

## Pattern of Macular Hole in Menilik II Comprehensive Specialized Hospital

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### Abstract

**Objective:** To assess the pattern of macular hole in Menilik II comprehensive specialized hospital, Addis Ababa, Ethiopia.

**Method:** A prospective cross-sectional study was conducted on patients with macular holes seen at the Retina clinic at Menilik II Comprehensive Specialized Hospital from April 2023 to August 2024. Data were collected using an interviewer-administered questionnaire and analyzed in SPSS version 26.

**Results:** A total of 56 individuals (58 eyes) were included in this study with age range of 8 to 81 years. Idiopathic macular hole was found in 55.4% of study participants with mean age of 60.6 (24 - 81) years. Traumatic macular hole accounted for 33.9% of macular hole. It was commonly seen in young males with mean age of 31.9 (8 - 70) years. Average size of macular hole was 619.77 (54 - 1115)  $\mu\text{m}$  where 82.1% of study participants had macular hole size above 400  $\mu\text{m}$ .

**Conclusion:** Idiopathic macular hole was found to be the commonest cause of macular hole. It was common in older females. Traumatic macular hole was common in young males. In both Idiopathic and Traumatic macular hole, a larger average size of macular hole was noted.

**Keywords:** Macular Hole; Central Vision; Menilik II Hospital; Ethiopia

### Introduction

A Macular Hole (MH) is a full-thickness defect or tear of retinal tissue involving the anatomic fovea of the eye. Affected individuals present with metamorphopsia (distortion of central vision), loss of central vision, and central scotoma. Age-related idiopathic macular hole (IMH), which is caused by tangential vitreous traction on the fovea, comprises most of these lesions [1].

MH has also been associated with trauma, high myopia, retinal vascular disease, uveitis, choroid neovascularisation, macular dystrophies, retinal reattachment surgeries, and lens removal [2].

The prevalence of MH reported in the literature varies greatly. It is reported as 3.3 per 1000 people in the Baltimore Eye Study [3], 0.2 per 1000 in the Blue Mountains Study [4], 0.9 per 1000 in the Beijing Study [5], 1.7 per 1000 in a study in Southern India [6] and 4 per 1000 in the Beaver Dam Study [7].

The International Vitreomacular Traction Study (IVTS) group formed a classification scheme for macular holes based on OCT findings. A full-thickness macular hole is a full-thickness defect from the internal limiting membrane to the retinal pigment epithelium. This

classification takes factors like the size of the macular hole, the cause of the macular hole, and the presence or absence of Vitreomacular traction (VMT) into account [2].

Vitrectomy surgery is indicated for all recent full-thickness macular holes. In the most recent case series, the success rate for this procedure in achieving closure and vision improvement was greater than 90%. Thus, early diagnosis and timely management are crucial to prevent blindness from a macular hole.

### Aim of the Study

The study aimed to provide relevant data on the pattern of macular holes observed at Menilik II Comprehensive Specialized Hospital, Addis Ababa, Ethiopia. This can aid physicians in diagnosing, investigating, and managing patients with macular holes.

### Methods

**Method and setting:** The study was conducted at Menilik II Comprehensive Specialized Hospital, based in Addis Ababa, Ethiopia. It has been providing eye care services for over 4 decades. The department of Ophthalmology has general outpatient clinics and five subspecialty clinics, including the Retina subspecialty clinic.

A prospective cross-sectional study was conducted on patients with macular holes seen in the Retina clinic at Menilik II Comprehensive Specialized Hospital from April 2023 to August 2024.

**Ethics:** The study was approved by the Research and Publication Committee of the Department of Ophthalmology, School of Medicine, College of Health Science, Addis Ababa University.

The study followed the principles outlined in the Declaration of Helsinki. Verbal Consent was taken from each participant.

**Study tool:** A Questionnaire was prepared to collect the socio-demographic, clinical presentation, medical history, trauma history, and ocular surgical history of study participants, and a comprehensive ocular examination was done on every patient.

### Operational definitions

Visual impairment was classified based on the International Classification of Diseases 11 (2018) as:

- No visual impairment- Visual acuity from 6/6 to 6/12.
- Mild visual impairment- Visual acuity worse than 6/12 to 6/18.
- Moderate visual impairment- Visual acuity worse than 6/18 to 6/60.
- Severe visual impairment- Visual acuity worse than 6/60 to 3/60.
- Blindness- Visual acuity worse than 3/60.

Macular hole was classified by the IVTS classification [2], which has three parameters:

- The size of the macular hole (horizontal diameter at the narrowest point of the macular hole) can be small  $\leq$  250 micrometer, medium 250 - 400 micrometer and large  $>$  400 micrometer.
- Cause can be primary or secondary.
- Presence or absence of vitreomacular traction.

