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A Study of Ocular Coherence Tomography (OCT) Findings in Patients Having Different Types of Age-Related Macular Degeneration (ARMD) in Government Hospital, Jamnagar, Gujarat

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A B S T R A C T

Introduction:People over 50 who have ARMD, also known as age-related macular degeneration disorder, suffer from a degenerative disease. Drusen, geographic RPE atrophy, separation of the serous retinal pigment epithelium, and choroidal neovascularization were all symptoms of the disorder. The main factor causing lifelong blindness is ARMD. The forecasted increase is substantial because it is predicted that the population of people 80 and older would increase by 105% in the following ten years. Wet / exudative / neovascular and dry /atrophic / non-neovascular degenerative lesions of the macula are the two categories, clinically speaking. Loss of vision may result from either of these categories. ***Aim and Objective*:** Aim of the study is to find out ocular problems in different types of age-related Macular Degeneration (ARMD). ***Material and Method*:** It is a hospital based prospective study. After taking into consideration the inclusion and exclusion criteria, patients whose having different types of age-related Macular Degeneration (ARMD) and their ocular problems operated in Department of Ophthalmology, M. P. Shah medical college, Jamnagar between December 2021 to June 2022 at our institute observed for study. ***Result*:** We enrolled 200 patients with Age related macular degeneration patients who visiting at our OPD centre. In our study population, the highest percentage observed in the age group of 66-75 years age group. Female predominance was seen. Dry ARMD was significantly higher in females compared to males. ***Conclusion*:** In the coming years, ARMD will become an important cause of vision loss in India due to ageing population because of better longevity.

Keywords: Age-related macular degeneration, diabetic retinopathy, Ocular coherence tomography, choroidal neovascularization, Drusen.

INTRODUCTION

The macula lutea is the name given to the centre of the retina. Excellent centre visual acuity resolution is made possible. Numerous conditions, such as diabetic retinopathy, age-related macular degeneration (AMD), and retinal vein occlusion, which can result in a significant loss of visual acuity, can impair the macula structure. Ophthalmoscopy or a slit-lamp examination using a contact lens are two common methods for examining the macula. Modern research, medical diagnosis, and a range of entertainment applications all depend on advanced imaging technologies. Because it enables 3D picture presentation and offers superior object and scene perception, 3D imaging is alluring.Tomographic imaging and topographic imaging are both types of 3D imaging that collect information about an object's internal subsurface particle reflection and scattering and positionally dependent outward surface reflection and scattering of objects. Non-intrusive 3D tomographic imaging is unquestionably an essential diagnostic tool for assessing the health of a live body.X-ray computed tomography (CT), positron emission tomography (PET), magnetic resonance imaging (MRI), ultrasound imaging, and confocal microscopy are a few of the 3D tomographic imaging methods that have confocal maturity (CM). With the exception of the CM, which mostly utilized for research, they have all been extensively

