Section A -Research paper

A CROSS-SECTIONAL STUDY ON MACULAR OEDEMA(MO)

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ABSTRACT
According to past research, MO may cause impaired center vision and "washed-out" colors. Hence, our study's aim was to evaluate clinical features, etiology, and MO patterns. We have found through our investigation that MO causes 35% of the vision loss in vitreoretinal disorders with DM. So, early identification and treatment are essential to averting blindness. Numerous modifiable risk factors for DM-MO may need early intervention, like DRT, CMO, SRD, PHT, SFF, and TRD patterns. Out of which, CMO was most common in 61.73% of patients. Furthermore, we also found that FFA also influences MO treatment response. Hence, to conclude, it is essential to determine MO's etiology, pattern, and chronicity to help personalize treatment modalities and further monitor its response.
Keywords: MO**,** FFA**,** Clinical Features, Etiology, MO Patterns **&** Treatment Response**.**

INTRODUCTION

Studies have proved that MO is painless & may predict specific symptoms as it develops further, which includes blurred or wavy center vision and/or colors that seem "washed out" or transformed.[1] Since the macular is located near the retina's center at the back of the eye, swelling may cause a person's central vision to blur. A person's central vision, where the cones are most densely packed, allows them to discern detail, shape, and color in the direction in which they are looking. Studies have also shown that the primary cause of MO is diabetic retinopathy. After cataract surgery, macular oedema might emerge a few days to weeks later due to retinal venous occlusions. Hypertension, inflammatory uveitis, exudative retinal detachment, renal failure, retinitis pigmentosa, radiation exposure, and medications including latanoprost, epinephrine, and nicotinic acid are other potential causes of retinal oedema.[1] Modern imaging techniques like fluorescein angiography and optical coherence tomography (OCT) have made it easier to describe the clinical evaluation of MO.[2,3] Thus, our study aim was to evaluate & assess clinical profile, etiology & various patterns of MO.

AIM

The goal of the study was to evaluate & assess clinical profile, etiology & various pattern of MO.

INCLUSION CRITERIA

1. Patients having symptoms of MO.
2. Patients of both genders i.e. male & female were included in the study.

EXCLUSION CRITERIA

1. Those patients whose Fundus examination were difficult were excluded from our study.
2. Patient with Central Corneal Opacities.
3. Patient with Media Opacities like Vitreous Degeneeration or Vitreous Haemorrhage.
4. Patient with Dense Central Cataract.
5. Patient who all are under treatment for MO.

MATERIALS & METHOD

Our study was a cross sectional study for patients with MO problems & reported to Department of Opthlmology ,KH , Karad.

STUDY DESIGN- Our study was an cross sectional type of study.

SOURCE OF DATA – We have started our study from December 2018 which ended at May 2020 .

METHODOLOGY

The performa of the investigation was explained to all patients after taking informed written consent .Further, detailed history & examination were done. Examination include Visual acuiy (VA) by Snellens Distant Vision chart & Jaegers near vision chart, Amslers Grid , Colour Vision using Ishihara Chart & Slit Lamp 90 D examination. Fundus examination performed using indirect & direct fundoscopy after dilating with 0.8% tropicamide & 5% phenylephrine eye drop .(if not contraindicated). Furthermore, docmentation & pattern of MO was evaluated & recorded using Fundus Camera , OCT & FFA .

SAMPLE SIZE – A total of 60 patients were involved in our study .

RESULT

GENDER

SEX	NUMBER	PERCENTAGE (%)
Male	43	71.67%
Female	17	28.33%
Total	**60**	**100%**

TABLE 1: GENDER DISTRIBUTION.

In our study we found that , male patient were 43 & female were 17 in number therfore male : female ratio was 2.53:1.

AGE

Age group (years)	Number	Percentage (%)
21-30	2	3.33 %

31-40	2	3.33 %
41-50	10	16.67 %
51-60	11	18.33 %
61-70	22	36.67 %
71-80	11	18.33 %
81-90	2	3.33 %
Total	**60**	**100%**

TABLE 2 : AGE DISTRIBUTION.

DURATION OF DM

DURATION (YEARS)	NO OF PATIENTS	PERCENTAGE (%)
<5 years	1	4.16%
5-10 years	1	4.16%
10-20 years	13	54.16%
≥ 20 years	9	37.5%

TABLE 3 : DURATION.