**Procedure**

All consecutive patients presenting to the retina clinic at Menilik II Comprehensive Specialized Hospital with a macular hole were included in this study. An ocular examination was performed on every participant. Visual acuity and Best Corrected Visual Acuity (BCVA) were measured using the Snellen’s chart. Intraocular pressure was measured using an air-puff tonometer. Anterior segment examination was done by Slit lamp biomicroscope, followed by dilated fundus examination with a 90-diopter lens. A Vitreoretinal surgeon confirmed the diagnosis of a macular hole, and each case was investigated with Optical Coherence Tomography (OCT) to describe the pattern of the macular hole.

**Data analysis**

The completeness of each data set was checked, and then the data were entered and analyzed using SPSS version 26. Summary statistics and frequencies were performed for the descriptive data. Binary logistic regression was performed to identify the relationship between the independent variables and macular hole. Variables with  $p < 0.05$  were considered significantly associated with macular hole.

**Result**

**Socio-demographic characteristics**

A total of 56 individuals (58 eyes) were included in this study. The mean age for all macular holes was 51.3 +/- 20 years (8 - 81 years). Males accounted for 53.6% of participants.

Characteristics	Frequency	Percentage
<b>Age in years</b>		
<15	1	1.8
15-40	19	33.9
41-64	16	28.6
>=65	20	35.7
<b>Sex</b>		
Male	30	53.6
Female	26	46.4
<b>Address</b>		
Urban	41	73.2
Rural	15	26.8
<b>Occupation</b>		
Governmental employee	9	16.1
Private employee	7	12.5
Daily labourer	2	3.6
House wife	15	26.8
Student	5	8.9
Others	18	32.1

**Table 1:** Socio-demographic characteristics of study participants (n = 56), Menilik II comprehensive specialized Hospital, Ethiopia.

*Others: Farmer, Retired.*

**Ocular and medical characteristics**

Of the 56 participants, 31 individuals (55.4%) had an idiopathic macular hole. Females accounted for 74.2% of Idiopathic macular holes with a male-to-female ratio of 1:2.9. The Mean age for Idiopathic macular holes was 60.6 (24 - 81) years.

A traumatic macular hole was found in 19 individuals (33.9%), with males accounting for 84.2% of participants, with a mean age of 31.9 (8 - 70) years.

Unilateral macular hole was found in the right eye of 22 patients (39.3%) and in the left eye of 32 patients (57.1%). A bilateral macular hole was found in 2 individuals (3.6%).

	Frequency	Percentage
Idiopathic macular hole	31	55.4
Traumatic macular hole	19	33.9
Others	6	10.7

**Table 2:** Causes of macular hole (n = 56), Menilik II comprehensive specialized hospital, Ethiopia.

*Others: Age-related macular degeneration (3), diabetic retinopathy (2), post-uveitic (1).*

The most common presenting symptom was progressive visual reduction (82.1%), followed by sudden visual loss (8.9%). Mean duration of symptoms for idiopathic macular hole was 26.2 (1 - 96) months. Mean duration of symptoms for traumatic macular hole was 5 (0 - 24) months.

Symptom	Frequency	Percentage
Progressive visual reduction	46	82.1
Metamorphopsia	2	3.6
Central scotoma	3	5.4
Sudden vision loss	5	8.9

**Table 3:** Presenting symptoms of study participants (n = 56), Menilik II comprehensive specialized hospital, Ethiopia.

**Visual impairment**

The presenting visual acuity of all macular holes ranged from 6/24 to hand motion, where 21 individuals (37.5%) had initial visual acuity worse than 3/60. Nineteen individuals (33.9%) still had best corrected visual acuity worse than 3/60.

The majority of patients with idiopathic macular hole (38.7%) had visual acuity between 6/18 and 6/60, while the majority of patients with traumatic macular hole (52.6%) had visual acuity < 3/60.

Presenting Visual acuity	Macular hole (%)	IMH (%)	TMH (%)
6/18-6/60	18 (32.1)	12 (38.7)	4 (21.1)
6/60-3/60	17 (30.4)	10 (32.3)	5 (26.3)
<3/60	21 (37.5)	9 (29.0)	10 (52.6)

**Table 4:** Presenting visual acuity of study participants (n = 56), Menilik II comprehensive specialized hospital, Ethiopia.

BCVA	MH (%)
<6/12-6/18	3 (5.4)
6/18-6/60	17 (30.4)
6/60-3/60	17 (30.4)
<3/60	19 (33.9)

**Table 5:** BCVA of study participants (n = 56), Menilik II comprehensive specialized hospital, Ethiopia.

**Macular hole and vitreous status**

The average size of the macular hole was 619.77 µm (54 - 1115 µm). Forty-six participants (82.1%) had a macular hole size above 400 µm.

The average size of the idiopathic macular hole was 631.2 µm (124 - 1068 µm).

The average size of Traumatic macular holes was 627.4 µm (335 - 1115 µm).

