

# Incidence and risk factors for retinal vein occlusion at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

B Fiebai, CS Ejimadu, RD Komolafe

Department of Ophthalmology, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria

## Abstract

**Objective:** The objective of the following study is to determine the incidence of retinal vein occlusion (RVO) and identify the risk factors in RVO in patients presenting to a tertiary hospital in Rivers State.

**Materials and Methods:** The medical records of consecutive patients with RVO who presented to the retina clinic of the eye Department of University of Port Harcourt Teaching Hospital over a 5 year period were retrieved. Information extracted from the data included the demographic data of patients, presenting visual acuity, history of systemic and ocular disease, blood pressure and intraocular pressure. Data was analyzed using the Statistical Package for Social Sciences 20.0. (IBM Corporation and its licensors 1989,2011).

**Results:** Out of the 364 patients seen at the retina clinic during this period, 27 (7.4%) had RVO. Seven patients had bilateral disease. The incidence of RVO in the retina clinic was 7.4%. Systemic hypertension, diabetes mellitus, hyperlipidemia and glaucoma were the main risk factors recorded in our patients. Central retinal vein occlusion (CRVO) 20 (74%) was more predominant than branch retinal vein occlusion (BRVO) 7 (26%). 21 eyes of patients with CRVO had visual acuities of < 3/60, while 7 eyes of patients with BRVO had visual acuities less than 3/60. Vitreous hemorrhage 10 (52.6%) was the most common complication encountered. All cases of non-perfused vein occlusion 4 (14.8%) were seen in patients who had CRVO.

**Conclusion:** The incidence of RVO in our hospital is high. RVO is a significant cause of visual impairment, with CRVO being more common. Identifying associated risk factors and treating these could help reduce the incidence of RVO.

**Key words:** Incidence, Port Harcourt, retinal vein occlusion, risk factors

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## Introduction

Retinal vein occlusion (RVO) is a common vascular disorder of the retina. It causes marked or total visual loss in the middle aged or elderly, however no age group is immune.<sup>[1,2]</sup> It is the second most common retinal vascular disease after diabetic retinopathy.<sup>[1-3]</sup> The prevalence of RVO has been shown to vary from 0.7% to 1.6% and it affects approximately 16 million people worldwide.<sup>[3,4]</sup>

The exact pathological event that occurs in RVO is unclear, but it is believed to result from intraluminal thrombus formation associated with changes in the blood constituents,

blood flow or vessel wall consistent with Virchow's triad for thrombogenesis.<sup>[5,6]</sup> Thrombotic occlusion of the central retinal vein can occur from various pathological events such as compression of the vein (mechanical pressure due to structural changes in the lamina cribosa including glaucomatous cupping, orbital disorders, inflammatory swelling in the optic nerve,) hemodynamic disturbances (associated with sluggish circulation), vessel wall changes such as vasculitis and changes in the blood (such as deficiency of thrombolytic factors).<sup>[5-7]</sup>

### Address for correspondence:

Dr. B. Fiebai,  
Department of Ophthalmology, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria.  
E-mail: bassief@yahoo.com

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RVO has been shown to occur concomitantly with certain systemic disorders. These systemic disorders and certain ocular disorders are regarded as risk factors associated with RVO. These include; cardiovascular disease, hypertension, diabetes mellitus, hyperlipidemia, glaucoma and hyperopia.<sup>[8-10]</sup>

RVO is classified according to the location of the obstruction into central retinal vein occlusion (CRVO) when the obstruction is at the optic nerve head, branch retinal vein occlusion (BRVO) when the obstruction involves a branch of the retinal vein and hemi retinal vein occlusion when one half of the retina supplied the vein is affected.

RVO is one of the most common retinal pathologies seen in the retinal unit of the eye Department of University of Port Harcourt Teaching hospital since its establishment about 7 years ago. Some of these patients present with complications and ocular morbidity is high. These patients also have been found to have systemic and ocular conditions which are associated with RVO.

