

Study of Characteristic Retinal Findings among Hypertensive Population Attending a Tertiary Care Hospital in Nepal

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ABSTRACT

Background

Systemic hypertension is one of the most common chronic, debilitating diseases prevalent in the modern era, with many complications in terms of stroke, chronic kidney disease, coronary artery disease and retinopathy. When it comes to the eye, as a target organ damage, it leads to one of the many vision threatening conditions, hence degrading the quality of life. Early detection and subsequent management of patients at risk of hypertensive retinopathy serves to be a crucial panacea in the treatment course.

Objective

To investigate the characteristics retinal findings among hypertensive population and analyze the associated risk factors.

Method

A hospital based prospective study was conducted, among 250 patients presenting to ophthalmology outpatient department in Dhulikhel Hospital, Kathmandu University Hospital (DH-KUH), over a time span of 6 months, to analyze hypertensive retinopathy and its implications. Fundus examination under mydriasis was done on all subjects and hypertensive retinopathy was graded according to the modified Scheie classification.

Result

Most patients belonged to age group of 56-65 years (30%). Nearly half (48%, N=120) of the hypertensive population had some forms of retinopathy. Grade II hypertensive retinopathy (24.8%) was the most common hypertensive change observed. Majority (55%) of the patients with retinopathy were smokers. About two-third of the subjects (67.5%) had been diagnosed to have hypertension and under treatment for over 5 years.

Conclusion

The occurrence of retinopathy among hypertensive patients attending ophthalmology department is higher. Awareness regarding systemic hypertension and its effect on ocular health is very important to be disseminated among public. Timely referral among medical specialities could diagnose and prevent curable blindness among hypertensive patients.

KEY WORDS

Epidemiological analysis, Retinopathy, Systemic hypertension

INTRODUCTION

Hypertension is one of the most important health problems, leading to serious complications such as stroke, chronic kidney disease, coronary disease and retinopathy.^{1,2} Systemic hypertension is a clinical condition where there is elevated blood pressure above 140/90 mmHg persistently, which is based on an average of two or more blood pressure readings, taken at two or more visits.³

One in six people worldwide, or nearly one billion, are affected by hypertension, and it is estimated to increase to 1.5 billion by 2025.¹ Nepal blindness survey 1981 shows 3.3% of blindness to be a direct causative of retinal changes, of which hypertensive retinopathy (HR) make the major bulk.⁴ Retinal microvascular changes assist in classifying risk factors and treatment decisions for hypertension.⁵ Joint National Committee Seventh (JNC-VII) reports on prevention, detection, evaluation and treatment of high blood pressure recommended evaluation of HR as a part of standard care of hypertension and lists it as a marker of target organ damage. Patient presenting with hypertension alone in the stage I, is an indication for starting antihypertensive treatment. HR signs predict stroke, independently of hypertension and other risk factors.⁶

In most patients, HR does not cause vision loss as long as the hypertension is treated. However, if hypertension remains untreated, it can lead to vision loss within a short period of time.⁷ There is a paucity of studies related to HR in Nepal, and by this study, we aim to investigate the incidence of HR amongst hypertensive patients attending a tertiary care hospital.

METHODS

A hospital based prospective study was conducted, among patients presenting to the ophthalmology outpatient department in Dhulikhel Hospital, Kathmandu University Hospital (DH, KUH), over a time span of 6 months from 1st May 2017 to 1st November 2017, to analyze the hypertensive retinopathy and its implications. Whole sampling method was applied. There was a total of 250 hypertensive patients attending ophthalmology outpatient department in Dhulikhel Hospital, Kathmandu University Hospital (DH, KUH) with the following aims: To know the occurrence of hypertension in various age groups

1. To determine the gender wise percentage of hypertension
2. To determine the percentage of hypertension among various caste
3. To know the status of retinal blood vessels in hypertensive patients and the severity of hypertension by grading hypertensive retinopathy according to Modified Scheie classification.⁸

4. To determine correlation between smoking and hypertensive retinopathy

Fundus examination under mydriasis was done on all subjects and hypertensive retinopathy was graded according to the modified Scheie's classification. The study was approved by Institutional Review Committee of Kathmandu University School of Medical Sciences (KUSMS).

The patients enrolled in this study had following characteristics:

1) Inclusion criteria:

- a) All those patients with significantly elevated blood pressure, were evaluated in detail by the department of medicine, and were then referred to the department of ophthalmology, for evaluation of hypertensive retinopathy.
- b) Patients of age group 25-80 years.

2) Exclusion criteria:

- a) Patients with corneal and lenticular opacities and any other disease that may have a high refractive media preventing fundus examination.
- b) Critically ill patients, disoriented patients and those unwilling to participate in the study.
- c) Patients with known co-morbidities like Diabetes mellitus and other systemic diseases like leukemia that may overlap the patho-physiology of hypertension.

