

Original research article

Patients With Essential Hypertension and High Serum Lipid Levels Are Evaluated for Hypertensive Retinopathy

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Abstract

Aim: Assessing the impact of hyperlipidemia on fundus alterations in hypertensive individuals and correlating the aforementioned results with elements of the lipid profile.

Methods: In the Ophthalmology Department of I Care Institute of Medical Science and Research, Haldia, 135 individuals with essential hypertension underwent a cross-sectional study. Patients with diabetes mellitus, myopia, cloudy ocular media, and other abnormalities of the posterior segment were not allowed to participate in the study.

Results: In 135 patients with essential hypertension, 65.44% of them developed retinopathy, whereas the other patients showed no symptoms of it. Patients were 60.24(±15.14) years old on average. Although there was no gender preponderance in retinopathy, this investigation demonstrated that the incidence of hypertensive retinopathy increased dramatically after the age of 60.

Conclusion: It was found that the onset of hypertensive retinopathy was substantially correlated with the duration of hypertension. It was discovered that obesity and an increase in all of the lipid profile markers (Serum TG, TC, LDL, and LDL:HDL) were substantially linked with retinopathy in hypertensive patients.

Keywords: Dyslipidemia, high-density lipoprotein, hypertensive retinopathy, low-density lipoprotein

Introduction

The most significant issue with public health in both developed and developing nations is high blood pressure. It is frequent, asymptomatic, easily identifiable, and typically curable, and if left untreated frequently results in fatal consequences.

One of the vascular consequences of essential hypertension is hypertensive retinopathy. It is well known that once blood pressure rises over a certain threshold, the autoregulation of retinal

circulation ceases. Elevated blood pressure, however, does not entirely explain the severity of retinopathy. [1]

As a risk factor, exacerbating factor, or complicating factor, dyslipidemia in hypertension patients is well-known. [2] In addition to accelerating atherogenesis, hypertension and hyperlipidemia can lead to deteriorating alterations in the walls of big and medium-sized arteries,[3] which exacerbate ischemic heart disease, stroke, cardiac arrest, and cerebrovascular bleeding. [4-8]

The objective of this study is to adapt a lipid-lowering medication to individuals with essential hypertension in order to examine the relationship between hypertensive retinopathy and a changed serum lipid profile.

Methods

A hospital-based, descriptive cross-sectional study was conducted on 135 patients who were seen in the Ophthalmology Department of the I Care Institute of Medical Science and Research, Haldia for eight months after being identified as having essential hypertension by doctors from the Internal Medicine Department of the Gouri Devi Institute of Medical Sciences and Hospital, Rajbandh. The intervention was performed as needed. JNC 7 criteria were used to classify the hypertension stage. All patients provided verbal informed consent before a proforma with full demographic information, hypertension duration, fasting blood lipid profile, including serum LDL, HDL, TC, and TG, and presence or absence of obesity as defined by the WHO for South Asian populations was filled out.

The study excluded patients with diabetes mellitus, excessive myopia, hazy ocular media in both eyes, and other retinal vascular and posterior segment abnormalities. To identify fundus abnormalities due to hypertension, a thorough ophthalmological examination was performed, including slit lamp examination and fundus evaluation under mydriasis with tropicamide 1% using both indirect (HEINE SIGMA 150 KC) and direct ophthalmoscopes (HEINE Beta 200). Patients underwent thorough fasting serum profiling investigations.

Using the Modified Keith Wagner Barker Classification, hypertensive retinopathy was staged. Version 22 of the SPSS application was used to enter and analyse the data. Using the Chi-square test, the relationships between serum lipid profile parameters and hypertensive retinopathy were evaluated.

Results

After satisfying the eligibility requirements, 135 hypertensive individuals were enrolled in the study, of which 50.4% were male and 67.6% had hypertensive retinopathy, and 49.6% were female and 64.2% had the condition. There was no statistically significant correlation between gender and retinopathy ($p=0.672$). The average age of the study population was $60.24(\pm 15.14)$ years. Of the total patients analysed, 8.9% were under 40 years old, of whom 25% had hypertensive retinopathy, and 10.4% were ≥ 80 years old, of whom 71.4% had as well. This study shown that hypertensive retinopathy considerably increases with age ($p=0.0001$) and dramatically increases after the age of 60. 65.9% of the 135 study participants had hypertensive retinopathy, with grade I retinopathy accounting for 23% of all cases, grade II for 29.6%, grade III for 12.6%, and grade IV for 0.7% of cases.

