Original Article

Analysis of Retinal Signs in Patients with Primary Hypertension

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ABSTRACT

OBJECTIVE OF STUDY: To detect retinal signs in patients with primary hypertension.
DESIGN OF STUDY: Hospital based prospective study.
PLACE OF STUDY: Department of Medicine Unit II, Chandka Medical College Hospital Larkana.
DURATION OF STUDY: One year from January 2010 to December 2010.
MATERIAL AND METHODS: Our study included evaluation of 495 patients of age greater than 20 years with primary systemic hypertension (BP>139/89mmHg) for presence of retinopathy. The hypertension was detected by physician with sphygmomanometer and the retinopathy was detected by ophthalmologist with fundoscopy. The type and severity of hypertensive retinopathy was graded on the basis of KEITH-WAGENER CLASSIFICATION. The investigations advised were complete blood cell count, complete urine examination; sugar fasting, lipid profile, blood urea, serum creatinine, electrocardiogram, echocardiography and X-Ray chest PA-view. Only known patients of primary hypertension were included in this study and patients of primary hypertension with other retinal vessel diseases and secondary hypertension were excluded.
RESULTS: We evaluated 495 patients, 317(64.04%) males and 178 (35.95%) females aged 20 years and above. (P value=<0.001, X^2 Value=34.29, df=4). The hypertensive retinopathy was present in 223(45.1%) patients and absent in 272(54.9%) patients (P value= <0.045, X^2 value=6.19, df=2). The severity and grading of retinopathy seen was, grade-I hypertensive retinopathy in 108 (48.4%,n=223) patients, grade-II in 71(31.8%, n=223), grade-III retinopathy in 36(16.1%, n=223) patients and grade-IV in 8 (3.6%, n=223) patients. (P value=<0.0001, X^2 Value=52.76, df=6).
CONCLUSION: With early detection of retinal signs in primary hypertensive patients, the eyes and other systemic complications of primary hypertension can be prevented.

KEYWORDS: Retinal signs - primary hypertension.

INTRODUCTION

The systemic hypertension induced abnormalities in the retina and its blood vessels (hypertensive retinopathy) seen on fundoscopy were first described by Marcus Gunn in 1859. The first modified and most widely used grading system for hypertensive retinopathy was proposed by Keith et al in 1939 and Dodson PM et al 1996 on the basis of increasing clinical severity as follows:

GRADE-1= consists of mild generalised retinal arteriolar narrowing.

GRADE-2=consists of severe generalised or focal arteriolar narrowing and arteriovenous nicking (venous compression at arteriovenous crossings).

GRADE-3=consists of grade1 and grade 2 signs plus the presence of macro aneurysms, blot and flame shaped haemorrhages, cotton-wool spots and hard exudates in the retina.

GRADE-4=consists of grade1, 2, and 3 signs plus the presence of optic disc oedema, macular exudative star. (Malignant hypertensive retinopathy).[1 2]

The systemic arterial hypertension produces a series of pathophysiological changes in retina and its blood vessels. In the initial vasoconstrictive stage, the vasospasm and an increase in retinal arteriolar tone results generalized narrowing of the retinal arterioles. In the sclerotic stage, the intimal thickening, hyperplasia of media wall and hyaline degeneration develops generalized and focal arteriolar narrowing, opacification of arteriolar walls with widening and accentuation of the central light reflex (silver/copper wiring) and venous compression by arterioles at arteriovenous junctions (arteriovenous nicking).In the exudative stage, the breakdown of blood-retina barrier, necrosis of the smooth muscles and endothelial cells ,exudation of blood and lipids ,and retinal ischemia produces macro aneurysms, haemorrhages, hard exudates and cotton-wool spots. At this time in the advanced stage, severely elevated blood pressure (malignant hypertension = (abrupt elevation in blood pressure >210/120 mmHg)) creates bilateral optic disc swelling, star shaped macular hard exudates in addition. The exudative and advanced stages should be differentiated from other mimicking ocular and systemic diseases involving the retina and its vessels like diabetes melli-

tus, anaemia, leukaemia, polycythaemia, retinal vasculitis, Behcet's disease, acquired immunodeficiency syndrome, cytomegalovirus retinitis, increased intracranial pressure (Papilledema), ischemic optic neuropathy, and optic neuritis[3,4]. To prevent ocular and systemic complications of primary hypertension the patients should be properly treated by antihypertensive therapy as early as possible and also should be closely observed for aggravating risk factors of retinopathy through relevant investigations. Patients with grade IV hypertensive retinopathy signs will continue to need urgent small stepwise antihypertensive therapy in order to avoid a sudden reduction in blood pressure which may lead to cerebrovascular accident. With adequate hypertension treatment, regression of hypertensive retinopathy signs may occur over a period of 6 months to a year.[5,6,7]

