

## Original Research

### Incidence of ocular complications in hypertension: An observational study

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#### ABSTRACT:

**Background:** The study was conducted to assess the incidence of ocular complications in hypertension. **Material and methods:** Four hundred twenty six hypertension subjects were enrolled in this cross-sectional observational study. The subjects had been informed about the procedure and were asked to give consent. Age > 18 years, willingness to take part in the study, and a confirmed diagnosis of hypertension—regardless of course, duration, severity, or cause—were requirements for inclusion. Pregnancy as well as media opacities that prevented the fundus from being accessible were among the exclusion criteria. A standard ophthalmological examination was conducted, comprising visual acuity assessment, anterior segment slit-lamp examination, intraocular pressure measurement using applanation tonometry, and assessment of the ocular fundus via direct ophthalmoscopy following pupil dilation with tropicamide 1% and phenylephrine 10%. Statistical analysis was conducted using SPSS software. **Results:** One Hundred patients demonstrated ocular complications. Hence; incidence was 23.47 percent. In this study, there were total 100 subjects with hypertension out of which 37 were females and 63 were males. The most common complication among subjects having hypertension was hypertensive retinopathy evident in 50 subjects. Glaucoma was the next common complication seen in 25 subjects, followed by retinal artery occlusion in 16 subjects and retinal vein occlusion in 9 subjects. **Conclusion:** The most common complication among subjects with hypertension was hypertensive retinopathy followed by glaucoma, retinal artery occlusion and retinal vein occlusion.

**Keywords:** hypertension, complications, retinopathy, glaucoma

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#### INTRODUCTION

Hypertension is a major public health problem worldwide and on the African continent.<sup>1,2</sup> The disease, once considered to be rare outside Europe and North America, is now a leading cause of disability and mortality in developing countries. Its prevalence is projected to reach 30% worldwide by 2025. Poor control of hypertension increases the likelihood of complications affecting the cardiovascular and cerebrovascular systems, kidney and retina, often labelled under the term target-organ damage (TOD). The development of subclinical TOD, such as left ventricular hypertrophy (LVH), increased intima-media thickness of the large vessels, microalbuminuria following glomerular dysfunction, cognitive decline and hypertensive retinopathy precedes the occurrence of major complications, which include stroke, congestive heart failure and myocardial infarction, renal failure and retinal

vascular occlusions.<sup>3-5</sup> This study was conducted to assess the ocular complications of hypertension.

#### MATERIAL AND METHODS

Four hundred twenty six hypertension subjects were enrolled in this cross-sectional observational study. The subjects had been informed about the procedure and were asked to give consent. Age > 18 years, willingness to take part in the study, and a confirmed diagnosis of hypertension—regardless of course, duration, severity, or cause—were requirements for inclusion. Pregnancy as well as media opacities that prevented the fundus from being accessible were among the exclusion criteria. A standard ophthalmological examination was conducted, comprising visual acuity assessment, anterior segment slit-lamp examination, intraocular pressure measurement using applanation tonometry, and assessment of the ocular fundus via direct

ophthalmoscopy following pupil dilation with tropicamide 1% and phenylephrine 10%. Statistical analysis was conducted using SPSS software.

## RESULTS

One Hundred patients demonstrated ocular complications. Hence; incidence was 23.47 percent. In this study, there were total 100 subjects with

hypertension out of which 37 were females and 63 were males. The most common complication among subjects having hypertension was hypertensive retinopathy evident in 50 subjects. Glaucoma was the next common complication seen in 25 subjects, followed by retinal artery occlusion in 16 subjects and retinal vein occlusion in 9 subjects.

**Table 1: Gender-wise distribution of subjects.**

Gender	Number of subjects	Percentage
Males	63	63%
Females	37	37%
Total	100	100%

**Table 2: Ocular complications**

Complications	Number of subjects	Percentage
Retinal artery occlusion.	16	16%
Retinal vein occlusion	09	09%
Glaucoma	25	25%
Hypertensive retinopathy	50	50%
Total	100	100%

## DISCUSSION

Hypertension has profound vascular and often silent multisystemic effects. The eye is unique in the sense that it reflects the direct sequelae of elevated blood pressure as retinal microvasculature changes visualized as hypertensive retinopathy; associated with risk of systemic morbidity and mortality. However, hypertension also plays a pivotal role in the development of diabetic retinopathy, with blood pressure control leading to prevention of diabetic retinopathy progression. Several other eye diseases such as retinal vascular occlusion, retinal arteriolar emboli, retinal macroaneurysm, glaucoma and age-related macular degeneration may also be related to hypertension, but these associations are not as well known to physicians.

