

# RUBEOSIS IRIDIS: PATTERN OF PRESENTATION IN A DEVELOPING COUNTRY

**FIEBAI B., COOKEY S.A.H., IBANGA I.**

*Department of Ophthalmology, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria.*

## **Correspondence:**

**Email:** [bassief@yahoo.com](mailto:bassief@yahoo.com)

## **ABSTRACT**

### **Purpose:**

*To determine the pattern of presentation and clinical profile of patients with rubeosis iridis in a developing country.*

### **Setting:**

*The study was carried out in the department of ophthalmology, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria.*

### **Methods:**

*The case records of all patients who presented with features of rubeosis iridis to the department of ophthalmology from January 2013 to December 2017 were retrieved. Data collected included, age, sex, diagnosis, presenting visual acuity, presenting intraocular pressure, presence of angle neovascularization, presence of hyphaema. Results were analysed using Statistical Package for Social Sciences ( SPSS) 22.0 for Windows statistical software*

### **Results:**

*Twenty- four eyes of twenty patients were studied. Four patients had bilateral disease. The mean age=55.92±12.91 years, with an equal sex distribution. The commonest aetiological factors seen were Proliferative diabetic retinopathy, in 10 (42%) eyes and retinal vein occlusion 10(42%) eyes. Three patients (12%) had retinal detachment and 1 patient (4%) had chronic uveitis. Most patients presented with severe visual impairment (V/A < 6/60) and intraocular pressures between 21-45mmHg. There was a statistically significant difference between the stage of presentation and the intraocular pressure at presentation- p= 0.000. Seventeen (70.8%) patients had hyphaema. Medical treatment with intraocular pressure lowering medications used in combination with intravitreal Anti Vascular endothelial growth factors was the commonest modality of treatment employed, used in 9(37.5%) eyes*

### **Conclusions:**

*The pattern of presentation and Rubeosis iridis in the developing country mirrors that reported in other countries to a great extent with proliferative diabetic retinopathy and retinal vein occlusion as the major aetiological factors. However the late stage at*

*presentation appears to be peculiar in our clime. More awareness needs to be created in these risk groups to enhance early detection and prompt intervention to prevent visual loss.*

**Key words:** Angle neovascularization, iris neovascularization, Anti- VEGF, Hyphaema, Neovascular glaucoma, Rubeosis Iridis.

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## INTRODUCTION

Rubeosis iridis (RI) also known as neovascularization of the iris (NVI) occurs when small fine blood vessels develop and proliferate on the surface of the iris initially seen at the pupillary border as tufts of blood vessels.<sup>1-4</sup> Salu in 1928 was the first to observe abnormal vessels on the surface of the Iris in diabetics and called it rubeosis iridis<sup>5</sup>

Rubeosis iridis develops as a result of ischaemia in the posterior segment with production of vascular endothelial growth factors which facilitate development of anterior segment neovascularisation (NVI and angle neovascularization- NVA).<sup>6</sup> Neovascularisation occurs when there are up to 75 disc diameters of capillary non-perfusion of the retina. The pupillary border and angle are first involved due to their close contact with aqueous.<sup>7</sup>

The aetiology of RI occurs from systemic and ocular pathologies such as proliferative diabetic retinopathy, retinal vein occlusion, retinal detachment<sup>2,8-10</sup> Patients may present in the symptomatic stages with blurring of vision, redness,

pain and photophobia, or in the non-symptomatic stage where the rubeosis iridis is found on examination in a patient with an underlying pathology.<sup>2,11-13</sup> Signs on examination include conjunctival injection, corneal edema and inflammation.<sup>2,11,12</sup>

These patients are prone to hyphaema when the fragile blood vessels rupture and this could be severe enough to occlude the visual axis and cause a drop in vision. The vessels on the iris may also eventually proliferate to the iridocorneal angle and cause an increase in the intraocular pressure(IOP) resulting in a secondary glaucoma called neovascular or haemorrhagic glaucoma.

NVG is believed to progress through 3 stages;<sup>12</sup>

Stage 1 (Pre-glaucoma) – Iris and/or angle rubeosis, with normal IOP

Stage 2 (Open- angle glaucoma)- Growth of fibrovascular tissue and rubeotic vessels over the trabecular meshwork with decreased aqueous outflow and increased IOP. There may be hyphaema

Stage 3 (Closed angle glaucoma)- The fibrovascular membrane proliferates and

contracts, causing progressive angle closure, ectropion uveae. Rubeosis is severe with possible hyphaema and IOP may be as high as 60-70mmHg.