employed in hospitals and clinics. Below, we have provided a quick summary of these 3D tomographic imaging methods.These imaging techniques with resolution and penetration depth are summarized in Figure 1. We see that, in terms of picture resolution and penetration, there is a clear imaging gap between CM and ultrasound. An imaging technique that enables non-invasive 3D imaging with close to cellular resolution and real-time viewing could greatly enhance early diagnosis and advance knowledge of the human body's subsurface region. An imaging technique that fills this gap is optical coherence tomography (OCT) [1]. People over 50 who have ARMD, also known as age-related macular degeneration disorder, suffer from a degenerative disease. Drusen, geographic RPE atrophy, separation of the serous retinal pigment epithelium, and choroidal neovascularization were all symptoms of the disorder [2]. The prevalence of this disease and its growing significance are presumptions made in ARMD research. The main factor causing lifelong blindness is ARMD [3]. The forecasted increase is substantial because it is predicted that the population of people 80 and older would increase by 105% in the following ten years [4]. Wet / exudative / neovascular and dry /atrophic / non-neovascular degenerative lesions of the macula are the two categories, clinically speaking. Loss of vision may result from either of these categories. OCT research has taken the lead in identifying the anatomic indicators in neovascular AMD. Central subfield thickness (CST), an OCT-derived metric, was applied to help pick the re-treatment [5, 6]. We are now lacking a reliable non-invasive vascular biomarker to monitor healthy ageing and the progression of AMRD illness. A clinical environment can quickly become familiar with the state-of-the-art, non-invasive, dye-free OCT-A method of retinal vascular imaging. The amount of CNVM in wet ARMD can be found, activated, and measured using the three-dimensional imaging technique known as OCT [7, 8]. In contrast to conventional angiography, OCT does not call for the use of exogenous dyes, therefore undesired side effects like nausea and other serious adverse events are avoided. The utility of OCT as a diagnostic tool, however, has not been extensively studied. How effectively OCT imaging performs in ARMD diagnosis has only been evaluated in a small number of clinical investigations. Therefore, we designed this study to evaluate OCT's potency in detecting ARMD. OCT is more specific diagnostic tool in detecting subretinalneovascular membrane and also to assess the extent, location and activity of neovascular membrane. Hence OCT is better diagnostic tool in early wet ARMD which helps in early management of patients with ARMD and thereby preventing severe visual loss due to ARMD. If diagnosed early, we can prevent the progression dry ARMD lesion into visual impairing exudative lesions.Today SD-OCT allows for high-speed, high-resolution imaging of retinal structures and provides non-invasive three-dimensional information on retinal pathology in situ and in real time. It thus leads to more profound understanding of patients RPE status which is relevant structure in all form of ARMD. As drusen and atrophic lesions can be evaluated from the same scan pattern, all forms of ARMD can be assessed quantitatively.

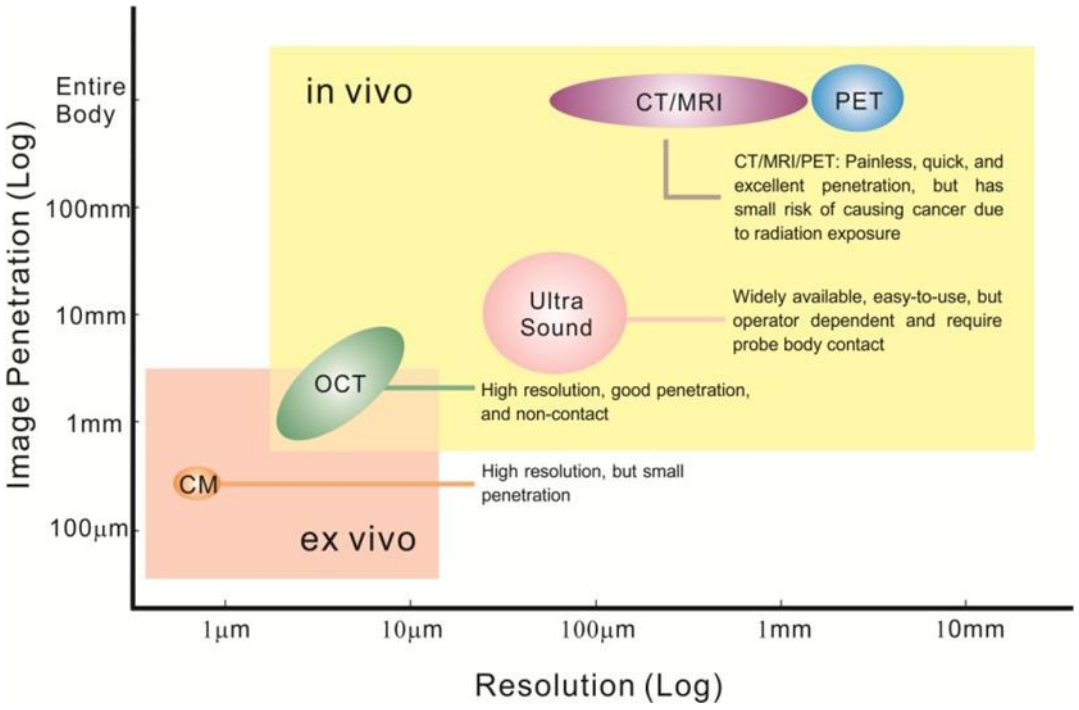

Figure 1: Comparison of image penetration and resolution between OCT and other imaging technologies. (from Ref. [1] with permission from Dr.Hui Lu)

