



Risk Factors Associated with Retinal Vein Occlusions in Western Indian Population at A Tertiary Care Hospital: An Observational Study.

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Abstract

Background: Retinal vein occlusion (RVO) is a vision-threatening retinal vascular disease and a common cause of vision loss. Prevention and management of systemic and ocular risk factors are important in these vulnerable groups. The present study aimed at the evaluation of major risk factors associated with RVO in Western Indian population.

Methods: An 18-month prospective observational single-centric study was conducted in a tertiary care center from April 2020 to November 2021. The study comprised 140 patients with RVO. Detailed systemic evaluation and comprehensive ocular examinations including optical coherence tomography (OCT), fundus evaluation and extensive laboratory investigations were performed in all patients. **Results:** Of the 140 patients, the majority (60.71%) were between 61 and 80 years old, with a mean age of 65.62 ± 9.36 years. A male preponderance (62.14%) was observed. Branch retinal vein occlusion was the commonest type of retinal vein occlusion (66.42%) and the commonest anatomical subtype was supero-temporal BRVO (22.85%). The most common risk factor was systemic hypertension (55%) followed by diabetes mellitus (30%) and dyslipidemia (8.57%). The most common ocular risk factor was glaucoma (12.41%). It is noteworthy that 80% of the diabetic patients had uncontrolled fasting blood sugar and 37.14% of the total cohort had elevated C-reactive protein (CRP) levels. **Conclusion:** Hypertension and diabetes mellitus were the most important systemic risk factors for the development of RVO in this Western Indian cohort. Advanced age and male gender are also strong predisposing factors to the condition, thus highlighting the need for strict metabolic and cardiovascular monitoring in elderly patients to prevent sight-threatening occlusions.

Keywords: Retinal Vein Occlusion, Hypertension, Branch Retinal Vein Occlusion, Macular Edema, Risk Factors.



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INTRODUCTION

Retinal vein occlusion (RVO) is the second most prevalent cause of visual reduction in retinal vascular diseases after diabetic retinopathy [1]. The condition is caused by obstruction of the retinal venous system. This obstruction is usually caused by a rigid, arteriosclerotic artery compressing the vein, or thrombosis of the vascular lumen [2, 3]. RVO is anatomically classified as central retinal vein occlusion (CRVO), hemi-retinal vein occlusion (HRVO) or branch retinal vein occlusion (BRVO) according to the site of the occlusion. The incidence of RVO is strongly age-dependent, affecting mainly the elderly population [4].

The pathogenesis usually involves a combination of hemodynamic stasis, endothelial injury and a hypercoagulable state. Various systemic risk factors are strongly associated with poor visual outcomes. The main culprits are hypertension, dyslipidemia and type 2 diabetes mellitus [5]. Emerging systemic parameters like elevated serum homocysteine levels have also been implicated in the pathogenesis of retinal vein thrombosis [6]. Despite the advances in medical science, efforts to restore visual acuity after severe retinal venous obstruction are frequently met with limited success, particularly when it is associated with complications such as macular edema and neovascularization [7].

Therefore, a better understanding of the predisposing clinical, systemic and ocular factors is of immense importance for the early prevention and timely application of therapeutic modalities. **Aims:** To study the clinical demographics and specific risk factors for retinal vein occlusions in a Western Indian population presenting to a tertiary care hospital.

MATERIALS AND METHODS

Study Design and Setting: Single-center prospective observational study in department of ophthalmology of tertiary care hospital.

Study Period: The study was conducted over 18 months from April 2020 to November 2021.

Patient Demographics: The target population consisted of 140 patients diagnosed with RVO attending the Ophthalmology outpatient department. Inclusion criteria required patients (male or female) to be >18 years and <75 years of age and to give written informed consent. Exclusion criteria were significant media opacities impairing fundus visualization, other major ocular diseases causing visual impairment, immunocompromised status, and pregnancy.

Study Procedures and Variables Analyzed: All patients were submitted to a complete systemic evaluation. Pulse rate, blood pressure, respiratory rate were recorded and special emphasis was given to cardiovascular assessment. Uncorrected and best corrected visual acuity (LogMAR), slit-lamp anterior segment examination, pupillary reaction, non-contact tonometry (NCT) for intraocular pressure (IOP), indirect ophthalmoscopy and optical coherence tomography (OCT) of the macula were done in detailed local ocular examinations.

Broad laboratory workup was done including complete blood counts (CBC), fasting and postprandial blood sugars (FBS/PPBS), renal and liver function tests (RFT/LFT), lipid profile, serum homocysteine, C-reactive protein (CRP), and erythrocyte sedimentation rate (ESR). When indicated, radiological and imaging tests such as chest x-ray, electrocardiogram (ECG), 2D ECHO, and carotid Doppler ultrasounds were done. Standard statistical methods (SPSS version 20.0) were used to collect and analyze data and to calculate proportions, means and standard deviations.

