

**Proportion and Clinical Profile of Epiretinal Membrane: A Descriptive Clinical Study**Jayasree Kottaram<sup>1</sup>, Manjit P S<sup>2</sup>, Vijayamma N<sup>3</sup><sup>1</sup>Resident, Department of Ophthalmology, Government Medical College, Kottayam, Kerala, India, 686008<sup>2</sup>Associate Professor (CAP), Department of Ophthalmology, Government Medical College, Kottayam, Kerala, India, 686006<sup>3</sup>Professor, Department of Ophthalmology, Government Medical College, Kottayam, Kerala, India, 686008

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Conflict of interest: Nil

**Abstract:**

**Introduction:** Epiretinal Membrane is the most common type of fibrocellular proliferation which is found at vitreoretinal interface in ageing population. The avascular membrane, which is greyish and semi-translucent, can be observed on the surface of the retina, namely above the internal limiting membrane (ILM). There is a growing trend in the number of individuals who are receiving surgical treatment for epiretinal membrane. It gradually impacts the central vision and results in metamorphopsia. Advanced form of epiretinal membrane can cause significant loss of visual acuity and visual symptoms.

**Aim and Objectives:** The aim of the study was to find out proportion and clinical profile of Epiretinal membrane among patients attending Ophthalmology OPD, Government Medical College, Kottayam, Kerala.

**Material and Methods:** This study design was descriptive in nature, conducted in a hospital setting. Patients were selected from Ophthalmology OPD at the Ophthalmology department of the Government Medical College and Hospital in Kottayam, Kerala, India by simple random method. This was done after obtaining approval from the Scientific Review Committee and Institutional Ethics Committee and obtaining consent in writing from patients. Epiretinal membrane was diagnosed by Ophthalmological clinical examination and confirmed by OCT. The presence of other risk factors was assessed from history, clinical examination and B scan. The clinical profile of epiretinal membrane cases was analyzed. Statistical analysis was done using SPSS.

**Results:** Proportion of epiretinal membrane was 10% in the study population. Majority of cases belonged to older age (61-80 yrs) group. Epiretinal membrane was commonly bilateral presentation. There was no significant difference in gender among cases. Diabetic mellitus ( $p=0.001$ ) and dyslipidemia ( $p=0.003$ ) had positive association with epiretinal membrane. Proliferative diabetic retinopathy ( $p=0.001$ ), retinal surgeries, retinal vessel occlusion and posterior vitreous detachment had significant association with epiretinal membrane ( $p<0.001$ ).

**Conclusion:** The estimated proportion of Epiretinal membrane was 10%. The presence of epiretinal membrane in the study population was associated with age, dyslipidemia, diabetes mellitus, proliferative diabetic retinopathy, vessel occlusion, retinal surgeries and posterior vitreous detachment.

**Keywords:** Epiretinal Membrane; Optical Coherence; Tomography.

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**Introduction**

Epiretinal membrane (ERM), sometimes referred to as macular pucker or cellophane maculopathy, is a condition that affects the interface between the vitreous and retina. It is characterized by the growth of a transparent film of fibrocellular tissue without blood vessels on the internal limiting membrane [1, 2]. ERM is categorized as idiopathic when it occurs without any association with intraocular inflammation, retinal vascular disorders, trauma, retinal detachment, or retinal surgery. It is

classified as secondary when it develops in combination with other ocular illnesses. [2, 3] Recent advances in imaging have allowed clinicians to more accurately diagnose and characterize ERMs and their associated complications, such as vitreomacular traction and macular hole. The clinical manifestation of an epiretinal membrane (ERM) can vary from being fully asymptomatic, detected during a routine examination, to being very symptomatic with

symptoms such as metamorphopsia, micropsia or macropsia, photopsia, and a decline or loss of central vision, significantly affecting the individual's quality of life. [4]

It is therefore a common and increasing indication for vitreoretinal surgeries in ageing population of many countries. Estimating the proportion and risk factors of ERM is perhaps the first step to better clinical management and understanding the burden of this disease. Therefore, present study has been conducted to identify the proportion and clinical profile of epiretinal membrane.

#### **Aim and Objectives:**

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The research obtained approval from the scientific research committee and Ethical Committee (IRB No. 62/2017/GMCK) and obtained a written consent from the patients after providing them with comprehensive information.

