



## Clinical Profile and Etiological Spectrum of Vitreous Haemorrhage: A Prospective Observational Study

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### Abstract

#### Background:

Vitreous haemorrhage (VH) is a significant cause of sudden visual impairment requiring urgent ophthalmic evaluation. This study aimed to evaluate the clinical profile, systemic associations, and management of patients presenting with vitreous haemorrhage.

#### Materials and Methods:

A prospective observational case series was conducted over a one-year period from December 2024 to December 2025 at a tertiary care ophthalmology centre. Sixty consecutive patients diagnosed with vitreous haemorrhage were enrolled. Data regarding demographic characteristics, systemic comorbidities, ocular findings, investigations, and treatment modalities were recorded using a structured proforma.

#### Results:

Sixty patients with vitreous haemorrhage were included. Proliferative diabetic retinopathy was the most common cause (60%), followed by ocular trauma (20%), retinal vein occlusion (10%), and other causes (10%). Vitreous haemorrhage was predominantly unilateral (76.7%), and most patients presented with visual acuity worse than 6/60. Diabetes mellitus was the most frequent systemic association. Pan-retinal photocoagulation was the most commonly advised treatment.

#### Conclusion:

Proliferative diabetic retinopathy remains the leading cause of vitreous haemorrhage. Early identification of systemic risk factors and timely management are essential to prevent irreversible visual loss.

**Keywords:** clinical profile, ocular trauma, proliferative diabetic retinopathy, vitreous haemorrhage, visual acuity

### Introduction

Vitreous haemorrhage (VH) is a common cause of sudden visual impairment requiring urgent ophthalmic evaluation [1,2]. It occurs due to bleeding into the vitreous cavity following disruption of the retinal or choroidal vasculature and is associated with a wide range of ocular conditions, including retinal vascular disorders, ocular trauma, inflammatory diseases, and postoperative complications [1,2]. Proliferative

diabetic retinopathy remains the leading cause of vitreous haemorrhage, particularly in populations with a high prevalence of diabetes mellitus [3]. Ocular trauma and retinal vein occlusion are also important etiological factors, commonly affecting younger and older individuals, respectively [4,5].

A comprehensive understanding of the clinical profile and systemic associations of vitreous haemorrhage is essential for timely diagnosis and appropriate management to prevent irreversible visual loss. Therefore, the present study aimed to analyse the clinical profile and systemic associations of vitreous haemorrhage in patients presenting to a tertiary care centre.

## Materials And Methods

### Study Design and Setting

This prospective observational case series was conducted at a tertiary care ophthalmology centre over a one-year period from December 2024 to December 2025.

### Study Population

Sixty consecutive patients diagnosed with vitreous haemorrhage during the study period were prospectively enrolled. Data were recorded using a structured proforma. The diagnosis of vitreous haemorrhage was established based on detailed ophthalmic examination and relevant ancillary investigations.

### Inclusion Criteria

1. Patients of any age and gender presenting with vitreous haemorrhage.
2. Patients attending the ophthalmology outpatient department or casualty during the study period.
3. Availability of complete clinical records including demographic details, systemic history, ocular findings, investigations, and management details.

### Exclusion Criteria

1. Patients with incomplete clinical records.
2. Patients unwilling to provide informed consent.

### Data Collection

Data collected included demographic details (age and gender), ocular history including previous trauma, surgery, and prior treatment, systemic comorbidities (diabetes mellitus, hypertension, chronic kidney disease, and other relevant systemic illnesses), and ocular findings.

Presenting visual acuity was assessed using a Snellen's visual acuity chart and recorded in standard Snellen notation. In patients with severe or sudden visual loss, visual acuity was assessed using counting fingers, hand movements close to face, perception of light, or absence of light perception, as appropriate.

Intraocular pressure (IOP) was measured using Goldmann applanation tonometry. In cases of ocular trauma, IOP assessment was performed cautiously, and digital intraocular pressure (DIOP) was assessed when applanation tonometry was contraindicated.

Anterior segment evaluation was carried out using slit-lamp bio microscopy. Dilated fundus examination was performed using indirect ophthalmoscopy. Additional ocular imaging, including fundus photography and optical coherence tomography (OCT), was performed to assess macular and retinal pathology. In eyes with poor fundus visualization, B-scan ultrasonography was used to evaluate vitreoretinal status.

### Outcome Measures

Primary outcome measures included the distribution of etiological factors, systemic associations, and treatment modalities. Secondary outcome measures included laterality and visual acuity at presentation.