MATERIAL AND METHODS

This prospective study was conducted in the medicine department unit-II of Chandka medical college hospital larkana from January 2010 to December 2010. Total 495 patients with primary hypertension were evaluated. Hypertension was diagnosed on screening of blood pressure >139/89 mmHg by physician with sphygmomanometer. After that, a specific proforma containing informed consent, biodata, detailed history, clinical examination, investigations and treatment was filled. To detect the retinopathy, all the patients were referred to ophthalmologist of Chandka Medical College Hospital Larkana. The retinopathy was detected by fundoscopy with direct ophthalmoscope, indirect ophthalmoscope, 90 D lens and fundus photography after dilating the pupil with 1% tropicamide eye drops. The type and severity of retinopathy seen was graded according to Keith-Wagener classification. The investigations performed were complete blood cell count, complete urine examination, blood sugar fasting, lipid profile, blood urea, serum creatinine, electrocardiogram (ECG), X-Ray chest PA-view and echocardiography. Only known patients of primary hypertension were included in this study and patients of secondary hypertension, primary hypertension with diabetic mellitus, vasculitis, optic neuritis, central retinal vein occlusion and ischemic optic neuropathy were excluded.

Statistical Analysis

The data were entered and analyzed in statistical program SPSS version 16.0. Qualitative data (frequencies and percentages) such as gender, age (in groups), grading of retinopathy and duration of retinopathy were presented as n(%).

RESULTS

In this study, 317(64.0%, n = 495) were males and 178(36.0%, n = 495) were females with age of 20 years and above. The majority of patients 193 (39.0%, n = 495) were more than 60 years of age, 140(28.0%, n = 495) patients were in between 51 to 60 years, 93 (18.8%, n = 495) patients were ranged from 41 to 50 years, 51(10.3%, n = 495) patients were from 31 to 40 years, and 18(3.6%, n = 495) were seen in the young age group of 20 to 30 years.**(Table I)** Out of 495 cases, 126(25.5%) patients had the duration of hypertension < 10 years, of these, 68(30.5%, n = 126) patients had hypertensive retinopathy, 224(45.3%) patients had the duration of hypertension from 10 to 20 years, of these,90(40.4%,n=224) patients had hypertensive retinopathy, whereas 145(29.3%) patients had the duration of hypertension more than 20 years, of these 65(29.1% n=145) patients had hypertensive retinopathy.**(Table II).** Most of the patients 108(48.4%, n = 223) had the Grade I hypertensive retinopathy, followed by Grade II in 71(31.8% n=223) patients, Grade III in 36 (16.1% n=223) patients and Grade IV in 8(3.6% n= 223) patients. **(Table III).** The relevant investigations showed decreased haemoglobin< 10 mg in 93 (18.78%) patients, proteinurea in 71 (14.34%) patients, altered lipid profile in 88 (17.77%) patients, increased blood urea and serum creatinine 56(11.31%) patients, ischemic heart changes on electrocardiogram 65 (13.13%) patients and left ventricular hypertrophy on echocardiography in 71 (14.34%) patients. The history of smoking was positive in 85 (17.17%) patients and obesity in 92(18.58%) patients.