**Inclusion criteria:** Patients attending the Department of Ophthalmology OPD, Government Medical College, Kottayam.

**Exclusion criteria:** Patients with media opacity which obscures the details of ERM in fundus.

#### **Sample size calculation:**

According to a pilot study conducted at Govt. Medical College Kottayam on proportion of patients having Epiretinal membrane, those who were attending Ophthalmology OPD, Proportion was found to be 15%.

$$N = z^2 \alpha pq/d^2$$

- $z^2 = 3.84$
- $P = \text{proportion of ERM} = 15$ .
- $Q = 100 - p$
- $d = \text{absolute precision} = 4$
- $N = 3.84 \times 15 \times 85 / 16 = 306$

#### **Method of data collection:**

306 patients were selected by simple random method. Every twenty eighth patient was selected from Ophthalmology OPD, Govt. Medical College, Kottayam.

A detailed interviewer administered questionnaire was used to collect information about age, sex, presenting complaints, medical history, cigarette smoking, and current medication. The presence of any systemic disease, history of ocular trauma and ocular surgery were noted. All the patients underwent a comprehensive physical examination and investigations as per hospital protocol. Vital parameters were measured and recorded. All participants underwent ophthalmology examination, including visual acuity, near vision, refraction, slit lamp examination, applanation tonometry, and dilated fundus examination. Best corrected visual acuity was measured using snellen visual acuity chart. Lens status was assessed for nuclear, cortical, posterior subcapsular cataract following the lens opacities classification system.

Fundus examination showed either cellophane maculopathy revealed as a glinting, shifting light reflex from inner surface of retina (early form) or preretinal fibrosis defined as more opaque, grayish membrane, which thicken and contracts with the appearance of superficial folds or traction line (late form). These findings were confirmed by optical coherence tomography. B scan will be done to ascertain the posterior vitreous detachment status.

All eyes were dilated and examined for epiretinal membrane; other associated ocular pathology like proliferative and non-proliferative diabetic retinopathy, Vessel occlusions, hypertensive retinopathy, glaucomatous cupping, retinal break, age related macular degenerations. Epiretinal membrane detected on clinical examination and was confirmed by OCT.

#### **OCT based morphological classification of ERM [5]**

##### **Group 1: Fovea –involving ERM**

1A: Outer retinal thickening and minimal inner retinal change

1B: Outer retinal inward projection and inner retinal thickening

1C: prominent thickening of inward retinal layer

##### **Group 2: Fovea – sparing ERM**

2A: Formation of macular pseudohole

2B: Schisis like intraretinal splitting

#### **Statistical Analysis:**

Data was coded and analyzed using software statistical package for social science version 16. The study variable such as socio-demographic profile and the outcome variables and factors associated with ERM were expressed in percentages and 95% confidence interval calculated. Association between various qualitative variable were assessed using chi-square test. For

statistical evaluation, probability of value  $p < 0.05$  was significant. The factors that were found to have significant relationship with Epiretinal membrane were analyzed using logistic regression.

**Results:** A total of 306 patients were selected by simple random method. Out of which 30 patients

diagnosed to have presence of epiretinal membrane.

Proportion of Epiretinal membrane among patients attending Ophthalmology OPD was 10%. The demographic profile of study population was as shown in Table 1.

**Table 1: The demographic profile**

Parameters		N (%)
Classification of ERM	Primary	8 (27%)
	Secondary	22 (73%)
Laterality	Unilateral	3 (1%)
	Bilateral	27 (9%)
Grading	Cellophane maculopathy	18 (6%)
	Pre-retinal fibrosis	12 (4%)

The number of cases increases with age group, maximum number of cases was belonging to 61-80 yrs (16.9%). This finding was statistically significant ( $p=0.003$ ). A slightly increasing frequency of Epiretinal membrane was seen in females (12.4%) as compared to (6.60%) males, which was found to be statistically insignificant difference ( $p=0.094$ ). Diabetes mellitus and dyslipidemia were found to be having a statistically significant association with ERM ( $p=0.001$  and  $0.003$ , respectively). [Table 2]