Aim & Objectives

Aim of this study is to find out ocular problems in different types of Age-related Macular Degeneration (ARMD). To study the different OCT findings in people diagnosed with ARMD, types of ARMD and the prevalence of Dry and wet ARMD.

Material & Methods

It is a hospital based prospective study. After taking into consideration the inclusion and exclusion criteria, patients whose having different types of age-related Macular Degeneration (ARMD) and their ocular problems operated in Department of Ophthalmology, M. P. Shah medical college, Jamnagar between December 2021 to June 2022 at our institute observed for study.

Inclusion Criteria: Patients age above 50 years, Men and women both are included, Outdoor patients and Patient diagnosed with ARMD.

Exclusion Criteria: Patients age below 50 years.

After taking into consideration the inclusion and exclusion criteria, patients whose having different types of Age-related Macular Degeneration (ARMD) and their ocular problems operated in Department of Ophthalmology, M. P. Shah medical college, Jamnagar observed for study.

Ethical committee was taken before starting the study.Written and informed consent was taken from all patients who participated in the study.

Material:

Snellen's Vision Box, Torch light, Dilator drops- Tropicamide, Homatropine, Atropine, Direct and Indirect Ophthalmoscope, Non-Contact Tonometry, OCT machine.

Procedure:

An eye doctor may use drops in the patient's eyes to dilate their pupils prior to the OCT scan. This makes it possible to examine the retina more clearly. In order to remain during the examination, the subject will sit straight on a chair in front of the OCT device. The eye doctor will scan the eye after aligning the device with the eye under examination. OCT is painless and requires no contact with the eye. The head must remain motionless as the equipment scans, which could take 5 to 10 minutes. A person can resume their regular activities after the exam. For several hours after the OCT, eyes that have dilating eye drops may still be sensitive to light. The thickness of the retina can be determined via an OCT scan, and any fluid-filled regions can be found. OCT. Blood veins in the choroid carry oxygen and nutrients to the eye examine the choroid, a tissue layer located in the rear of the eye between the sclera (the white outer layer) and the retina. OCT could give the following observation:1) drusen, which are small deposits of protein and lipids that form beneath the retina 2) the retina's structure 3) any abnormal or new blood vessels 4) Any internal eye bleeding. AMD comes in two different forms. Each kind of sign can be recognised by OCT. Dry AMD and Wet AMD.

Figure 2: OCT machine

RESULTS

We enrolled 200 patients with Age related macular degeneration patients who visiting at our OPD centre, government medical college, Jamnagar. These patients were enrolled between December 2021 to June 2022 at our institute. We selected these patients based on satisfied with our inclusion and exclusion criteria. The highest percentage (50%) observed in the age group of 66-75 years. Female (57.7%) were more affected than male. Dry and Wet ARMD was significantly higher in females compared to males.In our study, Dry ARMD was highly observed in the age group of 66-75 years (45%) compared to wet ARMD (5%). Wet ARMD (10%) was highly observed in the age group of > 75 years compared to dry ARMD (2.5%). So, we could say that in the age group of 61-65 years, total 75(37.5%) cases of ARMD out of 200 observed. In the age group of 66-75 years, total 100 cases of ARMD out of 200 observed and lastly > 75 years, total 25(12.5%) cases of ARMD out of 200 (50%) observed. both Dry and Wet ARMD are more common in females. So, we could say that the ARMD was significantly associated with gender. In this study conducted among 200 people, total 115 (57.5%) cases were observed in females and 85 (42.5%) cases were observed in males. Clinical presentation of Dry and Wet ARMD are shown in Figure 3 and Figure 4. Out of 200 patients, 100 (50%) patients had Diabetic Retinopathy and 165 (82.5%), had hypertensive retinopathy showed association with ARMD.

