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AETIOLOGICAL STUDY OF RETINAL HEMORRHAGE IN YOUNG ADULT IN A TERTIARY CARE CENTRE

Ophthalomology

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ABSTRACT

Background: Retinal haemorrhage in young adults is an important clinical entity representing underlying ocular or systemic pathology. Unlike older populations, etiologies in this age group are diverse and often non-degenerative, necessitating comprehensive evaluation. **Methods:** This prospective observational study included 136 patients aged 18–40 years presenting with retinal haemorrhage. Detailed clinical history, ocular examination including slit-lamp biomicroscopy, fundus evaluation, and visual acuity assessment were performed. Ancillary investigations such as fundus photography, optical coherence tomography (OCT), B-scan ultrasonography, and systemic evaluation were undertaken. **Results:** The mean age was 29.4 ± 6.2 years with male predominance (64.7%). Bilateral involvement was seen in 57.4% of cases. The most common presenting symptom was gradual diminution of vision (27.9%), followed by floaters (23.5%). Ophthalmoscopically, flame-shaped haemorrhages and cotton wool spots were the most frequent findings. Inflammatory retinal vasculitis (27.9%), predominantly Eales disease, was the leading etiology, followed by blunt ocular trauma (20.6%) and hypertensive disorders including pregnancy-induced hypertension (19.1%). Infectious (12.5%) and hematological causes (9.6%) also contributed significantly. Most patients presented with moderate visual impairment (6/18–6/60). Bilateral haemorrhages were more common in systemic conditions, unilateral involvement predominated in trauma and vascular occlusions. **Conclusion:** Retinal haemorrhage in young adults demonstrates a distinct etiological spectrum dominated by inflammatory, traumatic, and systemic causes. Early comprehensive evaluation is essential for accurate diagnosis and timely management to prevent vision-threatening complications.

KEYWORDS

INTRODUCTION

Retinal haemorrhage refers to the extravasation of blood into the various layers of the retina and represents an important clinical sign in ophthalmology. The retina, owing to its rich microvascular network, end-arterial circulation, and high metabolic demand, is particularly vulnerable to vascular insults. Any disturbance in the integrity of retinal vessels—whether due to endothelial dysfunction, hemodynamic alterations, inflammatory damage, or hematological abnormalities—can result in retinal haemorrhage.[1 2]

Retinal haemorrhages may be detected incidentally during routine fundus examination or may present with symptoms like diminution of vision, scotoma, metamorphopsia, or sudden visual loss depending on their location and extent. Retinal haemorrhages are commonly seen in elderly individuals with diabetes mellitus and hypertension. There is a need for comprehensive evaluation to identify infectious, inflammatory, metabolic, hematological, or pregnancy-related causes.[3]

Disruption of blood retinal barrier due to hypoxia, inflammation, increased intravascular pressure, or endothelial injury leads to leakage of blood components into the retinal tissue.[4] Hyperviscosity syndromes, thrombocytopenia, anemia, and coagulation defects predispose individuals to retinal bleeding even in the absence of structural vascular disease. These mechanisms are relevant in young adults, in whom inflammatory, infectious, metabolic, and hematological etiologies are proportionately more common than age-related atherosclerotic disease.[56]

Based on Anatomical Location they are of:

- Flame-shaped haemorrhages
- Dot and blot haemorrhages
- Preretinal and subhyaloid haemorrhages
- Subretinal haemorrhages.[24]

Retinal haemorrhages in young adults (18–40 years) are relatively uncommon and frequently associated with non-traditional risk factors. These include Type 1 diabetes mellitus, pregnancy-induced hypertension, haematological disorders, hypercoagulable states, inflammatory and infectious vasculitis (including tuberculosis), trauma, oral contraceptive use, and systemic infections. The absence of age-related vascular degeneration in this group highlights the importance of identifying potentially reversible or life-threatening systemic conditions.[36]

Objectives

- To study the etiological spectrum of retinal haemorrhage in young adults.
- To evaluate the clinical profile of patients presenting with retinal haemorrhage
- To analyze ophthalmoscopic findings in different etiological groups
- To assess visual acuity at presentation
- To study the laterality of retinal haemorrhage

MATERIALS AND METHODS

Study Design A prospective observational study.