**Table 2: Relationship of different risk factors with Epiretinal Membrane**

Risk factors	Epiretinal Membrane			Chi-Square Value	P-value
	Present N (%)	Absent N (%)	Total N (%)		
Diabetes mellitus	19 (17.4%)	90 (82.6%)	109 (100%)	11.139	0.001 (S)
Hypertension	11 (9.4%)	93 (90.6%)	104 (100%)	0.106	0.744 (NS)
Coronary Artery Disease	03 (3.9%)	74 (96.1%)	77 (100%)	4.061	0.057 (NS)
Dyslipidemia	15 (18.1%)	68 (81.9%)	83 (100%)	8.805	0.003 (S)
Smoking	10 (12.3%)	71 (87.7%)	81 (100%)	0.805	0.370 (NS)

NS- Not Significant, S- Significant. Posterior vitreous detachment, previous history of retinal surgeries, vessel occlusion retinopathy, proliferative diabetic retinopathy were found to have a statistical significant association with ERM ( $p < 0.05$ ). [Table 3]

**Table 3: Relationship of ocular conditions with Epiretinal Membrane**

Ocular conditions	Epiretinal Membrane			Chi-Square Value	P-value	
	Present N (%)	Absent N (%)	Total N (%)			
Posterior vitreous detachment	21 (61.8%)	13 (38.2%)	34 (100%)	116.8	<0.001 (S)	
Cataract surgery	12 (11.5%)	92 (88.5%)	104 (100%)	0.536	0.464 (NS)	
Retinal surgeries	06 (50.0%)	06 (50.0%)	12 (100%)	22.821	<0.001 (S)	
Vessel occlusion	05 (62.5%)	03 (37.5%)	08 (100%)	25.79	<0.001 (S)	
Hypertensive retinopathy	06 (9.8%)	55 (90.2%)	61 (100%)	0.000	0.992 (NS)	
Diabetic retinopathy	Non-proliferative	06 (13.0%)	40 (87.0%)	46 (100%)	0.643	0.423 (NS)
	Proliferative	07 (29.2%)	17 (70.8%)	24 (100%)	11.042	0.001 (S)
Retinal break	01 (16.7%)	05 (83.3%)	06 (100%)	0.326	0.464 (NS)	
Glaucomatous cupping	02 (6.7%)	28 (93.3%)	30 (100%)	0.370	0.751 (NS)	
Age related macular degeneration	0 (0%)	08 (100%)	08 (100%)	0.893	1.000 (NS)	

NS- Not Significant, S- Significant. Most common presentation of ERM was decreased vision (12.8%). [Table 4]

**Table 4: Frequency of Ocular Symptoms in ERM**

Presenting Complaint	Epiretinal Membrane		Total	Chi-Square Value	P-value
	Present	Absent			
Asymptomatic	5	96	101	5.784	0.123 (NS)
	5.0%	95.0%	100.0%		
Decreased Vision	25	170	195	5.784	0.123 (NS)
	12.8%	87.2%	100.0%		
Metamorphopsia	0	8	8	5.784	0.123 (NS)
	.0%	100.0%	100.0%		

Central Visual loss	0	2	2		
	.0%	100.0%	100.0%		
Total	30	276	306		
	9.8%	90.2%	100.0%		

NS- Not Significant

**Discussion:**

Recent researches have gathered population-based prevalence data on ERM from various ethnic groups, revealing rates ranging from 2.2% to 18.5%. [6-8] Xiao W et al [9] conducted a study and observed that 9.1% of general population had some form of epiretinal membranes, 6.5% had cellophane maculopathy and 2.6% had the advanced form of pre-retinal fibrosis.

In this study, percentage of epiretinal membrane cases increased from 60-80 yrs group. After this, there was a decrease in the incidence of epiretinal membrane. This finding was statistically significant with  $p < 0.003$ . This could be due to lower life expectancy or the study population selected from hospital population. The relationship with age was more likely to be due to the increased frequency in older people of conditions such as posterior vitreous detachment, cataract surgery and retinal diseases that may cause epiretinal membrane. Ching Hui NG et al [10] concluded that increasing age was the risk factor for ERM (odds ratio 1.19, 95% confidence intervals).

Among other systemic risk factors, diabetes mellitus ( $p = 0.001$ ) and dyslipidemia ( $p = 0.003$ ) had statistically significant association, while coronary artery disease and hypertension had no significant association with epiretinal membrane ( $p > 0.05$ ).