3) After obtaining an informed written consent, patient underwent ophthalmology examination was done, with the help of Snellen's chart for vision testing, slit-lamp bio-microscope for anterior segment examination and 90 diopter lens for fundus evaluation after dilating the pupils fully with tropicamide plus eye drop.

All the collected data were entered in Microsoft Excel. Statistical analyses were performed using the software called Statistical Package for the Social Sciences, version 20.0. For all the statistical analyses, significance was accepted at $p < 0.05$.

RESULTS

In this study 30% (n=36) of the population belonged to the age group of 56-65 years, followed by 46-55 years age group accounting for 27.5% (n=33) (Table 1).

Male were found 51.66% (n=62) of the study population and the remaining 48.33% (n=58) were female (Table 2).

In this study(44.16%) population belonged to Newar caste, followed by 20.8% (n=25) belonging to Brahmin caste (Table 3).

In this study 55% (n=66) cases were found smokers (Table 4).

Table 1. The incidence of HR in different age groups (n =120)

Age group	Screened	HR	Non-HR	HR Percentage (%)
25-35	22	7	15	5.83
36-45	38	13	25	10.80
46-55	63	33	30	27.50
56-65	71	36	35	30.00
66-75	40	20	20	16.60
76-80	16	11	5	9.16
Total	250	120	130	100.00

HR = Hypertensive retinopathy

Table 2. Table showing hypertensive retinopathy in different sex (n =120)

Sex group	Screened	Percentage	HR	Non-HR	HR Percentage (%)
Male	123	49.2	62	65	51.66
Female	127	50.8	58	65	48.33
Total	250	100	130	130	100

Table 3. Table 3. Table showing HR hypertensive retinopathy in different castes (n =120)

Caste	Screened	HR	Non-HR	HR Percentage (%)
Brahmin	60	25	35	20.0
Newar	105	53	52	44.16
Rai/ Magar/ Thapa	54	24	30	20.00
Chhetri	23	13	10	10.80
Others	8	5	3	4.16
Total	250	120	130	100.00

Table 4. Table showing hypertensive retinopathy among smokers and non-smokers

Smoking Habit	Screened	HR	Non-HR	HR Percentage (%)
Present	121	66	55	55.00
Absent	129	54	75	45.00

Table 5. Table showing relationship between varying grades of HR and total HR (According to Modified Scheie classification)

Table 5. Showing relationship between varying grades of HR and total HR (According to Modified Scheie classification)

Systolic BP	No HR	Grade I	Grade II	Grade III	Grade IV	Others
Up to 150	50	24	31	7	-	-
151-175	60	10	25	3	-	-
176-200	20	4	6	4	-	-
> 200	-	-	-	-	-	BRVO (4) Ischemic CRVO (2)
Total	130	38	62	14	-	6

Among Study population of 52% had no features suggestive of HR, and amongst those having HR, 24.8% had grade II, 15.2% had grade I, 5.63 had grade III and none of them had grade IV HR.

Table 6. Showing incidence of different severity of HR (According to Modified Scheie’s classification)

Severity of HR	Incidence (%)
No HR	52.00
Grade I	15.20
Grade II	24.80
Grade III	5.63
Grade IV	0

Majority of the patients with HR were diagnosed with hypertension and under treatment for 6-10 years duration i.e. 58.33% (n=70) followed by duration and treatment for hypertension for 0-5 years i.e. 32.5% (n=39).

Table 7. Showing the relationship between duration of hypertension with hypertensive retinopathy

Duration of hypertension (Years)	Screened	HR	Prevalence
0-5	130	39	32.50
6-10	79	70	58.33
11-15	30	10	8.33
16-20	11	1	0.80
Total	250	120	100.00

DISCUSSION

In our study, majority of the study population belonged to the age group of 56-65 years (30%). In a similar study conducted by Karki et al. 160 patients (54.96%) were more than 60 years of age.⁹ In a similar study conducted by Pun et al. mean age of patients enrolled in the study was 60.58 ± 12.26 years.¹⁰ In a study conducted by Adhikari et al. the mean age of patients was 60.24 (± 15.14) years that ranges from 23-93 years.¹¹ In a study conducted by Bastola et al. the mean age of the study group was 58.5 (±9.2) years.¹²

We found that there was no statistically significant sex preponderance (p=0.05) as 51.66% (n=62) of the study population were male, and the remaining 48.33% (n=58) were female. In a similar study conducted by Karki et al. 56.22% (n=170) were female and 43.72% (n=132) were male patients.⁹ In the study conducted by Adhikari et al. there were 50.4% male, among them 67.6% had HR and 49.6% female, among them 64.2% had HR.¹¹ Most of the study population belonged to Newar caste i.e. 44.16% (n=53), followed by Brahmin caste i.e. 20.8% (n=25). In a similar study conducted by Karki et al. Brahmin caste made the major bulk of the study population accounting for 38.41% (n=116), followed by Newar caste i.e., 29.80%

(n=90).⁹ In our study, we found that majority of the study population i.e. 55% (n=66) were smokers.

