

**Original article:**

## **Correlation of hypertension and hypertensive retinopathy in patients with ischemic arterial stroke**

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### **ABSTRACT:**

**Introduction:** Hypertension is one of the risk factor for hypertensive retinopathy in patients with ischemic arterial stroke. Hypertension leads to retinal vasculature changes which correlates with cerebral vasculature changes.

**Objective:** To study Correlation of hypertension and hypertensive retinopathy in patients with ischemic arterial stroke

**Materials and Methods:** Study design- Comparative hospital based study , Detailed history regarding ocular symptoms was noted and detailed fundus examination was done. Hypertensive retinopathy grading done according to Keith-Wagener-Barker Classifications.

**Observations and Results :** Patients with ischemic arterial stroke, out of 37 patients, 30 (81.08%) were hypertensive. 14(46.66%) had history of hypertension and 16 (53.33%) were diagnosed hypertensive on admission. Majority of patients with CVA had hypertension diagnosed on admission. 19 of 30 patients (63.33%) with hypertension had hypertensive retinopathy, 7 (23.33%) had diabetic and hypertensive retinopathy and 4 (13.33%) were normal , of 16 patients - diagnosed hypertensive - 13 had hypertensive retinopathy and 3 were normal .26 of 30 patients (86.66%) with hypertension had hypertensive retinopathy. Of 26, 3 (11.5%) had grade I hypertensive retinopathy,19(73.07%) had grade II hypertensive retinopathy and 4 (25%) had grade III hypertensive retinopathy. Majority patients had grade II hypertensive retinopathy.

**Conclusion:** Hypertensive retinopathy is associated with cerebrovascular accidents. Serial fundus examinations in hypertensive patients are necessary to help in. An ophthalmologist plays an important role in diagnosing and classifying the severity of hypertensive retinopathy

### **INTRODUCTION**

An ophthalmologist can play a very important role in diagnosing the level of lesion due to characteristic ophthalmic manifestations. Hypertension and diabetes mellitus are two major risk factors for stroke. Fundus examinations can help in identifying patients with hypertensive retinopathy and diabetic retinopathy and grading the severity of it . In order to epidemiologically clarify the relationships between the fundoscopic findings and occurrence of cerebrovascular diseases, an analysis was done by Aoki N <sup>1</sup> and the results were as

follows: Among the fundamental fundoscopic findings, irregular constriction, narrowing and retinal bleeding were high risk factors of cerebral haemorrhage in due order. Arteriolar reflex lateral displacement, irregular constriction, tapering, vertical displacement, white plaque and retinal bleeding were high risk factors of cerebral thrombosis in the order listed. Sheathing of arteriole was significantly related to the occurrence of cerebrovascular diseases. Risk of cerebral haemorrhage was significant and highest in grade 3 of Scheie's hypertensive and Keith-Wagener's classifications. As is to be expected, the higher the grade of each fundoscopic finding and the classifications of the retinal findings, the higher the risk of occurrence of cerebrovascular diseases. Three or more, bright red colour and large plaque shape of retinal bleeding in the upper and lower temporal areas were more indicative of future cerebrovascular diseases than in other area, and one or two, dark red colour or smaller bleeding. Haemorrhage, the fundoscopic findings were more important than systolic and diastolic blood pressure and other findings for disease and stroke mortality.

Numerous studies have reported a strong association between various hypertensive retinopathy signs and both subclinical and clinical cerebrovascular disease and stroke mortality<sup>2</sup>.

In the ARIC study (Atherosclerosis risk in communities study), individuals with retinal haemorrhages, micro aneurysms and cotton-wool spots<sup>3</sup>, as defined from photographs, were two to four times more likely to develop an incident clinical stroke within 3 years, even when controlling for the effects of blood pressure, cigarette smoking, lipids and other risk factors.

In the ARIC study, individuals with both MRI-defined white matter lesions and hypertensive retinopathy were 18 times more likely [relative risk (RR) 18.1; 95% confidence interval (CI) 5.9–55.4] to develop an incident clinical stroke event than those without either white matter lesions or hypertensive retinopathy<sup>4</sup>

Another study by Julia Slarket al<sup>5</sup> to determine if hypertensive retinopathy (HTR) is an indicator of silent brain infarction (SBI) in asymptomatic hypertensive subjects using MRI and retinal photography revealed that HTR is a predictor of stroke and the higher the grade of HTR, the more prevalent SBI than in persons with normal retina (by linear association test,  $p=0.001$ ).

Another study by Kwa VIH, Van der Sande JJ<sup>6</sup> et al was done to correlate Retinal arterial changes with cerebral small-vessel disease. It showed that pathologic changes in the retinal arteries parallel changes in the small cerebral arteries that cause WML and lacunes, both in hypertensive and in normotensive patients.

#### **AIMS AND OBJECTIVES**

To know the correlation of hypertension and hypertensive retinopathy in ischemic arterial stroke patients.

##### **Inclusion criteria:**

- Patients seen in the out-patient department of ophthalmology of a major general hospital who have diagnosed ischemic arterial stroke.

##### **Exclusion criteria:**

- Past history of trauma to eyes and head.
- Presence of other ocular diseases, which confound the findings of cerebrovascular accidents.
- Patients with infective CNS conditions such as tuberculosis, pyogenic meningitis, etc.
- Patients not willing to be a part of the study

## MATERIALS AND METHODS

- Study design- Observational hospital based study
- Study Period-June 2017 to June2019
- History of risk factors related to stroke was noted.
- Onset and duration of hypertension with treatment history was noted.