Table 1: Age and Gender wise distribution of Dry and wet ARMD

AGE			
Age Group (years)	**Dry**	**Wet**	**Total**
61-65	65 (32.5%)	10 (5%)	**75(37.5%)**
66-75	90 (45%)	10 (5%)	**100(50%)**
>75	5 (2.5%)	20 (10%)	**25(12.5%)**
Total	**160 (80%)**	**40 (20%)**	**200(100%)**
GENDER			
Gender	**Dry**	**Wet**	**Total**
Female	85 (42.5%)	30 (15%)	**115(57.5%)**
Male	75 (37.5%)	10 (5%)	**85(42.5%)**
Total	**160 (80%)**	**40 (20%)**	**200(100%)**

Table 2: Distribution of PED (Pigment Epithelium Detachment) in Dry ARMD

PED (75)	**Positive**	**Percentage %**
Serous	20	10%
Fibrovascular	10	5%
Drusen	30	15%
Haemorrhagic	15	7.5%

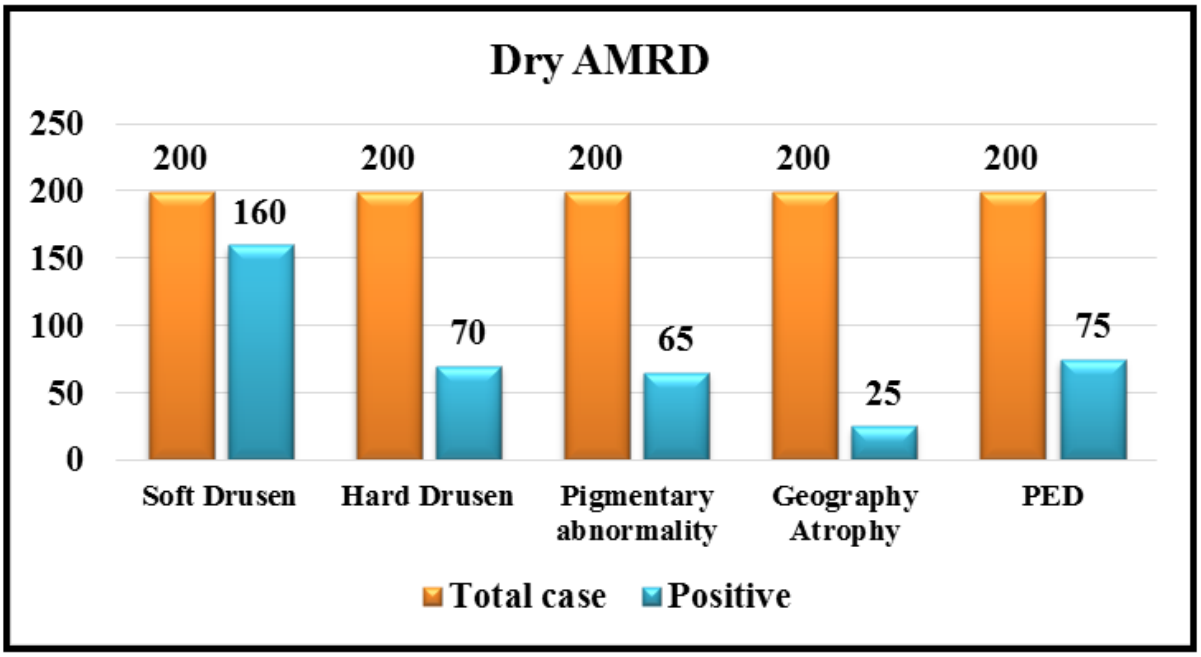

Figure 3: Clinical presentations of Dry ARMD

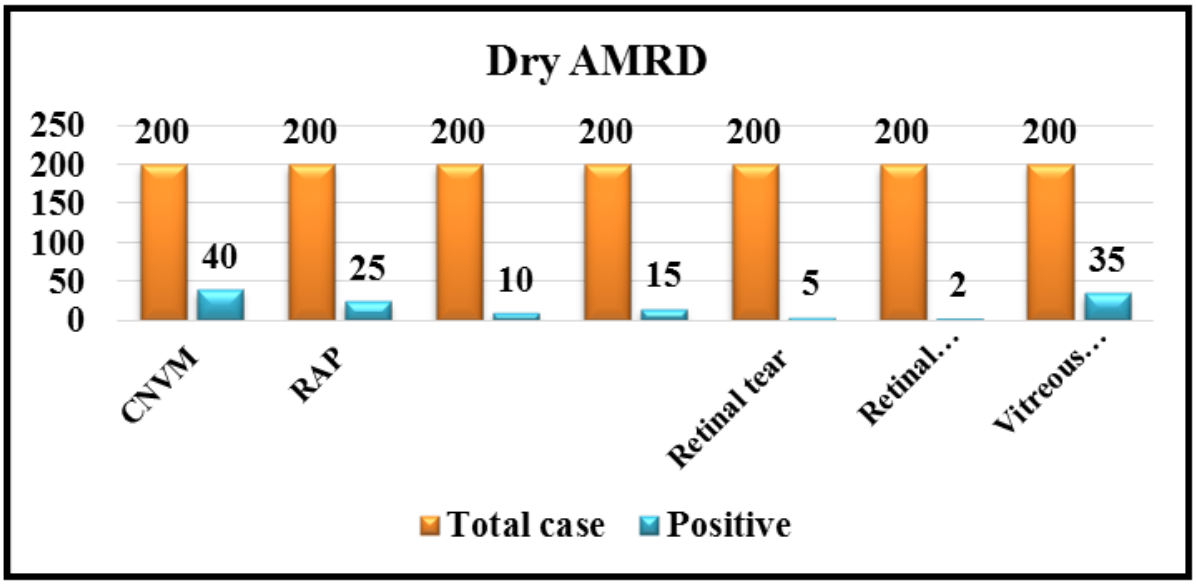

Figure 4: Clinical presentations of Wet ARMD

Table 3: Distribution of Diabetic Retinopathy and Hypertensive Retinopathy in Dry and Wet ARMD

Disease	Dry	Wet
Diabetic Retinopathy	**50**	**50**
Hypertensive Retinopathy	**135**	**30**

DISCUSSION

The prevalence of ocular diseases among the elderly population observed to be high. Each person above fifty years of age was susceptible to suffer from one or more ocular diseases. Ocular diseases found to be more among males, people in the lower socio-economic strata, landless labourers and older age groups. Age was observed to have a profound influence on the occurrence of ocular morbidity. Hence, the confounding effect of age has been minimized by calculating age standardized morbidity rates when evaluating the effect of sex, socio-economic status and occupation on ocular morbidity. The higher prevalence of ocular diseases in old age could be due to increasing degenerative conditions, increased susceptibility to infections, lack of proper care of the eyes, among other reasons. Among the various retinal diseases, degenerative conditions such as age-related macular degeneration (ARMD) observed to be the commonest. So, we want to observe only ARMD patients whose age having more than 60 years and associated OCT findings of these