In our study we have found that , majority of the patients wit MO showed 10 -20 years (54.16%) duration for DM.

RISK FACTOR

RISK FACTORS	NO OF PATIENTS	Percentage (%)
Hypertension	3	12.5%
Dyslipidaemia	17	70.8%
HbA1c = > 6.7	14	58.33%
Nephropathy	10	41.67%
Smoking	11	45.83%

TABLE 4 : RISK FACTOR.

In our study we have found that, 70.8% patients had Dsylipidaemia followed by 58.33% for HbA1c risk factor for patients with DM-MO.

CSMO & DYSLIPIDAEMIA

DYSLIPIDAEMIA	CSMO		TOTAL
	RIGHT EYE	LEFT EYE	
PRESENT	8	11	19 (76%)
ABSENT	2	4	6 (24%)
TOTAL	10	15	25

TABLE 5 :LINK BETWEEN THE 2 VARIABLE.

In our study we have found that, 76% (n=19) eyes shouwed a clinically significant link between the 2 variable for patients with DM-MO.

TYPE OF DM & ANTI-DM

TYPE	NO OF PATIENTS	PERCENTAGE
Type 1 (insulin dependent)	2	8.33%
Type 2 (oral HGA)	15	62.5%
Type 2 (on insulin)	7	29.17%

TABLE 6: TYPES OF DM & ANTI-DM.

In our study we have found that , 62.5% DM-MO showed type 2 DM on oral Hypoglycaemic agents & 29.17% shows type 2 DM on insulin . Only 2 patients were with type 1 with DM on insulin regimen.

TYPE OF ETDRS WITH MO

Type of DM with MO	No of patients	Percentage
Mild NPDR	2	8.33%
Moderate NPDR	8	33.33%
Severe NPDR	10	41.67%
PDR	4	16.67%

TABLE 7: ETDRS WITH MO.

In our study we have found that , severe NPDR was seen for 41.67% DM-MO patients.

OCT PATTERN

Classification	Right Eye	Left Eye	Percentage (%)
DIFFUSE RT (DRT)	5	3	20 %
CYSTOID MO (CMO)	10	15	62.5 %

POST HYALOID TRACTION(PHT)	2	0	5 %
SUBFOVEAL FLUID(SF)	1	0	2.5 %
TRACTIONAL RD(TRD)	3	1	10 %
Total Number of Patients	**21**	**19**	**100%**

TABLE 8:OCT PATTERN IN DM-MO.

In our study we have found that , most common OCT pattern is CYSTOID TYPE which was 62.5% followed by diffuse retinal thickening upto 20%.

FFA PATTERN

CLASSIFICATION	RIGHT EYE	LEFT EYE	PERCENTAGE (%)
FOCAL	2	1	10.71%
DIFFUSE	5	2	25 %
MIXED	7	11	64.29%
Total Number of Eyes	**14**	**14**	**100%**

TABLE 9 : FFA PATTERN IN DM-MO.

In our study we have found that , most common pattern was mixed type upto 64.29%.

CORRELATION BETWEEN FFA & OCT PATTERN

OCT / FFA	DRT	CMO	PHT	SF	TRD
FOCAL	0	3	0	0	0
DIFFUSE	5	1	0	1	0
MIXED	3	14	0	0	1
ISCHAEMIC	0	0	0	0	0

TABLE 10: CORRELATION BETWEEN 2 VARIABLES.

In our study we have found that , 14 eyes with cystoid MO showed mixed pattern on FFA , 3 showed focal patttern & 1 showed diffuse pattern respectively.

CORRELATION BETWEEN VA & OCT PATTERN

OCT / Visual Acuity	DRT	CMO	PHT	SF	TRD
<6/60	2	10	1	1	2
6/60-6/24	5	11	1	1	1
6/18-6/12	1	4	0	0	1

TABLE 11: CORRELATION BETWEEN THE 2 VARIABLE.

In our study we have found that , 10 eyes with cystoid MO showed vision <6/60 (40%) , 11 showed 6/60-6/24 (44%) & remaining 4 eyes had vision 6/18-6/12 (16%).

CORRELATION BETWEEN SEVERITY OF DM & OCT PATTERN IN DMO.

