

Incidence of ophthalmoscopic fundus changes in hypertensive patients

Karki KJD¹

¹Associate Professor, Department of Ophthalmology, Kathmandu Medical College.

Abstract

A prospective, hospital based, clinical study was conducted in hypertensive patients referred to the eye OPD, KMCTH, Sinamangal during a period of three months to find out the incidence of fundus changes. A total of 302 hypertensive patients were included in the study and their fundus changes were evaluated by direct ophthalmoscopy. The age of the patients ranged from 30-70 years and the duration of hypertension from 1-25 years. The blood pressure was not controlled in 218 patients (72.18%). More female patients (56.22%) were hypertensive than male (43.78%). But the fundus changes were less in female patients. Caste-wise hypertension was more common in Brahmins (38.41%) and fundus changes were also comparatively more. The fundus changes were found in 192 patients (63.57%) and the most common findings were hypertensive retinopathy. GrI + GrII combined together (52.31%). The other common fundus finding was BRVO in 11 patients (3.64%). A routine ophthalmoscopic fundus examination to detect the retinal changes in hypertensive patients is recommended.

Key words: Systemic hypertension, direct ophthalmoscopy, fundus changes.

Systemic hypertension is defined by the American Fifth Joint National Commission Report, USA (JNCV5) as a state of persistent elevated blood pressure above 140/90 mm of Hg based on an average of two or more blood pressure readings taken on two or more visits.¹

The joint National Committee on the prevention, detection, evaluation and treatment of high blood pressure in the United States and the British society of hypertension recommend routine ophthalmoscopic examination to detect signs of retinopathy in people with hypertension for the purposes of risk stratifications and treatment decisions.^{2,3}

Albuminuric retinitis was the term first used by Liebrich in 1859 for hypertensive fundus changes. The first and most widely accepted classification was that of Keith et al⁴ put forward in 1939. Later on Scheie⁵ proposed another classification in 1953. A simplified modification of Scheie classification is proposed by Hayreh et al⁶. All these classifications and gradings have their own limitations. Dr. Hayreh himself, therefore, recommended descriptive account of the individual fundus lesions, as revealed by ophthalmoscopy and fluoresce fundus angiography.

According to the report of Nepal Blindness Survey of Nepal-1981⁷ there are 3.3% of blindness due to

retinal changes, one of which is being the hypertensive retinopathy and other related complications. The prevalence of hypertension in urban population in Nepal is 5-15%⁸. As the urban population is increasing day by day, the hypertensive patients and hypertension related complications are also increasing in the same ratio. This study was, therefore, conducted to find out the incidence of fundus changes in hypertensive patients in KMCTH, Sinamangal.

Materials and Methods

A thorough systemic examination of the patients was done by the physicians. Vision testing and anterior segment examination of the eyes by the slit-lamp biomicroscope were done. The hypertensive patients aged 30-70 years having no other systemic diseases like diabetes mellitus to avoid overlapping of the pathophysiology of the two systemic diseases on the retina, and the eyes having no corneal and lens opacities or other diseases causing hazy media preventing fundus examination, were included for the study. The pupils were fully dilated with tropicamide eye drops and direct ophthalmoscopic examination of the fundus was done using the Heine Beta 200 direct ophthalmoscope.

Correspondence

Dr. K.J.D. Karki Associate Professor KMCTH, Sinamangal, Kathmandu, Nepal. Ph. No.: 5- 535093

All the findings were noted with a brief description. The KWB classification was used for the grading of retinal lesions. The fundus findings which had special clinical features were put under separate column with their clinical diagnosis.

Results

This study shows that out of 302 hypertensive patients examined 170 (56.22%) female patients and 132 (43.72%) male patients are affected with hypertension; the duration of hypertension ranged from 1-25 years; 160 patients (54.96%) were more than 60 years of age; 218 patients (72.18%) did not have their blood pressure controlled; caste-wise hypertension was found to be more in Brahmin patients 116 (38.41%) and fundus changes were also comparatively more in Brahmins (35.41%) and 220 patients (72.84%) are from Kathmandu.

This study further shows that 192 patients (63.57%) have abnormal fundus changes and the most common fundus changes (52.31%) are GrI + GrII combined together. The other common retinal change seen ophthalmoscopically is the branch retinal vein occlusion 11 patients (3.64%)⁹.

The other interesting fact that emerged from this study is that although systemic hypertension is less in male patients (43.72%) than female patients (56.22%), the fundus changes are found to be more in male patients (69.79%) than female patients (30.20%).

Table 1 Age distribution of hypertensive patients

Age	No	Percentage
31-40 Years	18	5.96
41-50 Years	48	15.89
51-60 Years	70	23.17
61-70 Years	166	54.96
Total-	302	100.00

Table 2 Sex distribution of hypertensive patients

Sex	No. of hypertensive patients	Percentage
Female	170	56.22
Male	132	43.70
Total-	302	100.00

Table 3 Ethnic distribution of hypertensive patients

Caste	No	Percentage
Brahmin	116	38.41
Newar	90	29.80
Kshatriya	58	19.20
Gurung, Magar, Rai, Limbu, Sunwar	26	8.60
Others	12	3.97
Total-	302	100.00

Table 4 Geographic distribution of hypertensive patients

Address	No	Percentage
Kathmandu	220	72.84
Terai	44	14.56
Hill	38	12.58
Total-	302	100.00

Table 5 Duration of hypertension

Duration -years	No	Percentage
1-5	204	67.54
6-10	52	17.21
11-15	20	6.62
16-20	12	3.97
21-25	14	4.63
Total-	302	100.00

