HYPERTENSIVE RETINOPATHY - PREVALENCE, RISK FACTORS AND COMORBIDS

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ABSTRACT

BACKGROUND

Hypertension is one of the most important current health problems with complications like coronary heart disease, stroke, chronic kidney disease and retinopathy. Hypertensive retinopathy is regarded as one of the independent indicator for systemic morbidity and mortality. This study aims at studying the prevalence of hypertensive retinopathy, the risk factors, associated factors and comorbid conditions of it.

MATERIALS AND METHODS

A cross-sectional study in 120 hypertensive patients in Chengalpattu Medical College is conducted for the prevalence of HT retinopathy and the influence of age, sex, systolic BP, duration of HT, body mass index and lipids on retinopathy were also studied. The prevalence of comorbid conditions like coronary heart disease, stroke, chronic kidney and chronic obstructive lung disease were also studied.

RESULTS

The prevalence of HT retinopathy among HT patients is 41.5%. Age, female sex, systolic BP, duration of HT are significant risk factors of HT retinopathy. A high serum levels of total cholesterol, LDL cholesterol and triglyceride are associated with HT retinopathy. Coronary artery disease and stroke are significantly associated comorbidities of HT retinopathy.

CONCLUSION

There is an increased prevalence of retinopathy among hypertensive patients; the risk factors both modifiable and non-modifiable increases the prevalence of retinopathy. The comorbid illnesses also increase the occurrence of retinopathy.

KEYWORDS

Hypertension, Retinopathy, Risk Factors, Comorbid Illness.

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BACKGROUND

Hypertension is one of the leading cause of global burden of the disease. Approximately, 7.6 million deaths and 92 million disability adjusted life years world-wide were attributable to high blood pressure since 2001. World Health Organisation defines Hypertension as a rise in blood pressure of systolic above 140 and diastolic above 90 mmHg that increases the risk for cerebral, retina, cardiac and renal events and therefore an increase in complications like coronary heart disease, stroke, chronic kidney disease and retinopathy.

MATERIALS AND METHODS

This study was conducted in 120 hypertensive patients who attended the Hypertension Clinic of Chengalpattu Medical College Hospital of age above 40 years during October 2015 to September 2016. Patients with secondary hypertension, critically ill patients were excluded. After getting the informed consent, patients underwent retinal examination by a trained ophthalmologist and were classified into 4 grades according to Keith-Wagener-Barker scale.

Grade 1 - When there was mild generalised retinal arteriolar narrowing.

Grade 2 - More severe generalised narrowing, focal areas of arteriolar narrowing and arteriovenous nicking.

Grade 3 - Consisted of Grades 1 and 2 signs plus the presence of retinal haemorrhage, microaneurysms, hard exudates and cotton-wool spots.

Grade 4 - Also referred to as accelerated (Malignant) hypertensive retinopathy with signs of the preceding three grades plus optic disk swelling and macular oedema.

The parameters such as age, gender, duration of hypertension, comorbid illnesses, details of anti-HT drugs are obtained from detailed history. The height of the participants was measured in meters by asking them to stand barefoot by facing the back adjacent to the wall and by keeping a scale straight on the head. For measuring the weight, the patients were asked to stand on the weighing machine without slippers and with minimal clothing and the readings were noted in kilograms. The body mass index was calculated from the height and weight of the patients using the formula.

Body Mass Index = Weight (Kg)/Height^2 (Meters).

Blood pressure was measured in the right arm of the patient in sitting position after the patient had rested for 30

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mins. The arm should be at the level of the heart while measuring BP. Patients were also asked to abstain from smoking and caffeine ingestion for duration of 6 hours previous to measuring BP. Around 5 mL of venous blood was collected after overnight fasting for 8 hours' duration. Serum total cholesterol, triglyceride and high density lipoprotein cholesterol (HDL - cholesterol) were determined by enzymatic methods. Low density lipoprotein - cholesterol (LDL - cholesterol) and very low density lipoprotein – cholesterol (VLDL - C) was calculated using the formula of Friedewald.
LDL-c = TC – (HDL + VLDL).