### Ethical Considerations

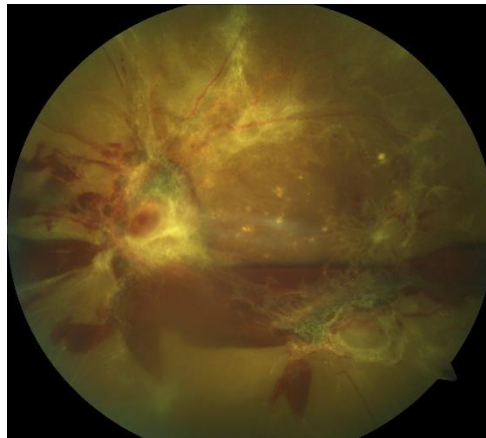
Ethical approval was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all patients prior to inclusion in the study.

### Results

A total of 60 patients with vitreous haemorrhage were included, with a male predominance (68.3%) and the highest frequency in the 51–60 year age group. Vitreous haemorrhage was unilateral in 46 patients (76.7%) and bilateral in 14 patients (23.3%). The majority of patients (70%) presented with visual acuity worse than 6/60.

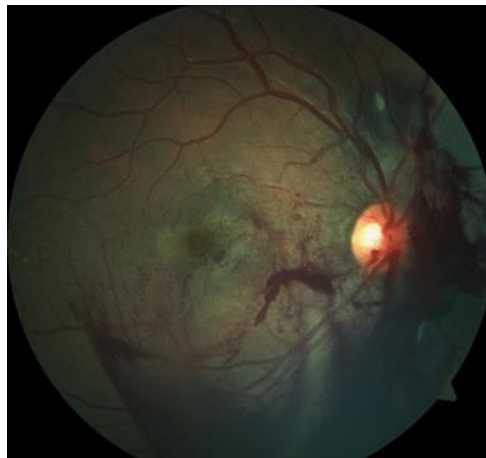
Proliferative diabetic retinopathy (PDR/high-risk PDR) was the most common cause of vitreous haemorrhage, accounting for 36 patients (60%). A representative fundus photograph demonstrating high-risk proliferative diabetic retinopathy is shown in Figure 1.

**Figure 1: Fundus photograph showing high-risk proliferative diabetic retinopathy with extensive fibrovascular proliferation and large preretinal haemorrhage obscuring the optic disc and inferior retina.**



Ocular trauma was the second most common cause, observed in 12 patients (20%). Among trauma cases, 7 patients (58.3%) had closed globe injuries with periorbital edema and subconjunctival haemorrhage, while 5 patients (41.7%) had firecracker-related injuries. Of the firecracker injuries, 3 patients (60%) presented with hyphema and epithelial defect, and 2 patients (40%) had epithelial defect with subconjunctival haemorrhage and periorbital edema. A representative traumatic vitreous haemorrhage with associated retinal changes is shown in Figure 2.

**Figure 2: Fundus photograph of the right eye showing dispersed vitreous haemorrhage with inferior settling of blood and areas of commotio retina following blunt ocular trauma.**



Retinal vein occlusion accounted for 6 patients (10%), and other causes such as secondary glaucoma, retinal vasculitis, and Terson’s syndrome were seen in 6 patients (10%). Diabetes mellitus was the most common systemic association (70%), followed by hypertension (50%) and chronic kidney disease (15%).

The following results were obtained:

Demographic Characteristics of Patients with Vitreous Haemorrhage (n = 60)

**Table 1: Gender Distribution of Study Participants (n = 60)**

S.NO	GENDER	NUMBER OF CASES (n)	PERCENTAGE %
1	Male	41	68.3%
2	Female	19	31.7%

	TOTAL	60	100%
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**Table 2: Age distribution of study participants (n=60)**

S.NO	AGE (YEARS)	NUMBER OF CASES(n)	PERCENTAGE %
1	0-10	1	1.7%
2	11-20	2	3.3%
3	21-30	8	13.3%
4	31-40	5	8.3 %
5	41-50	11	18.3%
6	51-60	14	23.3%
7	61-70	12	20%
8	71-80	2	3.3%
	TOTAL	60	100%

Mean age  $\pm$  SD: 48.9  $\pm$  16.7 years (range: 8–78 years)

**Table 3: Distribution of cases according to visual acuity**

S.NO	VISION CATEGORY	SNELLEN VA RANGE	NUMBER OF EYES	PERCENTAGE
1	Normal vision /Mild impairment	6/6 -6/18	6	10%
2	Moderate visual impairment	<6/18-6/60	12	20%
3	Severe visual impairment	<6/60-3/60	18	30%
4	Blindness	CF-PL + PL/NPL	24	40%
	Total		<b>60</b>	100%

**Table 4: Aetiology of vitreous haemorrhage**

ETIOLOGY	NUMBER OF PATIENTS	PERCENTAGE(%)
Proliferative diabetic retinopathy (PDR)	36	60%
Ocular trauma	12	20%
Retinal vein occlusion	6	10%
Inflammatory (Retinal vasculitis)	3	5%

Other causes	3	5%
TOTAL	60	100%

Other causes included postoperative SICS cataract surgery with surgical aphakia.