OCT / Severity	DRT	CMO	PHT	SF	TRD
Mild NPDR	2	0	0	0	0
Moderate NPDR	4	1	2	1	0
Severe NPDR	2	5	2	1	0
PDR	0	2	0	0	2

TABLE 12: CORRELATION.

In our study we have found that , cystoid MO was found to be in 5 eyes with severe NPDR , 2 eyes with PDR & 1 with moderate NPDR.

PATIENT WITH RETINAL VEIN OCCLUSION (RVO) & MO WITH ASSOCIATED RF

RISK FACTORS	CRVO	BRVO	PERCENTAGE (%)
Hypertension	3	11	93.33%
Diabetes mellitus	0	4	26.67%
Glaucoma	0	5	33.33%
Smoking	2	5	46.67%

TABLE 13: RVO & MO (RF).

In our study we havee found that , RVO showed hypertension upto 93.33% , 7 patients with smoking upto 46.67% , 5 patients with glaucoma upto 33.33% & remaining 4 patients with DM upto 26.67%.

ASSOCIATION OF SMOKING IN ARMD WITH MO.

Smoking addiction	Unilateral ARMD	Bilateral ARMD	Total	PERCENTAGE (%)
Present	3	0	3	60%
Absent	1	1	2	40%
Total	4	1	5	100%

TABLE 14: ASSOCIATION OF SMOKING & MO.

In our study we have found that , 60% patients were smokers who had ARMD with MO.

DISCUSSION

GENDER

The ratio of males to females in our study was 2.53:1, which is consistent with the findings of the Wisconsin Epidemiological Study of Diabetic Retinopathy, which found a ratio of 1.5:1.[4]

AGE

In our study, we divided the patients into seven groups covering a 10-year age range. The majority of common age groups were between 61 and 70 years old, with 22 patients in the 36.67% age group, 11 patients in the 51 to 60 year and 71 to 80 year age groups, 10 patients in the 16.67% 41 to 50 year age group, and 2 patients in the 3.33% 61 to 70 year age group. This yields a median age of 62, a range of 23 years, and a mean age of 60. According to a Wisconsin study, people in their middle years of life (ages 45 to 64) had the greatest incidence and prevalence of DR.[4,5,6] Our findings are congruent with those of their study.

RISK FACTOR

In our study , we have found that majority of the patients, 21 (35%) showed symptoms of DM,12(20%) patients with BRVO, 6 upto 10% had Hypertension ,5 patients had ARMD upto 8.33%, 4 patients had Irvine Gass syndrome (6.67%),3 patients had Hypertension & Diabetes (5%), 3 patients had CRVO (5%), 2 patients had BO and Tuberculosis each (3.33%), 1 patient had CSCR & RP each (1.67%) respectively. Out of which , as we know according to

various past studies that , CSCR is a type of serous retinal detachment & differential for MO. But it does not cause MO primarily.[7]

Furthermore, 39 patients with unilateral MO & 21 showed bilateral MO. The majority of the unilateral cases (30.77%) showed BRVO, followed by diabetes in 8 patients (20.51%). In addition,we also come to know from our investigation that , majority of the bilateral patients showed symptoms for DM in about 13 of 21 upto 61.90% which was followed by patients with only high BP & with high BP & DM upto 14.29% respectively.

VA & MO

In our study we have found that , 40 eyes upto 49.38% in total showed VA ranging from 6/60-6/24, 25 eyes upto 30.87% showed < 6/60 & remaining 16 upto 19.75% showed between 6/18-6/12. Further, 31 eyes upto 38.27% with near vision <N36, 27 eyes upto 33.33% with vision N36-N18 ,19 eyes upto 23.46% with vision N12-N10 & 4 eyes upto 8.16% with vision <N8. Hence , we have found no significant difference in near vision of MO patients using Chi square statistic = 4.059 & p value = 0.2552 .

METAMORPHOPSIA & MO

In our study, 39 out of 50 oedematous eyes showed metamorphopsia (78%) on Amslers grid test on presentation. So, again there was no statistical significance found with occurrence of metamorphopsia in patients with MO with Chi square statistic = 1.332 and p value = 0.2484.