When serum triglyceride concentration was greater than 400 mg/dL, LDL - cholesterol was determined directly by enzymatic method using commercial kits.

All the statistical analyses were done using the Statistical Package for Social Sciences Software Version 17.

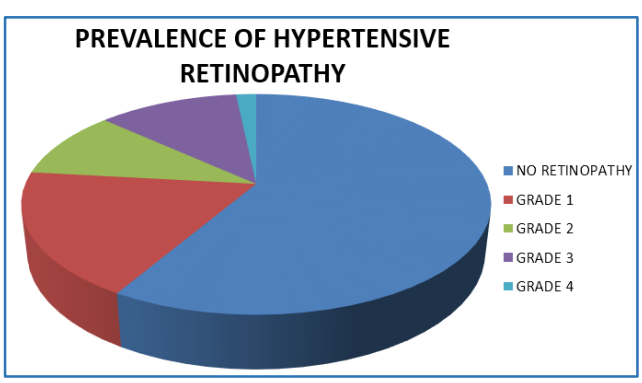
RESULTS

Profile	Values
Age (Years)	59.51 ± 13.93
Systolic Blood Pressure (mmHg)	155.3 ± 12.6
Duration of HT (Years)	5.25 ± 2.06
Body Mass Index (kg/m^2)	27 ± 5.3
Total Cholesterol (mg/dL)	180.9 ± 28.3
LDL Cholesterol (mg/dL)	115.8 ± 21.5
HDL Cholesterol (mg/dL)	34 ± 9.3
Triglycerides (mg/dL)	155 ± 37

Table 1. Demographic, Anthropometric and Clinical Profile of Patients

Grades	Percentage
1 (n = 22/120)	18.33%
2 (n = 12/120)	10%
3 (n = 24/120)	11.6%
4 (n = 2/120)	1.66%
Total (n = 50/120)	41.5%

Table 2. Prevalence of Retinopathy



Sl. No.	Risk Factors	With HR	Without HR	P Value
1	Age (Years)	66.4±13.2	54.6±12.33	<0.0001
2	Sex (M:F)	22:28	46:24	=0.0248
3	SBP (mmHg)	164.24±12.54	148.97±7.96	<0.0001
4	Duration of HT (Years)	6.60±1.57	4.26±1.77	<0.0001
5	BMI (kg/m^2)	27.31±5.49	26.79±5.17	=0.5927

Table 3. Risk Factors of Hypertensive Retinopathy

Sl. No.	Lipids	With HR	Without HR	P Value
1	Total Cholesterol (mg/dL)	201±27.87	116.25±17.76	< 0.0001
2	LDL Cholesterol (mg/dL)	130.16±21.6	105.6±14.6	< 0.0001
3	HDL Cholesterol (mg/dL)	33.92±10.11	34.06±8.83	= 0.9373
4	Triglycerides (mg/dL)	186.16±34.38	132.97±18.11	< 0.0001

Table 4. Lipid Profiles of Hypertensive Patients

Sl. No.	Comorbidities	With HR	Without HR	P Value
1	Coronary Heart Disease	38/50	34/70	0.0027
2	Stroke	26/50	24/70	0.0131
3	Chronic Kidney Disease	18/50	32/70	= 0.2339
4	Chronic Obstructive Lung Disease	12/50	38/70	= 0.4163

Table 5. Comorbid Illnesses

DISCUSSION

The prevalence of hypertensive retinopathy among the hypertensive patients in our study is 41.5% and majority of them are in Grade 1 retinopathy (18.33%). In a study by S. Erden in Isthanbul,[1] the prevalence of hypertensive retinopathy is 66.3% among the hypertensive patients and 33.6% of them are in Grade 1. In Palatini et al[2] study, 51% of hypertensive patients were affected by retinopathy. Besharati et al[3] found retinopathy frequency as 33.9% in outpatients with newly diagnosed hypertension. In a recent study,[4] the prevalence of retinopathy was 30.6% in elderly hypertensive patients.