**Table 5: Systemic association in patients with vitreous haemorrhage**

SYSTEMIC ASSOCIATION	NUMBER OF PATIENTS	PERCENTAGE
Diabetes mellitus	42	70%
Hypertension	30	50%
Chronic kidney disease	9	15%
Other systemic conditions	6	10%

Other systemic conditions include asthma, tuberculosis, pleural effusion.

Percentages exceed 100% as some patients had more than one systemic association.

### Systemic Associations

Diabetes mellitus was present in **42 patients (70%)**, making it the most common systemic association. Hypertension was observed in **30 patients (50%)**, and chronic kidney disease in **9 patients (15%)**. Other associated systemic conditions included asthma, tuberculosis, pleural effusion. Multiple systemic comorbidities were noted in several patients.

### Treatment Modalities

Conservative management was adopted in 21 patients (35%), particularly in cases related to ocular trauma. Pan-retinal photocoagulation (PRP) was performed in 25 patients (41.7%) and was the most frequently employed treatment modality. Anti-vascular endothelial growth factor (anti-VEGF) therapy was administered in 6 patients (10%), while combination therapy including both PRP and anti-VEGF was used in 2 patients (3.3%). Surgical intervention was required in 6 patients (10%) for non-clearing vitreous haemorrhage for more than four months.

### Discussion

Vitreous haemorrhage (VH) is a common cause of sudden, painless visual loss requiring prompt ophthalmic evaluation [1]. Understanding its etiological profile and systemic associations is essential for early diagnosis and prevention of irreversible visual impairment. In the present study, proliferative diabetic retinopathy (PDR) was identified as the leading cause, accounting for 60% of cases [3].

Gupta et al. reported diabetic retinopathy as the predominant cause of vitreous haemorrhage in 58–65% of patients in an Indian cohort [4]. Similarly, Laatikainen et al. and Spraul et al. identified diabetic retinopathy as the principal aetiology in hospital-based studies [1,3]. The 60% prevalence observed in our series is consistent with these findings. The high proportion of patients with diabetes mellitus (70%) further supports the strong association between systemic metabolic disease and vitreous haemorrhage [7].

Ocular trauma was the second most common cause (20%) in our study, comparable to findings reported by Cheema et al., particularly among younger and working-age individuals [5]. These findings emphasize the preventable nature of trauma-related vitreous haemorrhage and highlight the importance of ocular safety awareness.

Retinal vein occlusion accounted for 10% of cases. Lim et al. reported a similar association between retinal vein occlusion and systemic vascular risk factors, particularly hypertension [6]. In our cohort, hypertension was present in 50% of patients. Vitreous haemorrhage was predominantly unilateral, a pattern also observed by Gupta et al. and Laatikainen et al. [4,3].

The majority of patients presented with visual acuity worse than 6/60 at initial evaluation. Gupta et al. also reported severe visual impairment at presentation in patients with vitreous haemorrhage [4]. This pattern may reflect delayed presentation and inadequate

awareness of diabetic eye disease. Regular retinal screening and early referral remain essential, particularly in individuals with systemic comorbidities, as patients may present directly with vitreous haemorrhage without prior retinal screening [7].

Collectively, these findings reinforce that proliferative diabetic retinopathy remains the most common cause of vitreous haemorrhage in the Indian population [4,3]. The demonstrated association with diabetes mellitus and hypertension underscores the importance of comprehensive systemic and ocular evaluation in affected patients [7].

### Limitations

The relatively short duration of the study precluded assessment of long-term visual outcomes and final visual prognosis. Longer follow-up studies are required to better evaluate sustained treatment effects and visual recovery.

### Future Directions

Prospective multicentre studies with larger sample sizes and standardized follow-up protocols are needed to further assess visual prognosis and optimize management strategies for vitreous haemorrhage.

### Conclusion

Vitreous haemorrhage is a vision-threatening condition most commonly associated with proliferative diabetic retinopathy and systemic comorbidities such as diabetes mellitus and hypertension [4,7]. Early diagnosis, appropriate systemic control, and timely ophthalmic intervention are essential for preserving vision [8]. Trauma-related vitreous haemorrhage remains an important and preventable cause, particularly among the younger population.

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