In developing countries patients tend to present at the symptomatic stages for most conditions and this expectedly leads to poor visual outcomes even when treatment is instituted at presentation.<sup>14,15</sup>

Small isolated tufts of rubeosis iridis at the pupillary border can be followed closely with gonioscopy and initial treatment withheld if there are no other abnormal findings and IOP is within normal limits, while monitoring and controlling the underlying risk factors. Intravitreal anti-Vascular endothelial growth factors are generally given when posterior segment ischemia is established. This in combination with pan retinal photocoagulation can halt or reduce the development of NVG. However established cases of NVG are quite retractile to treatment and usually involves a combination of several modalities of treatment with Antivegfs, transcleral photocoagulation, cryocoagulation, surgical intervention including glaucoma drainage implants and medical therapy with pressure lowering medications.<sup>9,12,15-18</sup>

To the best of our knowledge there is no report of any study in Nigeria specifically

on Rubeosis iridis, though there are scanty reports on NVG. This article, therefore seeks to contribute to the data on rubeosis iridis and anterior segment neovascularisation in developing countries for which there is a dearth of data. This makes it difficult to compare, the clinical profile of patients and outcomes of treatment with patients in the developing countries, especially considering the limited available modalities of treatment available in our clime.

## **MATERIALS AND METHODS**

This was a retrospective study of case records of all patients who presented with features of rubeosis iridis to the department of ophthalmology from January 2013 to December 2017 were retrieved. Data collected included, age, sex, diagnosis, presenting visual acuity, presenting intraocular pressure, presence of rubeosis iridis (defined as vessels seen on the surface of the iris on slit lamp examination), presence of angle neovascularization and presence of hyphaema.

All patients received a full ocular examination at presentation including an undilated pupillary examination and

gonioscopy. Intraocular pressure was measured with a non contact tonometer.

Only patients who were followed up for at least 12 months were included in this study.

Information from each subject was entered into a spreadsheet using the Statistical

Package for Social Sciences ( SPSS) 22.0 for Windows statistical software and analysed. Comparison of variables was carried out using appropriate statistical tests. P values of <0.05 were considered statistically significant.

## RESULTS

**Table 1: Age and Gender Distribution**

| Age Groups (Years) | Gender           |                  |                   |
|--------------------|------------------|------------------|-------------------|
|                    | Male             | Female           | Total             |
| < 30               | 0 (0.0)          | 2 (8.3)          | <b>2 (8.3)</b>    |
| 31-40              | 0 (0.0)          | 1 (4.2)          | <b>1 (4.2)</b>    |
| 41-50              | 2 (8.3)          | 2 (8.3)          | <b>4 (16.7)</b>   |
| 51-60              | 3 (12.5)         | 4 (16.7)         | <b>7 (29.2)</b>   |
| 61-70              | 6 (25.0)         | 3 (12.5)         | <b>9 (37.5)</b>   |
| 71 and above       | 1 (4.2)          | 0 (0.0)          | <b>1 (4.2)</b>    |
| <b>Total</b>       | <b>12 (50.0)</b> | <b>12 (50.0)</b> | <b>24 (100.0)</b> |

Chi square test,(P value) 5.143 (0.399)

Mean age=55.92±12.91 years

Age range 27 to 73 years. There was no statistical difference between the ages of the males and females in the study population.

**Table 2: Presenting visual acuity and Final best corrected visual Acuity**

| <b>Visual Acuity Categories</b>     | <b>Presenting VA</b> | <b>Final VA</b>   |
|-------------------------------------|----------------------|-------------------|
| <b>(Snellen )</b>                   | <b>Freq. (%)</b>     | <b>Freq. (%)</b>  |
| <b>Distance Visual Acuity</b>       |                      |                   |
| Normal vision ( $\geq 6/18$ )       | 1 (4.2)              | 0 (0.0)           |
| Moderate VI ( $<6/18 - \geq 6/60$ ) | 2 (8.3)              | 4 (16.7)          |
| Severe VI ( $<6/60 - \geq LP$ )     | 18 (75.0)            | 17 (70.8)         |
| Blindness (NLP)                     | 3 (12.5)             | 3 (12.5)          |
| <b>Total</b>                        | <b>24 (100.0)</b>    | <b>24 (100.0)</b> |