Visual acuity: In cases of patients admitted in the medicine ward, visual acuity was noted bedside in terms of finger counting in meters. If patient is unconscious, vision has not been assessed.

In cases of patients who were assessed in ophthalmology department, visual acuity is recorded with the help of Snellen's chart at a distance of 6 meters.

External examination of adnexa is done.

Anterior segment evaluation consists of

- For bedridden patients in medicine ward, torchlight examination is done.
- For patients evaluated in ophthalmology out patient department, slit-lamp examination is done.  
Pupils: special emphasis is made on examination of pupils.
- Direct and consensual light reflex is checked.
- Relative afferent pupillary defect is noted if present.

Extraocular movements are assessed if patient is conscious and cooperative for the same.

Presence or absence of nystagmus is noted. If present, the type of nystagmus- whether jerk or pendular type is noted.

Posterior segment of the eye is evaluated with the eyes dilated with a mydriatic agent:

- Direct and indirect ophthalmoscopy is done.
- 90D slit lamp biomicroscopy examination for the evaluation of optic disc and macula is done in cases of patients assessed in outpatient department of ophthalmology.
- Detailed retinal blood vessel examination is done.
- Hypertensive retinopathy is graded according to Keith Wagner classification

- **Grade I**

Thickening, irregularity and tortuosity of retinal arterioles, increased refractiveness

- **Grade II**

Grade I plus arterio-venous nipping

- **Grade III:**

Grade II plus flame shaped haemorrhage and soft cotton wool exudates.

- **Grade IV:**

Grade III plus papilloedema

**RESULTS**

Out of 37 Patients with stroke, 30 (81.08%) were hypertensive. 14(46.66%) had history of hypertension and 16 (53.33%) were diagnosed hypertensive on admission. Majority of patients with CVA had hypertension diagnosed on admission

Table 1)

	History of hypertension		Hypertension diagnosed on admission	Total
	On treatment	Not on treatment		
<b>No. of patients</b>	13 (43.33%)	1(3.33%)	16 (53.33%)	30

19 of these 30 patients (63.33%) with hypertension had hypertensive retinopathy. 7 patients (23.33%) had both diabetic and hypertensive retinopathy.4 patients (13.33%) had normal fundus findings. Of the 16 patients who were diagnosed hypertensive on admission, 13 patients had hypertensive retinopathy and 3 patients had normal fundus.

Table 2)

	Patients with only hypertensive retinopathy	Patients with hypertensive and diabetic retinopathy	Patients with normal fundus	
<b>Patients with hypertension (%)</b>	19 (63.33%)	7 (23.33%)	4 (13.33%)	30

The classification of severity of hypertensive retinopathy (HTR) in ischemic arterial stroke is as follows.

Table 3)

	<b>Grade I HTR</b>	<b>Grade II HTR</b>	<b>Grade III HTR</b>
<b>No. of patients with hypertensive retinopathy in ischemic arterial stroke</b>	3 (11.5%)	19 (73.07%)	4 (15.38%)

**DISCUSSION**

In patients with ischemic arterial stroke, out of 37 patients, 30 patients (81.08%) were hypertensive. 14(46.66%) patients had history of hypertension and 16 patients (53.33%) were diagnosed hypertensive on admission. Thus, majority of the patients with cerebrovascular accidents had hypertension diagnosed on admission in this study .

19 of these 30 patients (63.33%) with hypertension had hypertensive retinopathy, 7 patients (23.33%) had both diabetic and hypertensive retinopathy and 4 patients (13.33%) had normal fundus findings (Table 30).

Of the 16 patients who were diagnosed hypertensive on admission, 13 patients had hypertensive retinopathy and 3 patients had normal fundus. Thus, fundus examination can aid in diagnosing hypertension in asymptomatic hypertensive.

Thus, 26 patients of 30 patients (86.66%) with hypertension had hypertensive retinopathy. Of these 26 patients, 3 patients (11.5%) had grade I hypertensive retinopathy, 19 patients (73.07%) had grade II hypertensive retinopathy and 4 patients (25%) had grade III hypertensive retinopathy.(Table 31).Majority of patients had grade II hypertensive retinopathy.

Thus, hypertensive retinopathy is associated with cerebrovascular accidents. A study by Julia Slark <sup>41</sup> et al to determine if hypertensive retinopathy (HTR) is an indicator of silent brain infarction (SBI) in asymptomatic hypertensive subjects using MRI and retinal photography revealed that HTR is a predictor of stroke and the higher the grade of HTR, the more prevalent SBI than in persons with normal retina (by linear association test, p=0.001).Thus, serial fundus examinations in hypertensive patients are necessary to help predict stroke. An ophthalmologist plays an important role in diagnosing and classifying the severity of hypertensive retinopathy. Appropriate measures can then be taken to control hypertension.

## CONCLUSION

- -In our study 26 pt out of 37 had hypertensive retinopathy.
- -So on basis of this we can conclude that hypertension is one of the risk factors for stroke.
- -Thus, serial fundus examinations in hypertensive patients are necessary to know the extent of retinal changes. An ophthalmologist plays an important role in diagnosing and classifying the severity of hypertensive retinopathy. Appropriate measures can then be taken to control hypertension.

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