Study Setting

The study was conducted in the Ophthalmology outpatient department of a tertiary care hospital.

Study Population

All patients aged between 18 and 40 years presenting with suspected retinal haemorrhage during the study period.

Inclusion Criteria

- Patients aged 18–40 years
- Patients diagnosed with retinal haemorrhage on fundus examination
- Patients who provided written informed consent

Ocular Examination

All patients underwent:

- Best corrected visual acuity assessment using Snellen's chart
- Anterior segment examination using slit-lamp biomicroscopy
- Intraocular pressure measurement by applanation tonometry
- Fundus examination after pupillary dilatation using:
  - Direct ophthalmoscopy
  - Indirect ophthalmoscopy
  - Slit-lamp biomicroscopy with +90D lens
- Fundus photography where feasible for documentation

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using descriptive statistics. Results were expressed as frequencies and percentages.

Ethical Considerations

The study was started after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants prior to inclusion.

RESULTS

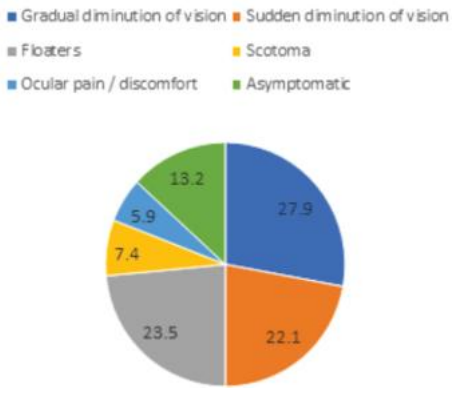
Demographic Profile The mean age of the study population was 29.4 ± 6.2 years. The majority of patients were males (64.7%), with a male-to-female ratio of 1.83:1.

Table 1: Demographic Profile (Age & Sex Distribution)

Parameter	Value
Age range	18–40 years
Mean age ± SD	29.4 ± 6.2 years
Male	88 (64.7%)
Female	48 (35.3%)
Male : Female ratio	1.83 : 1

Presenting Symptoms

Gradual diminution of vision was the most common presenting complaint (27.9%), followed by floaters (23.5%) and sudden diminution of vision (22.1%). A proportion of patients (13.2%) were asymptomatic.



Graph 1: Presenting Symptoms

Laterality of Retinal Haemorrhage

Bilateral involvement (57.4%) was more common than unilateral involvement (42.6%).

Table 2: Laterality of Retinal Haemorrhage

Laterality	Number (n)	Percentage (%)
Unilateral	58	42.6
Bilateral	78	57.4

Etiology of Retinal Haemorrhage

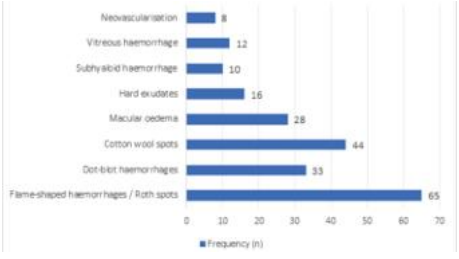
Inflammatory retinal vasculitis was the most common etiology (27.9%), followed by blunt ocular trauma (20.6%) and hypertensive spectrum disorders (19.1%). Infectious and hematological causes also contributed significantly.

Table 3: Etiology of Retinal Haemorrhage

Etiology	Number (n)	Percentage (%)
Inflammatory retinal vasculitis	38	27.9
Blunt ocular trauma	28	20.6
Hypertensive spectrum (including PIH)	26	19.1
Infectious causes	17	12.5
Hematological disorders	13	9.6
Retinal vascular occlusion	8	5.9
Diabetes mellitus	4	2.9
Valsalva retinopathy	2	1.5

Ophthalmoscopic Findings

Flame-shaped haemorrhages and cotton wool spots were the most frequently observed findings, followed by dot-blot haemorrhages. Sight-threatening findings such as vitreous haemorrhage and neovascularisation were less common.



Graph 2: Common Ophthalmoscopic Findings

Visual Acuity at Presentation

The majority of patients presented with moderate visual impairment (6/18–6/60). Good visual acuity (≥6/18) was seen in 32.4% of patients, 6/18-6/60 was seen among 47.8% of patients and below 6/60 was seen among 16.2%.