TABLE I: SHOWING AGE AND SEX DISTRIBUTION OF THE PATIENTS (n=495)

Age of Patients	No. of Patients n=495	Males n=317	Females n=178
20-30 years	18(3.6%)	18(5.7%)	0
31-40 years	51(10.3%)	42(13.2%)	9(5.1%)
41-50 years	93(18.8%)	48(15.1%)	45(25.3%)
51-60 years	140(28.3%)	74(23.3%)	66(37.1%)
> 60 years	193(39.0%)	135(42.6%)	58(32.6%)

TABLE II: SHOWING DURATION OF HYPERTENSION AND PREVALENCE OF RETINOPATHY (n=495)

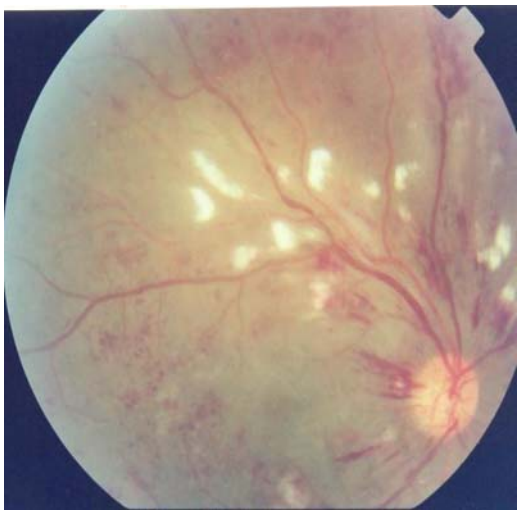
Duration of hypertension	Total Number of patients N=495	Hypertensive Retinopathy Absent- patients n = 272	Hypertensive Retinopathy Present- patients n = 223
<10 years	126(25.5%)	58(21.3%)	68(30.5%)
10-20 years	224(45.3%)	134(49.3%)	90(40.4%)
>20 years	145(29.3%)	80(29.4%)	65(29.1%)

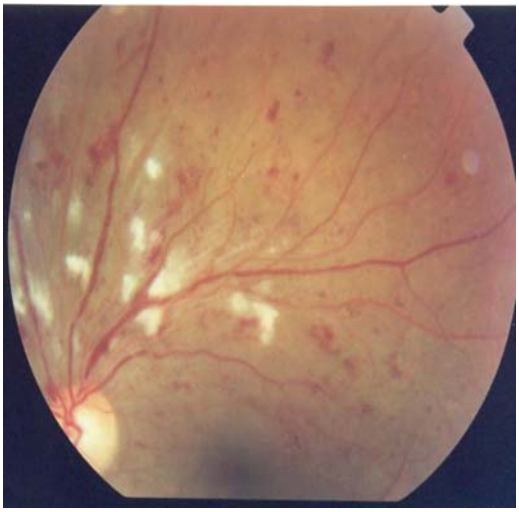
TABLE III: SHOWING DURATION OF HYPERTENSION AND GRADING OF RETINOPATHY (n=223)

Grading of Retinopathy	<10 years n = 68	10-20 years n = 90	>20 years n = 65	Total n=223
Grade I	37(54.4%)	51(56.7%)	20(30.8%)	108(48.4%)
Grade II	31(45.6%)	24(26.7%)	16(24.6%)	71(31.8%)
Grade III	0	15(16.7%)	21(32.3%)	36(16.1%)
Grade IV	0	0	8(12.3%)	8(3.6%)

ANNEX I:

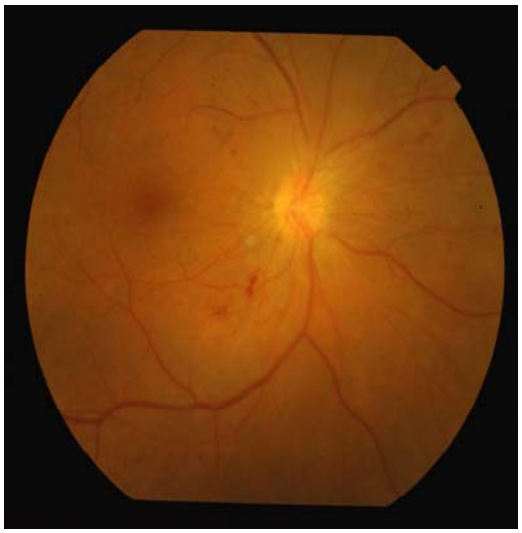
The bilateral colour retinal fundus photographs of 48 years old male with Grade III hypertensive retinopathy showing bilateral macro-aneurysms blot and flame shaped haemorrhages and cotton-wool spots.