The patient's age ranges from 38 to 81 years. The mean age of patients with retinopathy is 66.40 ± 13.2 years and the age of those with normal fundus is 54.60 ± 1.33. The difference is significant ($p < 0.0001$). In a study carried out by Bastola et al,[5] the mean age of the study group was 58.5 years. In the study by S. Erden,[1] the mean age is significantly higher among the retinopathy patients when compared with hypertensive patients without retinopathy. In a study conducted for evaluation of hypertension[6] subjects having retinopathy were mainly concentrated in the 6th decade (69.70%), increasing thereafter up to 83.78% who were over 60 years of age. This shows the increasing prevalence of hypertensive retinopathy with increasing age. Yu et al[7] who analysed 3654 older people without diabetes showed that retinopathy is correlated with increased age and existence and severity of hypertension.

In our study there were 52 females, out of which 28 females had retinopathy. There is a significantly high ($p < 0.0248$) female sex preponderance in our study. In the study by S. Erden,[1] no significant difference was found between women and men in terms of existence or grades of retinal changes.

In our study, patients having retinopathy had mean systolic blood pressure 164 + 12.54 and patients having normal fundus had mean systolic blood pressure 148 + 7.96, and there is significant association ($p < 0.0001$) with systolic blood pressure and hypertensive retinopathy. Systolic blood pressure levels were significant risk factors for retinopathy in the study by S. Erden,[1] but not in the study by G. Palamaner Subash Shantha et al.[8] This study showed a significant risk due to diastolic BP.

In our study, the duration of hypertension in patients having retinopathy has mean age of 6.6 years and patients having normal fundus has mean age of 4.26 years ($p < 0.0001$). The duration of hypertension is associated with development of retinopathy also in study by S. Erden.[1]

In our study, patients having retinopathy had mean BMI of 27.31 and patients having normal fundus had BMI of 26.79 and there is no significant association ($P < 0.5927$) with BMI. In study by G. Palamaner Subash Shantha et al,[8] the mean BMI was significantly high in hypertensive patients with retinopathy.

In our study, patients having hypertensive retinopathy had significantly (p value < 0.0001) high serum total cholesterol, LDL cholesterol (p value < 0.0001) and triglyceride levels (p value < 0.0001). The HDL cholesterol levels does not show any significant difference. Similarly, Bastola et al[5] in their study also showed that there was a statistically significant difference in the mean serum cholesterol level, mean triglyceride level and mean LDL levels in people with Grade II or higher grades of HR. Badhu et al[9] also assessed the serum level of LDL in hypertensive retinopathy. Their results showed a statistically significant ($P < 0.0196$) higher serum level of LDL-cholesterol in hypertensive patients with retinopathy. Similarly, in the same study the mean serum HDL-cholesterol value for the retinopathy group was 38.68 and that for the no retinopathy group was 39. There was no significant association between serum HDL-cholesterol and retinopathy.[10] These studies[5,9–10] also show a significantly high triglyceride levels in the retinopathy patients.

In our study, the patients having Coronary artery disease and Stroke shows significant association with hypertensive retinopathy and chronic kidney disease and Obstructive lung disease does not show any significant association. These results are similar to that of the study by Kabedi et al.[11] In a study conducted by Tien Y Wong et al[10] after controlling for systolic blood pressure, diabetes, glycosylated haemoglobin levels and other risk factors, retinopathy was associated with increased cardiovascular mortality.

CONCLUSION

The prevalence of HT retinopathy among HT patients is 41.5%. Age, female sex, systolic BP, duration of HT are significant risk factors of HT retinopathy, but the Body Mass Index is not a risk factor. A high serum levels of Total cholesterol, LDL cholesterol and triglyceride are associated with HT retinopathy, but high HDL cholesterol levels are not. Coronary artery disease and stroke are significantly associated comorbidities of HT retinopathy, whereas chronic kidney disease and chronic obstructive lung disease are not significantly associated with HT retinopathy.

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