This study is therefore aimed at determining the incidence of RVO and identifying the risk factors for this condition.

## Materials and Methods

The medical records of all consecutive new patients who presented to the retina clinic of the eye department of University of Port Harcourt Teaching Hospital between January 2008 and December 2012 were extracted.

Parameters evaluated included patients demographic data, clinical diagnosis, type of RVO, ocular and systemic risk factors and ocular complications. CRVO was characterized by widespread scattered superficial and deep retinal hemorrhages with or without optic disc hyperemia, retinal edema, venous dilatation and sheathed veins. Old resolved CRVO was diagnosed by collateral vessels. BRVO was characterized by retinal hemorrhages within the sector of the retina supplied by the occluded vein. The presence of relative afferent pupillary defect was used to differentiate patients with ischemic and non-ischemic CRVO. Fundal examinations were carried out with 90D stereoscopic lens and a mydriatic fundus camera. Optical coherence tomography was used to confirm macular edema (MO) and abnormally thickened retina. Other investigations carried out were; full blood counts, fasting blood sugar, glycosylated hemoglobin, lipid profile and urea, electrolyte and creatinine.

- Hypertension was defined as patients with blood pressure (BP) >140/90 mmHg, measured on 2 or more visits, seating
- Diabetes mellitus was defined as a fasting blood sugar >7.0 mmol/l
- Hyperlipidemia was defined as total cholesterol >7 mmol/l

- Patients who had glaucoma, had the primary open angle type
- Blindness was defined as visual acuity <3/60, while acuity of <6/18-3/60 was regarded as visual impairment.

Information from each subject was entered into a Spread sheet using the Statistical Package for Social Sciences 20.0 (IBM Corporation and its licensors 1989,2011) for Windows statistical software and analyzed. Comparison of variables was carried out using appropriate statistical tests.  $P < 0.05$  were considered to be statistically significant.

## Results

Out of the 364 patients seen in the retinal clinic over the 5 year period, there were 27 new cases of RVO. The total population of patients seen in the entire eye clinic during the period under review was 24,363. There were 7 cases of bilateral involvement resulting in 34 eyes with RVO.

There were 7 males (26%) and 20 females (74%), giving a male to female ratio of 1:2.8. The ages ranged from 38 to 73 years with a mean age  $54.8 \pm 10.1$  years [Table 1].

Table 2 shows the association between RVO and glaucoma. 9 (33.3%) patients with CRVO had glaucoma while 2 (7.4%) with BRVO had glaucoma. The difference was not statistically significant ( $df = 1$  Fisher exact = 0.05). Table 3 shows the relationship between RVO and hypertension. 6 (22.2%) of patients with CRVO were hypertensive, whereas 3 of patients with BRVO were hypertensive. This was however not statistically significant ( $df = 1$  Fisher exact  $P = 0.287$ ). The relationship between RVO and diabetes mellitus is illustrated in Table 4. Diabetes mellitus was present in 10 (37.0%)

**Table 1: Age and sex distribution of patients**

Age group	No.		No (%)
	Male	Female	Total
20-30	-	1	1 (4)
31-40	-	1	1 (4)
41-50	1	8	9 (33)
51-60	5	4	9 (33)
61-70	-	5	5 (19)
71-80	1	1	2 (7)
Total	7	20	27 (100)

**Table 2: Association between RVO and glaucoma**

Type of occlusion	Glaucoma (n (%))		
	Absent	Present	Total
BRVO	5 (18.5)	2 (7.4)	7 (25.9)
CRVO	11 (40.7)	9 (33.3)	20 (74.1)
Total	16 (59.3)	11 (40.7)	27 (100.0)

$df=1$ , Fisher exact  $P=0.05$ . BRVO=Branch vein occlusion, CRVO=Central retinal vein occlusion, RVO=Retinal vein occlusion

patients who presented with CRVO while 2 (7.4%) patients with BRVO presented with diabetes mellitus. The difference was not statistically significant (Chi-square = 3.18 df = 1;  $P = 0.075$ ). The relationship between RVO and hyperlipidemia was not statistically significant as shown in Table 5 (df = 1 Fisher exact  $P = 0.145$ ). Only 4 (80%) patients with CRVO had hyperlipidemia while 1 (20%) patient with BRVO had hyperlipidemia.