Most of the study population screened had no features suggestive of HR at that moment i.e. 52%, and among those having HR, mostly had Grade II HR i.e. 24.8%. In a similar study conducted by Karki et al. majority of the study population had Grade I and Grade II HR i.e. 52.31%. (However, in this study, Modified Keith-Wagner-Barker Classification was used as reference).⁹ Study conducted by Pun et al. most of the patients with HR had Grade I HR i.e. 31%. (However, in this study, Modified Keith-Wagner-Barker Classification was used as reference).¹⁰ In a study conducted by Adhikari et al. most of the patients with HR had Grade II HR i.e. 29.6%. (However, in this study, Modified Keith-Wagner-Barker Classification was used as reference).¹¹ In a study conducted by Badhu et al. most of the patients had no ophthalmic evidence of retinopathy (n=26), 10 subjects had grade III HR, whereas 12 others had various ocular complications of hypertension.¹³ (However, in this study, Keith-Wagner-Barker Classification was used as reference), In our study, we found that majority of the patients with HR were diagnosed with hypertension and under treatment for it for over 5 years duration i.e. 62.5% followed by duration and treatment for hypertension for 0-5 years i.e. 32.5%. In a similar study conducted by Karki et al. majority of the patients with HR were diagnosed with hypertension for a duration of 1-5 years (67.54%), and the remainder had been diagnosed with hypertension for over 5 years.⁹

Till date, only a handful of studies have been performed to investigate the incidence of HR in Nepal. Prospective study, large sample size incorporating every patient with hypertension attending the ophthalmology out-patient department of Dhulikhel Hospital for a span of 6 months, and the basis of this study being a composite of subjective and objective assessment of the patient, stand out to be some of our strengths. However, ours being a study of only 6 months, the patients couldn't be followed up, for assessing the progression or the regression of the HR changes. For this fact alone, a randomized controlled trial needs to be performed.

CONCLUSION

Hypertensive retinopathy (HR) is one of the target organ damage secondary to systemic hypertension. The fundus changes alone may be a predictor of ongoing pathophysiological changes consequent of hypertension that affects other organs like heart, brain and kidneys. Moreover, uncontrolled hypertension leads to visual impairment or visual loss, acutely or in the long run. Smoking further contributes to hasten the process. These all leads to the increase in morbidity and mortality of the patients with systemic hypertension. Thus, fundus examination alone serves as one of the best tools to find the changes suggestive of hypertensive retinopathy and halt the dynamic pathophysiology. Education and awareness about early diagnosis and adequate treatment is key.

REFERENCES

1. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *The Lancet*. 2005 Jan 15;365(9455):217-23.
2. Virani SS, Alonso A, Benjamin EJ, Bittencourt MS, Callaway CW, Carson AP, et al. Heart disease and stroke statistics-2020 update: A report from the American Heart Association. *Circulation*. 2020; 139–596.
3. The fifth report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC V). *Arch Intern Med*. 153(1993) 154-83.
4. Pokhrel RP, Grasset NC, Brilliant LB. The epidemiology of blindness in Nepal: report of the 1981 Nepal blindness survey. Seva Foundation; 1988.
5. Duncan BB, Wong TY, Tyroler HA, Davis CE, Fuchs FD. Hypertensive retinopathy and incident coronary heart disease in high risk men. *British Journal of Ophthalmology*. 2002 Sep 1;86(9):1002-6.
6. Chobanian, Aram, Bakris, George, Black, Henry, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003; 42: 1206-52.
7. Do DV, Wang X, Vedula SS, Marrone M, Sleilati G, Hawkins BS, et al. Blood pressure control for diabetic retinopathy. *Cochrane Database Syst Rev*. 2015 Jan 31;1:CD006127.
8. Scheie HG. Evaluation of ophthalmoscopic changes of hypertension and arteriolar sclerosis. *AMA archives of ophthalmology*. 1953 Feb 1;49(2):117-38.
9. Karki KJ. Incidence of ophthalmoscopic fundus changes in hypertensive patients. *Kathmandu Univ Med J (KUMJ)*. 2003;1(1):27–31.
10. Pun C, Tuladhar S. Profile of Hypertensive Retinopathy in a Tertiary Centre in Western Nepal. *J Gandaki Med Coll*. 2019;12(1):22–4.
11. Adhikari BN, Gautam PS, Bekoju B, Basnet S, Bhandari H. Association of Hypertensive Retinopathy with different serum lipid parameters in patients of Essential Hypertension: A Hospital Based Study. *J Nobel Med Coll*. 2018;7(2):50–7.
12. Bastola P, Pun CB, Koirala S, Shrestha UK. Fasting serum lipids and fundus changes in hypertensive patients. *Nepal Journal of Medical Sciences*. 2012 Aug 2;1(2):103-7.
13. Badhu BP, Dulal S, Baral N, Lamsal M, Shrestha JK, Koirala S. Serum level of low-density lipoprotein cholesterol in hypertensive retinopathy. *Southeast Asian J Trop Med Public Health*. 2003;34(1):199–201.