Size of macular hole	Frequency	Percentage
<= 250	4	7.1
250 - 400	6	10.7
> 400	46	82.1

**Table 6:** Size of macular hole of study participants, Menilik II comprehensive specialized hospital, Addis Ababa, Ethiopia.

Of 56 individuals, 23 (41.1%) had Weiss ring in the involved eye, and 10 (17.8%) had Weiss ring in the fellow eye. Five individuals (8.9%) with Traumatic macular hole had vitreous hemorrhage associated with macular hole.

	Involved eye	Fellow eye
Clear	27 (48.2%)	44 (78.6%)
Weiss ring	23 (41.1%)	10 (17.9%)
Vitreous haemorrhage	5 (8.9%)	1 (1.8%)
Vitreous cells	1 (1.8%)	1 (1.8%)

**Table 7:** Vitreous status of study participants (n = 56), Menilik II comprehensive specialized hospital, Ethiopia.

**Factors associated with macular hole**

There was no significant association between the size of macular hole and duration of symptoms, with P = 0.89 (COR = 1.06, 95% CI: 0.38 - 2.92). There was also no significant association found between the duration of symptoms and visual acuity of the eye with macular hole (P = 0.71, COR = 1.14, 95% CI: 0.57 - 2.27).

**Discussion**

This study included 56 individuals (58 eyes) with a macular hole. Females accounted for the majority of Cases of Idiopathic macular holes (74.2%), and the average age was 60.6 years (24 - 81). This finding is similar to studies conducted in the USA [8-10], China [5],

Southern India [11], Nigeria [12], and France [19]. The male-to-female ratio in idiopathic macular hole was found to be 1:2.9. This is similar to a study in the USA [8] with a male-to-female ratio of 1:2.4. Still, a higher male-to-female ratio of up to 1:7 has been reported in China [11]. Bilateral macular hole was lower in our study (3.6%) than in studies conducted in India (8%), the USA (11.7%), and China (14.3%).

The mean age of traumatic macular hole was 31.9 (8 - 70) years, and males accounted for the majority of cases (84.2%). This is similar to studies conducted in the USA [13,17] and China [14,15], in which traumatic macular holes occurred in young people related to sports and work-related incidents.

Idiopathic macular hole was the most common cause of macular hole (51.4%), followed by traumatic macular hole (33.9%). In previous studies, the incidence of traumatic macular hole has been reported to range from 2.1% to 8.2% [6,20]. A much higher incidence of traumatic macular hole was seen in our study compared to previous studies. This might be due to the higher incidence of ocular injury in our country compared to other countries [23] and to the hospital's referral burden, which receives most ocular injuries from across the country.

Generally, an idiopathic macular hole develops gradually. The mean duration of symptoms for idiopathic macular hole in this study was 26.2 months (range 1 - 96), which was higher than studies conducted in the USA [21] and the UK [22].

The mean duration of symptoms for traumatic macular hole was 5 (0 - 24) months. This is similar to the study done in South America [16], the USA [17], and Japan [18], where patients tend to present immediately or within a few weeks following trauma.

In addition, compared with patients with idiopathic macular hole, the majority of patients (52.6%) with Traumatic macular hole had visual acuity < 3/60. A similar finding was found in a study done in China [15]. The occurrence of other retinal pathologies from trauma can exacerbate the reduced vision seen in traumatic macular hole.

The average size of the idiopathic macular hole on OCT was 631.2  $\mu\text{m}$  (124 - 1068  $\mu\text{m}$ ). This finding is higher than that reported in studies conducted in the USA (330  $\mu\text{m}$ , 400  $\mu\text{m}$ ) [10,21] and the UK (492  $\mu\text{m}$ ) [22]. Similarly, the average size of Traumatic macular hole found in this study (627.4  $\mu\text{m}$ ) was higher than that reported in studies in the USA (366.1  $\mu\text{m}$ ) [9], Spain (370  $\mu\text{m}$ ) [20], and China (471.2  $\mu\text{m}$ ) [15].

### Conclusion

Idiopathic macular hole was found to be the most typical cause of macular hole. It is predominantly seen in older female individuals. Male-to-female ratio for Idiopathic macular hole was 1:2.9. Traumatic macular hole was more common in our setup than in other countries. It was commonly seen among young male individuals. Participants with Traumatic macular hole presented earlier than participants with Idiopathic macular hole. In both Idiopathic and Traumatic macular holes, a larger average size of macular hole was noted.

### Strength of the Study

To the best of our knowledge, this study is the first to describe the pattern of macular holes in our country. It can also serve as baseline information for future studies in this country and in other African countries.

### Limitation of the Study

Though this study provides relevant data on the clinical profile of macular hole, it was not able to describe detailed characteristics of macular hole in ocular coherence tomography (OCT). This gap could be filled in further studies.

### Author's Contribution

All the authors contributed to the conception, design, analysis, acquisition, and interpretation of the data.

### Funding Source

No funding source.

### Declaration of Competing Interest

None.

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