DISCUSSION

Retinal haemorrhage in young adults represents different clinical entity with a varied etiological spectrum differing significantly from that seen in older populations. The present study evaluated the clinical profile, etiological distribution, and ophthalmic findings in 136 patients aged 18–40 years.

In the present study, the mean age was 29.4 ± 6.2 years, and most patients in the 26–30 year age group. This is consistent with studies by Biswas et al, who reported peak incidence in the third decade of life, showing increased exposure to inflammatory, infectious, and traumatic risk factors in young adults.[7] A male predominance (64.7%) was seen in this study, with a male-to-female ratio of 1.83:1. Same findings were reported in Indian studies, where retinal haemorrhage in young adults is more common in males due to higher incidence of inflammatory vasculitis and trauma.[8] Eales disease was rreported to predominantly affect young males in the Indian subcontinent, further contributing to this distribution.[9] Gradual diminution of vision (27.9%) was the most common presenting complaint, followed by floaters (23.5%) and sudden diminution of vision (22.1%). These findings are comparable to studies by Saxena et al., who reported that visual diminution and floaters are the most frequent symptoms in young patients with retinal haemorrhage.[10] Floaters were associated with vitreous haemorrhage, while sudden visual loss correlated with premacular or vitreous involvement. Asymptomatic cases (13.2%) in the present study show the importance of routine fundus examination, consistent with observations by Wong and Mitchell that peripheral retinal haemorrhages may remain clinically silent.[11]

Inflammatory retinal vasculitis (27.9%) was the most common etiology in the present study. This finding is in agreement with Indian literature, where Eales disease and tuberculosis-associated vasculitis are major causes of retinal haemorrhage in young adults.[9] Blunt ocular trauma (20.6%) was the second most common cause. Similar trends have been reported by Saxena et al., who emphasized trauma as a major contributor to retinal haemorrhage in young individuals due to occupational and lifestyle factors.[10] Hypertensive disorders (19.1%) formed a significant etiological group. This is similar to findings by Reddy et al., who reported that retinal haemorrhages in young females are frequently associated with hypertensive disorders of pregnancy rather than chronic hypertension.[12] Infectious causes (12.5%), including malaria and dengue, were also prominent in the present study. This shows the endemic prevalence of these conditions in developing regions. Beare et al. reported malaria as a leading infectious cause of retinal haemorrhage in tropical countries.[13] Hematological disorders (9.6%), especially sickle cell anaemia, were another important cause. Previous studies have showed that retinal haemorrhage in hematological conditions occurs due to vascular occlusion, anemia, and thrombocytopenia, leading to retinal ischemia and capillary fragility.[14] Bilateral retinal haemorrhage was seen in 57.4% of patients in the present study. Bilaterality was more common in systemic conditions such as vasculitis, hypertension, infectious, and hematological disorders, while unilateral involvement predominated in trauma and retinal vascular occlusion. Similar patterns have been reported in earlier studies, where systemic diseases tend to produce bilateral retinal involvement due to diffuse microvascular pathology.[11] Flame-shaped haemorrhages and cotton wool spots were the most common fundus findings in the present study. These findings are consistent with previous reports indicating that superficial capillary involvement and retinal ischemia are common mechanisms in retinal haemorrhage.[15] Vitreous haemorrhage and neovascularisation were predominantly seen in inflammatory vasculitis and hematological disorders, correlating with disease severity and ischemic retinal changes. In Eales disease, recurrent vitreous haemorrhage is a hallmark feature due to neovascularization.[9] Most patients presented with moderate visual impairment (6/18–6/60). Severe visual loss was associated with vitreous haemorrhage, retinal detachment, and advanced disease. This is comparable with studies showing that visual outcome depends more on the location and severity of haemorrhage than on etiology alone.[15]

CONCLUSION

The findings of the present study are consistent with previous literature, showing that retinal haemorrhage in young adults is mainly due to inflammatory, traumatic, and systemic causes rather than degenerative vascular disease. High prevalence of inflammatory

retinal vasculitis and infectious etiologies reflects regional disease patterns and shows the importance of comprehensive ocular and systemic evaluation.

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