Table 6 Control of blood pressure in hypertensive patients

Control of B.P.	No	Percentage
Yes	84	27.81
No	218	72.18
Total-	302	100.00

Table 7 Fundus changes in hypertensive patients

Fundus changes	No.	Percentages
1. Fundus changes within normal limits	110	36.42
2. Hypertensive retinopathy		
GrI + GII	158	52.31
GrIII	18	5.96
GrIV	2	0.66
3. Other fundus lesions		
BRVO	11	3.64
CRVO	2	0.66
AION	1	0.33
Total-	302	100.00
Total-	302	100.00

Table 8 Percentage of normal/abnormal fundus changes

Fundus changes	No	Percentage
Normal	110	36.42
Abnormal	192	63.57
Total-	302	100.00

Table 9 Sex distribution of fundus changes

Sex	No	Percentage
Male	134	69.79
Female	58	30.20
Total-	192	100.00

Table 10 Ethnic distribution of fundus changes

Caste	No	Percentage
Brahmin	68	35.41
Newar	66	34.37
Kshtriya	34	17.70
Gurung, Magar, Rai, Limbu Sunar etc.	16	8.33
Others	8	4.16
Total-	192	100.00

Discussion

Systemic hypertension is a multi-factorial disease due to the interaction of many abnormalities in the body system. With persistent elevation of arterial pressure and increased peripheral resistance, the brain, the heart and the eyes are most likely affected. It affects the arteries, veins, choroid and the optic nerve in the eyes. The retinal vasculature changes may be the reflections of the changes of the vasculature of other organs of the body especially the cardiovascular system, the central nervous system and the renal systems.

The direct ophthalmoscope is the cheap, easily available, non-invasive and handy instrument by which the changes in the retinal vasculature and the optic nerve can be visualized directly in vivo. That is the reason why, at times, the ophthalmologist is the first physician to diagnose asymptomatic hypertensive patients.

The retina, choroid and the optic nerve are supplied by different system of blood vessels. Recent studies on the subject have revealed that in fact fundus changes in systemic hypertension fall into the following distinct categories: (1) Hypertensive retinopathy (2) Hypertensive choroidopathy and (3) Hypertensive optic neuropathy. Hypertensive choroidopathy^{6, 9-13} is seen in patients suffering from acute hypertension (Malignant hypertension) especially in young patients with eclampsia and pre-eclampsia, renal diseases and accelerated essential hypertension. The pathological processes of hypertensive optic neuropathy are not fully understood. It may be due to the accumulation of axoplasm in the region of the lamina retinalis and choroidalis.¹⁴⁻¹⁷

The hypertensive retinopathy lesions can be divided into vascular and extravascular retinal lesions. The retinal vascular lesions are retinal arteriolar changes; focal intra retinal peri arteriolar transudates (FIPTS); cotton wool spots (iris); retinal capillary changes; retinal venous changes; and increased permeability of the retinal vascular bed. The extra vascular retinal lesions are retinal haemorrhages; retinal and macular edema; retinal lipid deposits (hard exudates) and retinal nerve fibre loss.

A routine ophthalmoscopic examination of the hypertensive patients was recommended for the purpose of heart risk stratifications and hypertension treatment decisions.^{2, 3} Hypertensive retinopathy also predicts CHD in high-risk men, independent of blood pressure and CHD risk factors. The retinal micro vascular changes are markers of blood pressure

damage.¹⁸ Recently microvascular changes have been shown to predict stroke¹⁹ independent of measured blood pressure and other cardiovascular risk factors. These factors make the ophthalmoscopic examination of the hypertensive patients by the ophthalmologist all the more important. Realizing this importance all the cases of hypertension that come to the eye OPD, KMCTH, the pupils were fully dilated and routine direct ophthalmoscopy done.

There are many classifications and methods of grading hypertensive fundus changes. In this study the KWB classification is followed, being the most widely accepted and easy to follow. However, ophthalmologically it is, most of the times, difficult to find the differences in retinal changes in GrI and GrII. Moreover, these changes have almost the same clinical significance. The other problem one faces in evaluating fundus changes is that some of the retinal changes found in hypertension do not fit in any gradings. For that reason these retinal changes were put under a separate heading.

This clinical study shows that the fundus changes are directly related to the control of blood pressure. The other interesting fact that emerged from this study is that although more female patients are hypertensive than male patients the fundus changes are less common in female patients than in male patients. It may be inferred that the factors that control the retinal blood flow autoregulation and the blood-retinal barrier are different in two sexes.

Conclusion

Systemic hypertension is a multifactorial disease. It is defined as a state of persistent elevated pressure above 140/90 mm of Hg on two or more blood pressure recordings. It affects the arteries, veins, choroids and the optic nerve. The fundus changes may be the reflections of changes that are going on in other organs of the body like heart, brain and the kidneys. The direct ophthalmoscope is the best tool to find those changes in the fundus.

The control of hypertension is most important to prevent visual impairment or visual loss and also morbidity and mortality of the patient. For this reason the blood pressure should be controlled by weight control, sodium restriction, physical exercise, meditation and relaxation and control of blood pressure by antihypertensive drugs.

The blood pressure in malignant hypertension should be lowered gradually to allow sufficient time for the auto regulation of the blood flow to adapt itself. If the

blood pressure is lowered suddenly irreversible blindness may occur.

Hence, the physicians and the ophthalmologists must pursue a joint and coordinated approach to prevent visual loss and risk factors from hypertension.

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