20 patients (74%) had CRVO and 7 patients (26%) had BRVO. All cases of bilateral involvement were due to CRVO. 27 eyes (79.4%) had CRVO.

Table 6 shows that 21 eyes of patients with CRVO had presenting best corrected visual acuity of less than 3/60, while only 3 out of the seven eyes with BRVO had visual acuity of less than 3/60.

The ocular complications seen in this study were; vitreous hemorrhage (VH), MO, iris neovascularization and disc neovascularization. Ocular complications were seen in 19 (70.4%) of the 27 cases. The complications were more in patients who had CRVO (94.7%) and VH (52.6%) was the most common complication seen [Table 7].

Four (14.8%) patients with CRVO had an ischemic vein occlusion while 16 (59.3%) had the non-ischemic type [Table 8].

**Table 3: Association between RVO and hypertension**

Type of occlusion	Hypertension (n (%))		Total
	Absent	Present	
BRVO	4 (14.8)	3 (11.1)	7 (25.9)
CRVO	14 (51.9)	6 (22.2)	20 (74.1)
Total	18 (66.7)	9 (33.3)	27 (100.0)

df=1, Fisher exact  $P=0.287$ . BRVO=Branch vein occlusion, CRVO=Central retinal vein occlusion, RVO=Retinal vein occlusion

**Table 4: Association between RVO and diabetes mellitus**

Type of occlusion	Diabetes mellitus (n (%))		Total
	Absent	Present	
BRVO	5 (18.5)	2 (7.4)	7 (25.9)
CRVO	10 (37.0)	10 (37.0)	20 (74.1)
Total	15 (55.6)	12 (44.4)	27 (100.0)

$\chi^2=3.18$ , df=1,  $P=0.075$ . BRVO=Branch vein occlusion, CRVO=Central retinal vein occlusion, RVO=Retinal vein occlusion

**Table 5: Association between RVO and hyperlipidemia**

Type of occlusion	Hyperlipidemia (n (%))		Total
	Absent	Present	
BRVO	0 (0.0)	1 (20.0)	1 (20.0)
CRVO	0 (0.0)	4 (80.0)	4 (80.0)
Total	0 (0.0)	5 (100.0)	5 (100.0)

df=1, Fisher exact  $P=0.145$ . BRVO=Branch vein occlusion, CRVO=Central retinal vein occlusion, RVO=Retinal vein occlusion

A fundus picture of a patient with retinal vein occlusion is shown in Figure 1.

## Discussion

The incidence of RVO in this study was 7.4%. A study carried out in Onitsha reported a low incidence however the value were not recorded.<sup>[11]</sup> Studies carried out in the western world are mainly prevalence studies done with larger populations and it is therefore difficult to compare with our study.<sup>[13,12,13]</sup> A population based study will be required to determine the incidence or prevalence of RVO in our population as hospital based studies are never truly representative of the population.

RVO is a disease of the older population (age >50 years old). The mean age in this series was  $54.8 \pm 10.1$  years.<sup>[13,13-15]</sup> As you can see in Table 1, similar findings were reported in Onitsha.<sup>[11]</sup> There was a female preponderance in this study. This trend was also reported in the Onitsha study. This could be due to the fact that women in this area tend to take their health challenges more seriously and therefore present to the clinic more than men. The role of oral contraceptives may also play a significant role here as they have been implicated in vein occlusion.<sup>[16]</sup> These oral contraceptives and hormone replacement therapy are used more in women than men. Most other studies reported no

