retinal detachment+ Vitreous hemorrhage	Total
20-30	3	0	1	4
40-49	1	4	1	6
50-59	8	2	3	13
60-69	7	5	3	15
70-79	4	6	2	12
<b>Total</b>	<b>23</b>	<b>17</b>	<b>10</b>	<b>50</b>

**P.Value= 0.0143**

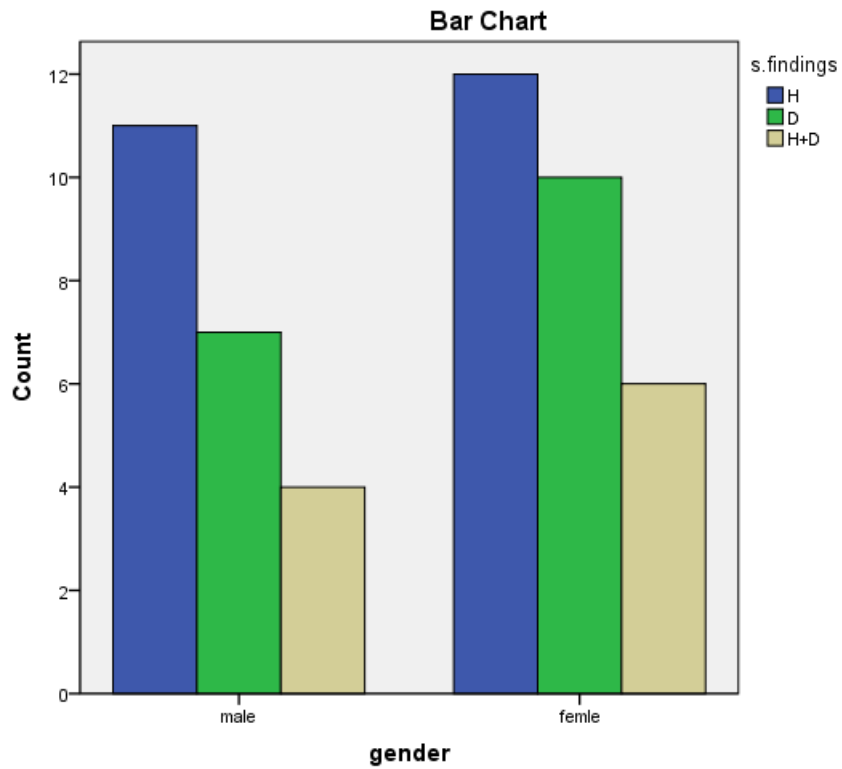


**Figure (4-5) Crosstabulation between sonographic findings and age**

**Table (4-6) Crosstabulation between sonographic findings and Gender**

<b>Gender</b>	<b>Vitreous hemorrhage</b>	<b>retinal detachment</b>	<b>retinal detachment+ Vitreous hemorrhage</b>	<b>Total</b>
<b>male</b>	<b>11</b>	<b>7</b>	<b>4</b>	<b>22</b>
<b>female</b>	<b>12</b>	<b>10</b>	<b>6</b>	<b>28</b>
<b>Total</b>	<b>23</b>	<b>17</b>	<b>10</b>	<b>50</b>