patients. During the study period, we were enrolled 200 patients who affected with ARMD disease visiting our OPD, tertiary care centre of Jamnagar. These patients were selected based on inclusion as well as exclusion criteria. In our study population, the highest percentage observed in the age group of 66-75 years age group. The lowest percentage observed in the age group of > 75 years. Dry ARMD was highly observed in the age group of 66-75 years (45%) compared to wet ARMD (5%). Wet ARMD (10%) was highly observed in the age group of > 75 years compared to dry ARMD (2.5%). So, we could say that in the age group of 61-65 years, total 75(37.5%) cases of ARMD out of 200 observed. In the age group of 66-75 years, total 100 cases of ARMD out of 200 observed and lastly > 75 years, total 25(12.5%) cases of ARMD out of 200(50%) observed. As per our study, among total 200 patients, 55% (110) are females having ARMD whereas 45% (90) are males having ARMD. We observed that both Dry and Wet ARMD are more common in females. So, we could say that the ARMD was significantly associated with gender. In this study conducted among 200 people, total 115 (57.5%) cases were observed in females and 85 (42.5%) cases were observed in males. Females showed higher risk for ARMD which supported by Beaver Dam Study and Blue Mountains Eye Study. Among ARMD patients, 80% had Dry ARMD whereas 20% wet ARMD. Our study results were comparable with the study of Krishnaiah*et al*., He also found that 81.34% had dry ARMD whereas 18.66% had wet ARMD [9]. Schults*et al*., studied that dry AMD accounts for 85% to 90% and wet AMD for 10% to 15% of cases in which dry AMD includes drusen and geographic atrophy and wet AMD includes RPE dysfunction, choroidal neovascularization, haemorrhage and RPE detachments. In our study, prevalence of Dry ARMD is 80% and WET ARMD is 20% in total 200 patients [10].

Dry ARMD

Dry ARMD is part of Drusen, Pigmentary abnormality and geography atrophy. Among 200 patients, 80% were soft drusen whereas 35% were hard drusen observed in ARMD patients. Our study was comparable with the results with Yeh J *et al*., He observed that 90.79% soft drusen. Hard drusen was more common in females compared to males whereas soft drusen observed common in both males and females [11]. Among dry ARMD patients, 32.5 % had pigmentary abnormality and 12.5% had geography atrophy. In study of Yeh J *et al*., [11] 74.67% patients observed with pigmentaryabnormalities and 0.75% with geography atrophy. In our study results, pigmentary abnormalities lower whereas geography atrophy higher with contrary to Yeh J *et al*., study [11].

WET ARMD:

Wet (exudative, neovascular) AMD is much less common than dry, but is associated with more rapid progression to advanced sight loss. The main manifestations are CNV and PED, though in recent years at least two additional conditions, retinal angiomatous proliferation (RAP) and polypoidalchoroidalvasculopathy (PCV). Among wet ARMD patients, 20% had CNVM, 37.5 % had PED (10% had serous PED, 5% had fibrovascular PED, 15% had drusen, 7.5% had haemorrhagic), 12.5% had retinal angiomatous proliferation and 5% polypoidalchoroidalvasculopathy observed in our study.

We also observed lateral stage of wet ARMD such as retinal tear, sub retinal haemorrhage, retinal detachment and vitreous detachment in our study. According to our observation, 17.5% vitreous detachment, 7.5% sub retinal haemorrhage, 2.5% had retinal tear and 1% retinal detachment in our study.

CONCLUSION

In the coming years, ARMD will become an important cause of vision loss in India due to ageing population because of better longevity. ARMD accounts for 9% of vision loss and it is usually underestimated as it has no overt symptoms in the early stages. So, screening of individuals over 60 years is important to diagnose ARMD at an early stage. Screening and follow up for early diagnosis and progression helps to initiate treatment at proper time in wet forms of ARMD. By proper screening, we can also maintain the functional vision and thereby improve the quality of life of patients. Patients with early ARMD should also be explained about the possibility of disease progression after cataract surgery, so that they can be followed up and treatment can be initiated at appropriate time. Hypertension, diabetes, play a role in the progression of ARMD. Hence Adequate control of comorbid condition can help to slow down the disease progression to some extent. OCT is more specific diagnostic tool in detecting subretinalneovascular membrane and also to assess the extent, location and activity of neovascular membrane. In my study, these biomarkers which are identified by review of OCT volume scans may aid in risk prognostication for patients and for identifying patients for early intervention trials.

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