This finding was consistent with previous studies. A study was conducted by Ching Hui NG et al [10] on prevalence and risk factors of epiretinal membrane in a multi ethnic United States population. The researchers postulated that there was a significant correlation between diabetes (OR 1.92, 95% CI, 1.39, 2.65) and hypercholesterolemia (OR 1.33, 95% CI, 1.04, 1.69) with CMR.

Ronald Klein et al, [11] presented with similar findings in his study of epidemiology of epiretinal membranes. They found that neither the presence nor severity of epiretinal membrane was related to hypertension, h/o cardiovascular diseases, h/o smoking, or history of alcohol consumption.

Wang SB et al [12] examined the occurrence and variables that contribute to the development of epiretinal membrane in a group of individuals at risk for cardiovascular disease, and compared their findings with those from the Blue Mountains Eye Study. [13] This study suggests that cardiovascular disease (specifically severity and extent of CAD) is not associated with ERM. However, there may be a greater prevalence of severe ERM (PMF) in a high

cardiovascular risk cohort relative to a population-based cohort. The findings of present study as well as a review of literature on similar studies indicate that cardiovascular diseases are not associated with ERM.

Checa et al [14] demonstrated that cigarette smoke extract induced the expression of a variety of profibrotic genes, and the activation of TGF- $\beta$ 1, resulting in the excessive accumulation of ECM and the activation of myofibroblasts, which also plays a crucial role in the pathogenesis of ERM. A study done by Wang SZ et al [15] aimed to compare the correlation among smoking & Epiretinal Membrane. This meta-analysis of analytic and observational research discovered an unforeseen beneficial impact of smoking in relation to ERM. The unexpected correlation between smoking and ERM was also noted in other investigations. Kawasaki et colleagues [16] ascribed this unforeseen protective correlation to the significant disparity in the ratio of male & female individuals who now smoke in their research cohort. Consequently, the proportion of male smokers is at 92.7%. McCarty et al [17] put out an alternative argument suggesting that a survival impact may be attributed to increased death rates among male individuals who now smoke.

A study by Ning cheung et al [18] showed that cataract surgery was significant factor that independently associated with secondary ERM. But present study found that there was no statistically significant difference between cataract surgery and ERM.

Out of various retinal diseases, proliferative diabetic retinopathy and retinal vein occlusion had significant association with epiretinal membrane. Klein et al [11] in a study conducted on the epidemiology of epiretinal membrane found that the higher frequency of epiretinal membrane was with proliferative diabetic retinopathy. Fraser-Bell Set al [7] conducted a population-based study of eye disease on the prevalence and associations of epiretinal membranes in Latinos aged 40 years or more. They hypothesized that ERMs were also more common in individuals who had proliferative diabetic retinopathy (25.7%). In this present study it was observed that there was no significant association between age related macular degeneration or glaucomatous cupping with epiretinal membrane. A cross-sectional community survey was conducted among residents of Chikusei in Ibaraki prefecture, Japan and observed that there

was no significant association between ERM and glaucomatous optic disc cupping in either age group.

#### Limitations of the study:

1) As the study population were out patients in tertiary health care system it will not exactly correlate with the prevalence and clinical profile of epiretinal membrane in the general population. The sample size was not adequate comparing the prevalence of epiretinal membrane with general population.

2) Another limitation of present study was ERM grading that was based on ophthalmoscopic examination and finding confirmed by OCT based grading. This could have resulted in underestimation of prevalence of epiretinal membrane. A subtle ERM could have been missed on fundus examination.

3) The higher incidence of diabetes and retinal vascular occlusions in the population studied could have caused the higher incidence of secondary ERMs compared to idiopathic ERMs. There are no adequate Indian studies conducted in tertiary institutions for making a comparison of study results.

#### Conclusion:

The estimated proportion of Epiretinal membrane was 10%. The presence of epiretinal membrane in the study population was associated with age, dyslipidemia, diabetes mellitus, proliferative diabetic retinopathy, vessel occlusion, retinal surgeries and posterior vitreous detachment. Due to advances in microsurgical vitrectomy systems and improvements in surgical techniques, early surgical intervention is now advocated for ERM by many, compared to rather traditional conservative approach in the past. As such, prompt detection of ERM and analysis of its cause is pertinent in the management of this disease entity.

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