Hypertensive retinopathy consists of a series of retinal microvascular signs that typically include retinal arteriolar narrowing, arterio-venous nicking, retinal haemorrhages, and microaneurysms as well as optic disc and macular oedema, in severe cases. These signs develop due to acute and chronic elevations in blood pressure.<sup>7</sup> The initial response is diffuse and localized vasospasm of the retinal arterioles with consequent arteriolar narrowing; reflecting autoregulatory vasoconstriction in an attempt to limit the blood received by the retinal capillary bed.<sup>8-12</sup> This study was conducted to assess the ocular complications of hypertension.

One Hundred patients demonstrated ocular complications. Hence; incidence was 23.47 percent. In this study, there were total 100 subjects with hypertension out of which 37 were females and 63 were males. The most common complication among subjects having hypertension was hypertensive retinopathy evident in 50 subjects. Glaucoma was the next common complication seen in 25 subjects,

followed by retinal artery occlusion in 16 subjects and retinal vein occlusion in 9 subjects. Kabedi NN et al studied the association between hypertensive retinopathy and cardiovascular, renal and cerebrovascular changes, and to determine the predictors of hypertensive retinopathy in Congolese patients. A total of 159 hypertensive subjects (mean age: 58.9 ± 13.2 years) were enrolled from the cardiology out-patient clinic. Retinopathy grade was assessed on direct ophthalmoscopy. Hypertensive cardiovascular, renal and cerebrovascular changes were indicated by left ventricular hypertrophy (LVH), chronic kidney disease (CKD) and stroke, respectively. Hypertensive retinopathy was present in 83.6% of the patients (grade 1: 42.1%; grade 2: 11.3%; grade 3: 23.3%; grade 4: 6.9%). There was no association between hypertensive retinopathy and the presence or absence of LVH (86.5 vs 73.3%,  $\chi^2 = 1.53$ ,  $p = 0.21$ ), chronic kidney disease (89.3 vs 83.3%,  $\chi^2 = 0.12$ ,  $p = 0.73$ ) or stroke (85.7 vs 83.2%,  $\chi^2 > 0.001$ ,  $p = 0.99$ ). On multivariate logistic regression, CKD was the most significant predictor of severe hypertensive retinopathy, with an odds ratio of 4.4. No association was found between hypertensive retinopathy and LVH, CKD or stroke. CKD was the most significant predictor of hypertensive retinopathy and there was a tendency toward increased risk of target-organ damage among patients with advanced hypertensive retinopathy.<sup>13</sup> Smith W et al assessed whether retinal arteriolar narrowing and structural abnormalities independently predicted 5-year incident severe (grade 2 or 3) hypertension in an older population-based cohort. Baseline retinal photographs were graded for focal retinal vessel wall signs and vessel diameters were measured. Participants were classified as having normal, high-normal blood pressure [BP] (systolic BP 121 to 139 mm Hg and/or

diastolic BP 81 to 89 mm Hg), mild hypertension (systolic BP 140 to 159 mm Hg and/or diastolic BP 90 to 99 mm Hg), or severe hypertension if they had a previous diagnosis of hypertension and were receiving antihypertensive medications or had systolic BP  $>$  or  $=$ 160 mm Hg and/or diastolic BP  $>$  or  $=$ 100 mm Hg at examination. Incident severe hypertension was defined in persons who were free of severe hypertension at baseline but classified as having severe hypertension at the 5-year examinations. Of the 1319 baseline subjects at risk, 390 (29.6%) developed severe hypertension. After adjusting for age, sex, body mass index, smoking, glucose, and total cholesterol, generalized retinal arteriolar narrowing at baseline was associated with increased risk of incident severe hypertension (odds ratio 2.6; 95% confidence interval, 1.7 to 3.9) when comparing the narrowest versus widest quintile. This association remained significant after further adjustment for baseline mean arterial BP or BP status. Their findings support the hypothesis that small vessel structural changes may precede the development of severe hypertension.<sup>14</sup>

## CONCLUSION

The most common complication among subjects with hypertension was hypertensive retinopathy followed by glaucoma, retinal artery occlusion and retinal vein occlusion.

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