**Table 3: Ocular Characteristics of study population with Rubeosis Iridis**

|                                    | <b>Number</b> | <b>(Percentage %)</b> |
|------------------------------------|---------------|-----------------------|
| <b>PRESENTING COMPLAINT(S)</b>     |               |                       |
| Nil                                | 2             | (8.3)                 |
| Pain/Redness                       | 13            | (54.2)                |
| Poor Vision                        | 9             | (37.5)                |
| <b>AFFECTED EYE</b>                |               |                       |
| Right Eye                          | 15            | (62.5)                |
| Left Eye                           | 9             | (37.5)                |
| <b>ASSOCIATED SYSTEMIC DISEASE</b> |               |                       |
| Nil                                | 2             | (8.3)                 |
| Diabetics Mellitus                 | 6             | (25.0)                |
| Hypertension                       | 2             | (8.3)                 |
| Hypertension/Diabetics Mellitus    | 14            | (58.3)                |
| <b>OCULAR CO-MORBIDITY</b>         |               |                       |

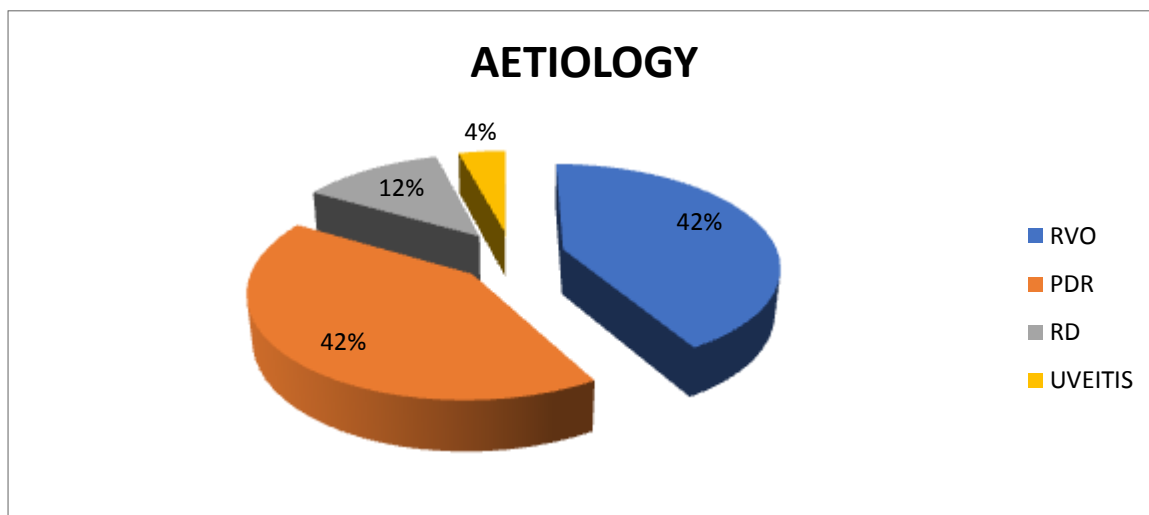
|                      |    |        |
|----------------------|----|--------|
| Nil                  | 1  | (4.2)  |
| Cataract             | 14 | (58.3) |
| Pseudophakia         | 3  | (12.5) |
| Aphakia              | 1  | (4.2)  |
| Uveitis              | 1  | (4.2)  |
| Vitreous Haemorrhage | 4  | (16.7) |

### INTERVENTION

|                                       |   |        |
|---------------------------------------|---|--------|
| Medical treatment                     | 8 | (33.3) |
| Medical treatment + Anti-VEGF         | 9 | (37.5) |
| Medical treatment + Anti-VEGF + TSCPC | 5 | (20.8) |
| Medical treatment + TSCPC             | 1 | (4.2)  |
| Medical treatment + Anti-VEGF + P.I   | 1 | (4.2)  |

N/B Of the 24 eyes studied in the 20 patients, 4 had bilateral disease.

**Figure 1: Aetiological Factors of Rubeosis Iridis in the Study Population**



Ten patients (42%) presented with retinal vein occlusion and proliferative diabetic retinopathy . Three patients(12%) had retinal detachment and 1 patient (4%) had chronic uveitis.

**Table 4: Stages of Neovascularisation seen in the study population <sup>11</sup>**

|  | Frequency | (Percentage %) |
|--|-----------|----------------|
|--|-----------|----------------|

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**STAGE**

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|                      |                   |
|----------------------|-------------------|
| 1 (Pre-glaucoma)     | 4 (16.7)          |
| 2 (Open angle NVG)   | 16 (66.7)         |
| 3 (Closed angle NVG) | 4 (16.7)          |
| <b>Total</b>         | <b>24 (100.0)</b> |

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Four patients (16.7%) were in the pre-glaucoma and closed angle glaucoma stage, while most of the study population had open angle NVG IN 16 eyes (66.7%).