RESULTS

The mean age of the 140 participants was 65.62±9.36 years (range 29-80 years) with a predominance of men (62.14%) resulting in a male to female ratio of 1.7:1. Branch retinal vein occlusion (BRVO) was the most common clinical diagnosis, occurring more often than central retinal vein occlusion (CRVO). The superior-temporal BRVO (22.85%) was the most common subtype.

Hypertension was the most common systemic risk factor in 55% of the population followed by diabetes mellitus in 30%. 80% of the diabetic patients had uncontrolled fasting blood sugars (>126 mg/dl). Dyslipidemia parameters were also significant with more than 20% of the cohort having high total cholesterol and high triglycerides. In addition, inflammatory markers showed an underlying vascular distress. The CRP was elevated (> 10 mg/L) in 37.14% of patients and serum homocysteine was elevated (> 15 mcmol/L) in 24.28% of patients.

On examination of the eyes, visual impairment ranged from mild to severe as measured by the LogMAR scale, and macular edema and increased foveal thickness were observed in more than 50% of the eyes examined.

Table 1: Age and Gender Distribution

Parameter	Subcategory	Number of Patients (n=140)	Percentage (%)
Age (Years)	20 - 40	10	7.14
	41 - 60	45	32.15
	61 - 80	85	60.71
Gender	Males	87	62.14
	Females	53	37.86

Table 2: Clinical Diagnosis (Types of RVO)

Diagnosis	Number of Patients (n=140)	Percentage (%)
CRVO	37	26.42
Hemi CRVO	8	5.71
Impending CRVO	2	1.42
BRVO	10	7.14
Inferior-temporal BRVO	19	13.57
Superior-temporal BRVO	32	22.85
Macular BRVO	9	6.42
Resolving BRVO	23	16.42

Table 3: Systemic and Ocular Risk Factors

Risk Factor	Number of Patients (n=140)	Percentage (%)
Hypertension	77	55.00
Diabetes Mellitus	42	30.00
Glaucoma	17	12.41
Pulmonary Disease	15	10.71
Dyslipidemia	12	8.57
Thyroid Disorder	9	6.42
Heart Disease	8	5.71
Stroke	5	3.57

DISCUSSION

Our study showed RVO to be mainly a disease of old age, with 92.86% patients being above 40 years and peak incidence (60.71%) between 61 and 80 years. This demographic pattern is very similar to the Blue Mountains Eye Study by Cugati et al. which showed a steep rise in the incidence of RVO with increasing age [8]. Moreover, male patients accounted for 62.14% of cases in our cohort. This gender predilection is consistent with the findings of Hayreh et al, who reported increased recurrence and demographic footprint of RVO in older male populations [9]. Similar sex disparities in Asians are also noted by Lim et al., further corroborating the observation of males with heightened demographic risk [10].

As far as anatomical distribution is concerned, BRVO was nearly three times more prevalent than CRVO in our study (66.42% vs 26.42%). Glacet-Bernard et al. [11] observed that BRVO is more prevalent than CRVO, owing to some localized anatomical weaknesses at arterio-venous crossings. Our patients demonstrated a high prevalence of supero-temporal BRVO, which is a direct reflection of these basic epidemiologic patterns. The most important risk factor was systemic hypertension, which was present in 55% of the study population. This is directly correlated with the Atherosclerosis Risk in Communities (ARIC) study that identified hypertension as the most important driver of retinal vascular occlusions [12]. Moreover, our findings are in agreement with the report of Thapa et al. in Nepal that systemic hypertension was the major risk factor in the South Asian population [13].

Diabetes mellitus was also found in 30% of cases with severe lack of glycemic control (80% had uncontrolled FBS). Although the incidence of diabetes was slightly lower in a similar Indian cohort reported by Prajapati et al. [14], the high rate of uncontrolled blood sugar observed in our study underlines the role of metabolic syndrome in aggravating endothelial injury. Sharma et al. have also reported that deranged metabolic profiles including dyslipidemia (which we saw as increased cholesterol and triglyceride levels) are the primary factors responsible for the atheromatous changes which result in the compression of the retinal veins [15].

Finally, the marked elevation of inflammatory and pro-thrombotic markers (CRP and homocysteine) is consistent with the comparative study of Bhargava et al. on Asian Indians suggesting a different systemic tendency to microvascular thrombosis [16]. This is further supported by our finding from the Central India Eye and Medical Study by Jonas et al, suggesting a close association of cardiovascular and metabolic derangements with the increasing burden of RVO in the Indian subcontinent [17].

CONCLUSION

Retinal Vein Occlusion is a profoundly sight threatening condition which is predominantly affecting elderly male population. Most common clinical presentation is Branch Retinal Vein Occlusion (BRVO). Uncontrolled systemic hypertension and uncontrolled diabetes mellitus were the most important modifiable risk factors contributing to the pathogenesis of RVO in this Western Indian cohort. Proactive and strict management of blood pressure, glycemic indices and lipid profiles is of utmost importance to minimize the incidence of these occlusions and to preserve visual function in susceptible aging populations.

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