**P.Value =0. 098**

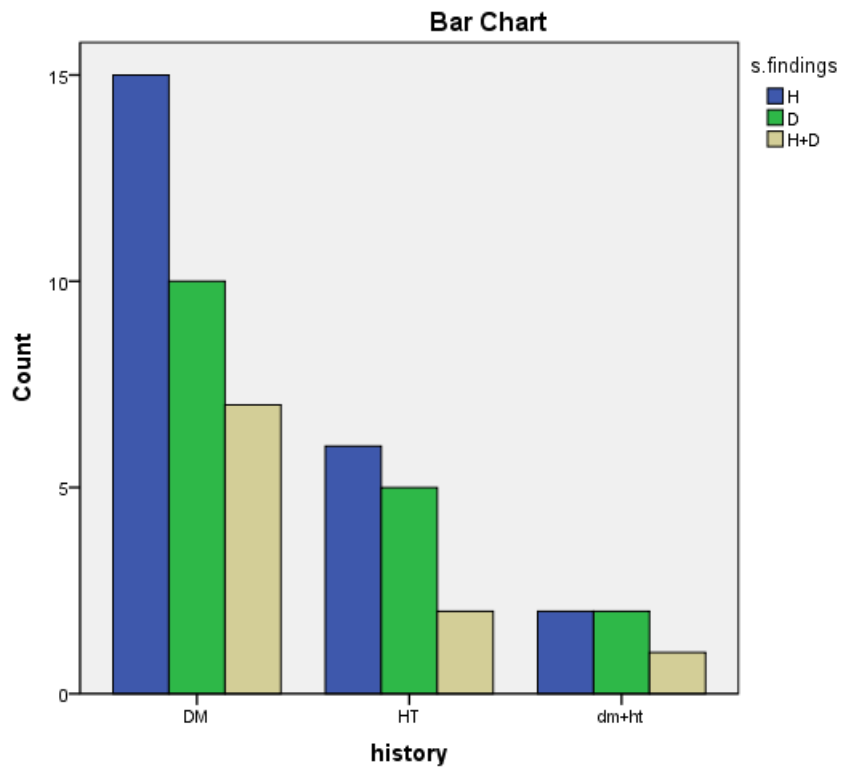


**Figure (4-6) Crosstabulation between sonographic findings and Gender**

**Table (4-7) Crosstabulation between sonographic findings and medical history**

history	Vitreous hemorrhage	retinal detachment	retinal detachment+ Vitreous hemorrhage	Total
<b>Diabetes</b>	<b>15</b>	<b>10</b>	<b>7</b>	<b>32</b>
<b>hypertensive</b>	<b>6</b>	<b>5</b>	<b>2</b>	<b>13</b>
<b>Hypertensive Diabetes +</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>5</b>
<b>Total</b>	<b>23</b>	<b>17</b>	<b>10</b>	<b>50</b>

**P.value= 0.097**



**Figure (4-7) Crosstabulation between sonographic findings and medical history**

# **Chapter five**

## **Discussion ,Conclusion and Recommendation**

## Chapter Five

### Discussion , conclusion & recommendations

#### 5.1 Discussion:

The current study is descriptive analytical study included 50 diabetic and hypertensive patients complain of eye problems thier age ranged between ( 20-77 ) years old .

table (4.1) they were divided to five groups , the most affected group was the (60-69) years, (50-59) years which were (30%)&(26%) respectively then (70-77) years which was (24%) then (40-49) which was (12%) the last group is the (20-30)which was (8%) .

table (4.2)According to the patient gender the study found that female were more affected by retinopathy (56%) than male (44%).

table (4.3) According to the patient medical history patients with diabetes were more affected (64%) than hypertensive (26%) and patient with both deseases (10%).

table (4-4). The study found a highly incidence of eye problems in ultrasound was vitreous hemorrhage (46%) then retinal detachment (34%) then both vitreous hemorrhage and retinal detachment (20%).

Table (4.5) The Correlation between sonografic findings and patient age Illustrate strong positive relationship p value (0.014).

table (4-6) the Correlation between sonographic findings and gender found that female were more affected than male.

Illustrate weak relationship p value (0.098).

Table (4.7) The Correlation between sonografic findings and patient history Illustrate weak relationship p value (0.097).

## **5.2 conclusion :**

The study concluded that B- scan ultrasonography was the initial imaging modality opted in most of the cases as it was readily available, simple, cost effective, non ionizing, non invasive and reliable modality for the diagnosis of eye for diabetic and hypertensive patients pathologies, ultrasound must be uses routinely in the evaluation of the eyes of diabetics and hypertensive patients also this research could form a database for further research in this area in the future.



#### **5.4 Recommendation:**

Ocular ultrasonography must be available in all diagnostic centers.

A well knowledgeable and trained sonographers should perform the ocular ultrasound.

All of diabetic and hyper tensive patients must do an ocular ultrasounds investigation at least one time on life.