OCT & MO

In our study, we found that cytoid was the most common OCT pattern, with 50 eyes showing MO of up to 61.73%, 22 eyes showing diffuse retinal thickening of up to 27.16%, 2 eyes showing post-hyaloid traction (PHT) of up to 2.47%, and 4 eyes showing tractional retinal detachment of up to 4.94%. Furthermore, DM was the most common cause of the cystoid pattern in 22 eyes (44%), followed by BRVO and CSCR in 6 eyes up to 12%. Furthermore, we found that DM and BRVO were the most common causes of DRT, accounting for 30% of cases in each of the six eyes investigated. We found no significant association between MO and OCT patterns when we analyzed the Chi-square statistic (p = 0.1209). Various studies have proved that ,OCT of Berlins Oedema patients showed disruption of IS/OS junction with overlying outer retinal hyper reflectivity and a hypo reflective sub retinal cleft.[8]

MO THICKNESS (MO-T)

53.09% i.e.n=43 showed MO-T upto 351-500 microns, 33.33% i.e. n=27 showed MO-T upto 250-350 microns & remaining 13.58% i.e. n=11 showed MO-T upto >501microns**.** Further, there were 19 males upto 79.17% & 5 females upto 20.83% , out of 24 were having DM with MO with a male to female ratio with 3.8:1. In addition, most common age group in DM-MO was between 61-70 years with 10 patients upto 41.67% , followed by 51-60 years of age with 7 patients (29.17%)

DURATION OF DM-MO

Patients with diabetic macular oedema had a duration of 10–20 years, whereas 37.5% had 20 years and 8.32% had 10 years.

RISK FACTOR

In our study we have found that, the associated of RF in DM-MO patients showed dyslipidaemia upto 70.8%, smoking upto 45.83%, nephropathy upto 41.67% & hypertension upto 12.5%. 76% i.e. n=19 eyes showed clinically significant MO with associated of dyslipidaemia upto 62.5%, DM-MO with TYPE 2 DM on oral Hypoglycaemic agents and

29.17% with TYPE 2 DM & were on insulin also. Only 2 patients with TYPE 1 DM were on insulin regimen.

DM & OCT PATTERN

In our study we have found that, 2 patients showed mild NPDR upto 8.33%, 8 patients showed moderate NPDR upto 33.33%, 10 patients showed severe NPDR upto 41.67% & 4 patients showed PDR upto 16.67% with DM-MO. Further, TRD pattern in 4 eyes upto 10%, PHT in 2 eyes upto 5% patients & subfoveal fluid upto 2.5% patients in one eye . Thus, we found that there was, no significant association found when between DM-MO & OCT patterns using Chi square statistic = 5.414 and p value = 0.2474.

FFA PATTERN

In our study, OCT was performed on twenty-one diabetic patients' right eyes and nineteen diabetic patients' left eyes. We found that the CYSTOID type, which was up to 62.5% in 25 eyes, and DRT, which was up to 20% in 8 eyes, were the most common OCT patterns. According to several studies, the DRT pattern is more common than the cystoid pattern. End-stage or R-MO patients, on the other hand, were found to be more prevalent in our study.[9] It was principally performed on 14 diabetic patients, and the most common pattern was found to be mixed (focal and diffuse) in 18 eyes; an additional 7 eyes showed a 25% diffuse pattern; and 3 eyes showed a 10.71% diffuse pattern. In terms of FFA patterns, 14 cystoid MO eyes showed a mixed pattern, whereas only three eyes showed a focal pattern and one eye showed a diffuse pattern.

RVO & MO(RF)

In our study we have found that, RF was associated with RVO in 14 patients with hypertension upto 93.33%, 7 patients with Smoking upto 46.67%, 5 patients with glaucoma upto 33.33% & remaining 4 patients with DM upto 26.67% respectively.

CONCLUSION

In our study, MO was the most common cause of vision loss in patients with diabetic vitreoretinal diseases, accounting for up to 35% of cases. To avert blindness, early detection and treatment are essential. If some risk variables are allowed to develop unchecked, DM-MO may need to be treated more quickly. Diagnosis is important & easy also with slit lamp bio microscopy & OCT for different aptterns of MO. In our cross sectional clinical study, 5 OCT patterns in DM were seen i.e. DRT, CMO, SRD, PHT, SFF and TRD. Out of which, CMO was the most common OCT finding found upto 61.73% patients. Additionally, FFA is used to determine whether or not the MO will respond to treatment. Therefore, we conclude that it is essential to determine the MO's etiology, pattern, and chronicity in order to personalize the treatment modality and monitor its response.

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