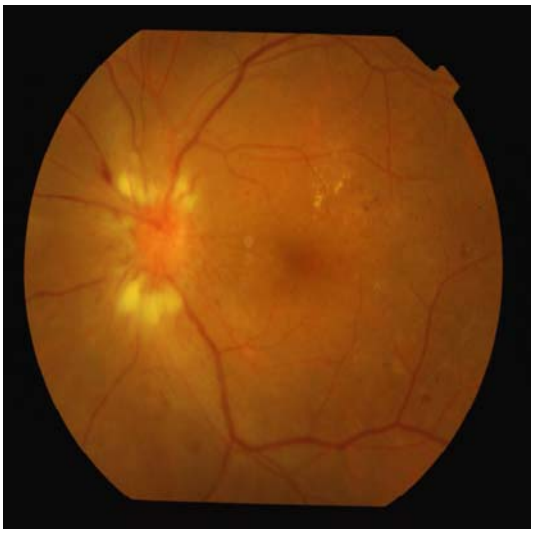




ANNEX II:

The bilateral colour retinal fundus photographs of 46 years old male with Grade IV hypertensive retinopathy (malignant hypertension) showing bilateral optic disc congestion, edema, exudates, splinter shaped haemorrhages, few macular exudates and sever retinal arteriolar attenuation with underlying venular dilatation.





DISCUSSION

The prolonged, uncontrolled systemic hypertension of any cause results impaired blood flow and many patho -physiological changes especially in the heart, brain, kidneys, eyes and vascular system leading to increased morbidity and mortality[8]. We had seen 45.1% prevalence of hypertensive retinopathy which is close to the study conducted by M Zakria et al, who noticed 56% prevalence[9]**.** Ps Sharp et al showed 11% prevalence in European population and 21% in Afro-Caribbean population[10]. Data from Beaver Dam Eye Study showed 3-14% prevalence of hypertensive retinopathy[11]**.** Wang JJ, *et al,* had noticed grade-I hypertensive retinopathy in 30-40% patients, grade-II in 70-80%, grade-III in 50-70% and grade-IV in 1%.[12] In our study we had seen grade-I hypertensive retinopathy in 108 (48.4%, n=223) patients, grade-II in 71(31.8%, n=223), grade-III retinopathy in 36(16.1%, n=223) patients (Annex No-1) and grade-IV in 8 (3.6%, n=223) patients. (Annex No-2). Shirafkam A et al in their study showed retinopathy in 95% patients of systemic hypertension with left ventricular hypertrophy. Similarly in our study, out of 71s hypertensive patients with left ventricular hypertrophy we have seen retinopathy in 65 (91.54%, n=71) patients[13,14]. The grade I and II hypertensive retinopathy signs are irreversible and remain for longer time even after controlling the hypertension with treatment. Therefore by detecting these signs we can prevent further progression of retinal damage, visual loss and other systemic complications by controlling hypertension. Grade III and IV hypertensive retinopathy signs are reversible and resolved with treatment and therefore are not risk markers of future hypertensive complications[15]. Malignant hypertension affects less than 1% of people with hypertension. But we have seen this in 8 (3.6%) patients. This difference may be because of increase number of medically uncontrolled hypertensive patients than controlled patients in our study. The visual loss in malignant hypertension results from retinal pigment epithelium changes, secondary retinal detachment and optic atrophy due to prolonged ischemia[16]. In the study of Keith NM et al[17], the 3 year survival of patients with grade-1 hypertensive retinopathy was 70% and the survival was only 6% in those with grade-4 hypertensive retinopathy. Malignant hypertension has a high mortality rate of 50% at two months and 90% at one year[18]. To stop the further progression of disease it is important to rule out and treat the aggravating factors like anaemia, proteinurea, altered lipid profile, renal dysfunction, ischemic heart disease, left ventricular hypertrophy, smoking, and obesity[19]. Also the early diagnosis and well controlled blood pressure with treatment, counselling about precautions like decreased salt and fat intake, regular brisk walk and to stop smoking plays very important role in preventing the eyes and other systemic complications of primary hypertension[20].

CONCLUSION

The early detection of retinal signs in primary hypertension is essential to prevent visual loss and other target organ damage.

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