**Table 5: Relationship between Stage at presentation and intraocular pressure**

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| <b>INTRAOCULAR PRESSURE (mmHg)</b> | <b>STAGE</b>      |                   |                   | <b>Total</b>      |
|------------------------------------|-------------------|-------------------|-------------------|-------------------|
|                                    | <b>1</b>          | <b>2</b>          | <b>3</b>          |                   |
|                                    | <b>Number (%)</b> | <b>Number (%)</b> | <b>Number (%)</b> | <b>Number (%)</b> |
| <b>&lt;21</b>                      | 3 (12.5)          | 1 (4.2)           | 0 (0.0)           | 4 (16.7)          |
| <b>21-45</b>                       | 1 (4.2)           | 11 (45.8)         | 0 (0.0)           | 12 (50.0)         |
| <b>&gt;45</b>                      | 0 (0.0)           | 4 (16.7)          | 4 (16.7)          | 8 (33.3)          |
| <b>Total</b>                       | 4 (16.7)          | 16 (66.7)         | 4 (16.7)          | 24 (100.0)        |

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**Chi square 20.50 p value (0.000)**

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Presenting Intraocular pressures of less than 21mmHg were seen in 4 eyes (16.7%), 12 eyes (50%) had IOP values between 21-45mmHg while 8(33%) eyes had IOP values greater than 45mmHg.

A bivariate analysis with the stages of neovascularization and presenting intraocular pressures revealed a statically significant difference. P= 0.000

Hyphaema was seen in 17(70.8%) eyes, while 7(29.2) eyes had no hyphaema.

**KEY**

Anti Vegf    Anti vascular endothelial growth factor

|      |                                    |
|------|------------------------------------|
| IOP  | Intraocular pressure               |
| NVG  | Neovascular glaucoma               |
| PDR  | Proliferative diabetic retinopathy |
| P.I  | Peripheral Iridectomy              |
| RD   | Retinal detachment                 |
| RVO  | Retinal vein occlusion             |
| TSPC | Transcleral photocoagulation       |

## DISCUSSION

The hospital prevalence of Rubeosis Iridis in our series was 0.17%. There is no reported prevalence of rubeosis iridis to compare this with.

The mean age of patients presenting with rubeosis iridis in our study (55.92±12.91 years) was similar to that reported in other parts of the world.<sup>1,11</sup> This is likely due to the fact that the aetiological factors and systemic conditions implicated are found in this age group.<sup>10</sup> The age group most affected in our series was 51-70 years.

There was an equal sex distribution in our report but most studies reported a male preponderance.<sup>1,15</sup> See Table 1.

Patients in developing countries have been reported to present late due to several factors such as lack of awareness, poor access to eye health and other socio-cultural factors.<sup>10,14,15</sup> The commonest complaints of majority who presented with the advanced stage were ocular pain, redness and poor vision.

Proliferative diabetic retinopathy and retinal vein occlusions were commonest aetiological factor implicated in this study. This was also reported in the Indian and Korean study and is generally found to be major causative factors in posterior segment neovascularization. Other aetiological factors in our population were retinal detachment and chronic uveitis. See figure 1.

Most patients in the current report presented with already established open angle glaucoma 16(66.7%). Hariharan et al similarly reported that 70% of cases in their study presented with NVG however it was not categorical if this was open or a closed angle variety. There was a statistically significant difference (p=0.000) between the stage of NVG and the presenting IOP when a bivariate analysis was done to compare this, as shown in Table 5.

Patients with RI are prone to spontaneous hyphaema as these vessels are fragile and could easily rupture. This could cause a



significant drop in vision if it compromises the visual axis and could lead to a further rise in IOP. In our series 17(70.8%) of the 24 eyes had hyphaema at some stage during their presentation and management. This has not been reported in any of the previous studies on rubeosis. The modalities of treatment employed for the management of our patients included medical therapy with IOP lowering medications, Intravitreal Anti vegf injections, transscleral photocoagulation and peripheral iridectomy, A combination of medical treatment and Anti Vegf was the most common modality used as this was the most accessible for patients. These

modalities of treatment are similar to that used in other parts of the country and the world in the management of NVG.<sup>2,15-18</sup>

## CONCLUSION

The pattern of presentation of Rubeosis iridis in the developing country mirrors that reported in other countries.

Proliferative diabetic retinopathy and retinal vein occlusion are the major aetiological factors however the late stage at presentation appears to be peculiar in our clime. More awareness needs to be created in these risk groups with early detection with prompt intervention to prevent visual loss.

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