With a mean hypertension duration of $10.13(\pm 5.35)$ years, 28.1% of all hypertensive patients had hypertension for ≤ 5 years, of which 28.9% had hypertensive retinopathy, and 19.3% had hypertension for more than 15 years, of which 100% had the condition. Hypertensive retinopathy was found to be substantially correlated with the length of hypertension ($p=0.0001$). Out of a total of 135 hypertension individuals, 42.97% were found to be obese, with grade II retinopathy affecting 86.20% of them. The development of hypertensive retinopathy was thus revealed to be statistically very substantially linked with obesity

($p=0.0001$). Out of the entire trial participants, 46.67% had TG levels below 150 mg/dl, and of them, 87.30% developed retinopathy, the majority of which was grade III.

Similar to this, 20% of the total study participants had TC levels between 200 and 239 mg/dl, of whom 66.67% had retinopathy, and 19.25% had TC ≥ 40 mg/dl, of which 96.15% had retinopathy, the majority of which was grade II. Similarly, out of 135, 14.81% hypertensive patients had LDL level of (130-159) mg/dl, of which 75% had retinopathy and 18.5% had LDL ≥ 160 mg/dl, of which 100% had retinopathy, and most of them had grade II retinopathy. Among the total study subjects, 31.85% had LDL:HDL ratio of 2.5-5, of which 67% had retinopathy and 12.59% had LDL:HDL ratio >5 , of which 100% had retinopathy, and again most of them had grade II retinopathy.

Table 1: Age distribution of HR

<i>Age group (years)</i>	<i>HR(-) Frequency(%)</i>	<i>HR(+) Frequency(%)</i>	<i>Total Frequency(%)</i>
<40	9	3	12
	(75.0)	(25.0)	(100.0)
40-49	11	13	24
	(45.8)	(54.2)	(100.0)
50-59	13	14	27
	(48.1)	(51.9)	(100.0)
60-69	6	21	27
	(22.2)	(77.8)	(100.0)
≥ 80	3	28	31
	(9.7)	(90.3)	(100.0)
<i>Total</i>	4	10	14
	(28.6)	(71.4)	(100.0)
	46	89	135
	(34.1)	(65.9)	(100.0)

Table 2: Duration of hypertension and retinopathy

<i>Duration (years)</i>	<i>HR(-) Frequency(%)</i>	<i>HR(+) Frequency(%)</i>	<i>Total Frequency(%)</i>
<5	27	11	38
	(71.1)	(28.9)	(28)
5-10	12	17	29
	(41.4)	(58.6)	(21)
11-15	7	35	42
	(16.7)	(83.3)	(31)
>15	0	26	26
	(0.0)	(100.0)	(20)
<i>Total</i>	46	89	135
	(34.1)	(65.9)	(100.0)

Table 3: Association with LDL

<i>LDL</i>					
HR	<130mg/dl Frequency (%)	130-159mg/dl Frequency(%)	≥160mg/dl Frequency(%)	Total Frequency(%)	p- value
<i>No retinopathy</i>	41 (89.1)	5 (10.9)	0 (0.0)	46 (34.1)	0.0001
<i>Grade I</i>	19 (61.3)	9 (29.0)	3 (9.7)	31 (23)	
<i>Grade II</i>	25 (62.5)	4 (10.0)	11 (27.5)	40 (29.6)	
<i>Grade III</i>	5 (29.4)	2 (11.8)	10 (58.8)	17 (12.6)	
<i>Grade IV</i>	0 (0.0)	0 (0.0)	1 (100.0)	1 (0.7)	
<i>Total</i>	90 (66.7)	20 (14.8)	25 (18.5)	135 (100.0)	