Ocular ultrasound investigation must be a main protocol for diagnosis of retinopathy.

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# **Appendices**

**Appendix (1)Data Collection Sheet (Questionnaire)**

**Evaluation of Retino-vetrous pathology in diabetic and hypertensive patients using ultrasound**

NO	Age year	Sex		Medical history		Sonographic findings
		Male	Female	HT	DM	
.1						
.2						
.3						
.4						
.5						
.6						
.7						
.8						
.9						
.10						
.11						
.12						
.13						
.14						
.15						
.16						
.17						

## Appendix2: Images from cases



(Image 1) 63 year old female shows retinal detachment .



(Image 2) 65 year old male shows retinal detachment + vitreous change .



(Image 3) 56 year old male shows vitreous hemorrhage .



(Image 4) 62 year old male shows posterior vitreous detachment.

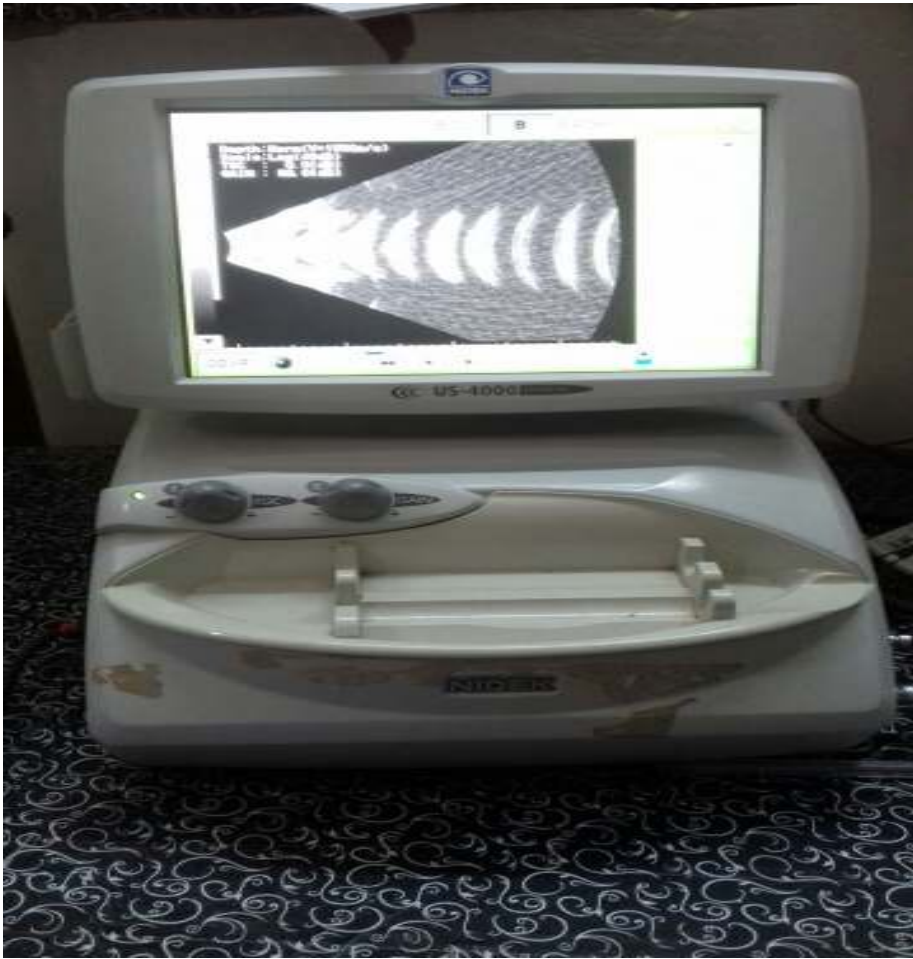




**(Image 5)** 67 year old female shows posterior vitreous detachment .



**(Image 6)** 73 year old male shows posterior vitreous detachment + vitreous change .



(Image 7) 1-NIDEC echo scan model US-4000 High frequency (10MHz).Two probes ( ultrasound machine used in data collection )