**Table 6: BCVA, type of occlusion seen in 34 eyes**

Type of occlusion	BCVA			Total
	>6/18	6/18-6/60	<6/60	
CRVO	1	5	21	27
BRVO	2	2	3	7
Total	3	7	24	34

BCVA=Best corrected visual acuity, BRVO=Branch vein occlusion, CRVO=Central retinal vein occlusion

**Table 7: Ocular complications**

Type of occlusion	Complications				Total
	VH	MO	INV	DNV	
CRVO	10	5	1	2	18
BRVO	-	-	1	-	1
Total	10	5	2	2	19

BRVO=Branch vein occlusion, CRVO=Central retinal vein occlusion, VH=Vitreous hemorrhage, MO=Macular edema, INV=Iris neovascularization, DNV=Disc neovascularization

**Table 8: Proportion of perfused and non-perfused RVO**

RVO	Clinical type (frequency) (%)		Total frequency (%)
	ISCH	NISCH	
CRVO	4 (14.8)	16 (59.3)	20 (74.1)
BRVO	0 (0.0)	7 (25.9)	7 (25.9)
Total	4 (14.8)	23 (85.2)	27 (100)

RVO=Retinal vein occlusion, ISCH=Ischemic retinal vein occlusion, NISCH=Non-ischemic retinal vein occlusion, BRVO=Branch vein occlusion, CRVO=Central retinal vein occlusion



**Figure 1:** Fundus picture of a patient with retinal vein occlusion

significant gender difference while others reported a slight male preponderance.<sup>[12-14]</sup>

Certain systemic diseases such as diabetes, hypertension and hyperlipidemia are associated with increasing age. This puts the patients at risk of end organ complications such as ocular complications. Studies have shown that advancing age, elevated BP, hyperlipidemia, elevated blood sugar and ocular perfusion were principal variables predicting incident RVO.<sup>[11,14,17]</sup> Systemic hypertension, diabetes and hyperlipidemia were the three systemic factors recorded in this study while glaucoma was the only ocular risk factor recorded. However, these were not statistically proven in our study to be significant. Further studies are necessary in a larger population to prove these associations. The Onitsha study recorded similar findings where systemic hypertension, diabetes and glaucoma were seen in their series.<sup>[11]</sup>

Most of the patients in this study presented with CRVO (27 eyes). BRVO was seen in only 7 eyes. This is supported by the Onitsha report where 83.7% of the patients had CRVO. However the opposite is reported from studies in the western world, where branch retinal vein is found to have a higher incidence than CRVO.<sup>[3,14,17]</sup> BRVO is thought to occur largely as a result of arteriosclerosis. Patients in the developed countries tend to be more prone to arteriosclerosis because of their type of diet compared with those in the developing countries. However with the trend increasing toward western diet and the increasing prevalence of diabetes and other disease related to arteriosclerosis one may begin to see more cases of BRVO. All patients who had bilateral involvement were those with CRVO. This pattern was again reported in the Onitsha study where out of the 5 patients with bilateral disease, 4 had CRVO. This pattern may be as a result of the fact that CRVO is predominant in the study population.

Patients with CRVO were found to have more profound visual loss than patients with BRVO. This can be explained

from the pattern of affectation of the retina by the vessel involved. Central retinal artery usually involves the four quadrants and inadvertently the posterior pole is affected, compared with when only a branch is involved which may likely spare the macular.

The most common ocular complication causing impaired vision in this series was VH, followed by macula edema and these were all seen in cases with CRVO. Based on the clinical findings using pupillary light response, 4 patients in this study were classified as having the ischemic form of RVO, the rest were believed to be perfused, all the four cases occurred in patients with CRVO. However we were limited by the lack of facilities for fluorescein angiography to ascertain this.

The retrospective nature of the study was also a limitation as we were compelled to use what information was available in the records.

## Conclusion

The incidence of RVO in our hospital is high. RVO is a significant cause of visual impairment, with CRVO being commoner. Women are more predisposed to the disease than men. Identifying associated risk factors and treating these could help reduce the incidence of RVO.

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