Table 4: Association with HDL

<i>HDL</i>					
HR	35mg/dl Frequency(%)	36-60mg/dl Frequency(%)	>60mg/dl Frequency(%)	Total Frequency(%)	p- value
<i>No retinopathy</i>	33 (71.7)	10 (21.7)	3 (6.5)	46 (34.1)	0.898
<i>Grade I</i>	19 (61.3)	9 (29.0)	3 (9.7)	31 (23)	
<i>Grade II</i>	24 (60.0)	11 (27.5)	5 (12.5)	40 (29.6)	
<i>Grade III</i>	10 (58.8)	6 (35.3)	1 (5.9)	17 (12.6)	
<i>Grade IV</i>	1 (100.0)	0 (0.0)	0 (0.0)	1 (0.7)	
<i>Total</i>	87 (64.4)	36 (26.7)	12 (8.9)	135 (100.0)	

Table 5: Association with HDL:LDL

<i>HDL:LDL</i>					
HR	<2.5 Frequency(%)	2.5-5 Frequency(%)	>5 Frequency (%)	Total Frequency (%)	p-value
<i>No retinopathy</i>	32 (69.6)	14 (30.4)	0 (0.0)	46 (34.1)	0.001
<i>Grade I</i>	16 (51.6)	13 (41.9)	2 (6.5)	31 (23)	
<i>Grade II</i>	20 (50.0)	12 (30.0)	8 (20.0)	40 (29.6)	
<i>Grade III</i>	7 (41.2)	4 (23.5)	6 (35.3)	17 (12.6)	
<i>Grade IV</i>	0 (0.0)	0 (0.0)	1 (100.0)	1 (0.7)	

<i>Total</i>	75	43	17	135
	(55.6)	(31.9)	(12.6)	(100.0)

Discussion

A cross-sectional investigation by Bastola et al. revealed that the mean age of the study group was 58.5(\pm 9.2) years; (range=33-48) [9]. In our hospital-based study, the mean age of patients was 60.24(\pm 15.14) years, ranging from 23 to 93 years. Of them, 50.4% were male and 67.6% had HR, whereas 49.6% were female and 64.2% had HR.

The gender preponderance was not statistically significant ($p=0.672$). Though there were few studies on the incidence of HR, none of the prior investigations revealed a gender preponderance. The frequency of HR was 65.9%, which is roughly in line with the findings of other research. An Indian study found that the prevalence of hypertensive retinopathy was 70% and 69% [10,11].

In the current investigation, hypertensive patients with high serum TC levels had an increased prevalence of retinopathy; this link was highly statistically significant ($P<0.0001$). In our research, we discovered a highly significant relationship ($P<0.0001$) between blood LDL cholesterol and the degree of retinopathy. High serum LDL cholesterol and HR were also statistically significantly correlated in the investigations of Bastola et al. [9] and Badhu et al. [12].

A rise in HDL was not associated with retinopathy, although overall, 26.67% of patients had HDL levels <35 mg/dl, of whom 72.22% had retinopathy, while 8.89% of patients had HDL levels >60 mg/dl, of which 75% had retinopathy. Therefore, larger-scale research is needed to confirm this correlation.

With a p -value <0.001 , our study demonstrated a strong correlation between the LDL:HDL cholesterol ratio and HR. The research by Gupta RP et al. revealed similar results ($p<0.0001$). Additionally, the overall relationship between serum TG and retinopathy was discovered to be statistically significant ($p<0.0001$). Gupta RP et al. demonstrated comparable outcomes ($p<0.01$).

In the current study, 87.30% of the total participants had retinopathy, the majority of them had grade III retinopathy, and 46.67% of them had TG levels ≥ 150 mg/dl. Similar to this, Bastola et al. indicated that grade II and higher grades of HR also had high mean serum TG levels. As a result, our study clearly links elevated serum lipid parameters to the occurrence of HR.

Conclusion

People over the age of 40 are more likely to develop hypertensive retinopathy, with a mean age of 60. No gender preponderance was present. The incidence of hypertensive retinopathy increased along with serum total cholesterol, LDL, and triglyceride levels. The relationship between HDL cholesterol and hypertensive retinopathy, however, was not discovered.

As a result, we can claim that dyslipidemia must be taken into account as one of the major risk factors for the prevalence and severity of HR. Therefore, it is advised to lower elevated serum lipid parameters in hypertension patients to prevent long-term damage to the eyes and other end organs.

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