

To Compare Rnfl Thickness in Hypertensive Patients on Antihypertensive Treatment and Normotensive by using Optical Coherence Tomography**Jagdish Choudhary^{1*}, Ashok Kumar Meena², Renu Meena³, Vanshika Arora⁴**¹III Year Resident, Department of Ophthalmology, Govt. Medical College, Kota, Rajasthan²Sr. Professor & HOD, Department of Ophthalmology, Govt. Medical College, Kota, Rajasthan³Assistant Professor, Department of Ophthalmology, Govt. Medical College, Kota, Rajasthan⁴III Year Resident, Department of Ophthalmology, Govt. Medical College, Kota, Rajasthan

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Conflict of interest: Nil

Abstract

Introduction: Hypertension is the health related risk factor in India with an increasing proportion of elderly people, a sedentary lifestyle and obesity associated with increasing urbanization and other lifestyle factors like high levels of salt intake, alcohol and tobacco consumption are contributing to this burden of hypertension [1,2]. Hypotension following antihypertensive treatment is associated with retinal nerve fibre loss. Altered autoregulation of retinal circulation in hypertension and hypotension leading to hypoperfusion and ischemia of the tissues of retinal nerve fibres.

Aim and Objectives: 1. To Compare RNFL thickness in hypertensive Patients on antihypertensive treatment and normotensive (Control Groups) by using Optical Coherence Tomography
2. To comparison of RNFL thickness in hypertensive patients on different anti-hypertensive agent by using cirrus HD-OCT 500.
3. To comparison of RNFL thickness in different long duration of hypertension in patients by using cirrus HD-OCT 500.

Materials and Methods: In a tertiary care facility, this cross-sectional study was carried out. The study included age-matched normotensives and patients with a diagnosis of hypertension. Therefore, a total of 100 patients, 50 patients with systemic hypertension and 50 age matched normotensives (above 40 years) were studied. Blood pressure measured using sphygmomanometer. Systolic BP, diastolic BP and pulse pressure measurement. Difference between (systolic, diastolic, mean arterial) blood pressure and IOP defined as ocular systolic perfusion pressure, ocular diastolic perfusion pressure and mean ocular perfusion pressure. Photography of the RNFL finding will be captured using OCT

Results: In our study statistically significant average RNFL thickness was detected in hypertensives on antihypertension treatment 98.31 ± 7.01 , when compared to the normotensives 102.51 ± 8.72 . Significant RNFL thickness reduction in hypertensives using antihypertensive medication suggests altered autoregulation, and low mean, diastolic, and systolic ocular perfusion pressure have raised the risk of optic nerve head damage. Furthermore, a number of studies have demonstrated that antihypertensive medications will lower the ocular perfusion pressure, which could potentially harm the perfusion of the optic nerve head. In the hypertensives group, the average RNFL thickness showed the reduction was significant over time ($P < 0.001$).

Conclusion: In conclusion, the RNFL thickness in hypertensives patients on antihypertension treatment statistically significant reduced than average RNFL thickness in normotensives patients. The RNFL thickness of all four quadrant showed a significant reduction over time.

Keywords: RNFLT (Retinal nerve fibre layer thickness), OCT (Optical coherence tomography), MOPP (Mean ocular perfusion pressure), Blood pressure.

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Introduction

India The burden of hypertension is being exacerbated by a demographic shift that includes a growing number of elderly individuals, sedentary lifestyles, obesity linked to increased urbanization,

and other lifestyle variables such excessive salt, alcohol, and tobacco use [3,4].

Hypertension is a major modifiable risk factor for cardiovascular and renal disease in India and improved detection and treatment of hypertension

in India would reduce a preventable burden of cardiac (congestive heart failure, coronary artery disease), cerebrovascular (ischemic and hemorrhagic stroke) and renal disease (chronic kidney disease) related to hypertension [5]

Hypotension following antihypertensive treatment is associated with retinal nerve fibres loss. Altered autoregulation of retinal circulation in hypertension and hypotension leading to hypoperfusion and ischemia of the retinal tissues. Systemic hypertension who were on treatment had significantly thinner peripapillary RNFL thickness [6,7,8].

Method and Material

- This cross-sectional study was conducted in a tertiary care centre . Patients diagnosed to have hypertension and age matched normotensives were enrolled in the studied.
- A total of 100 patients, 50 patients with systemic hypertension and 50 normotensive patients matched for age (above 40 years) were studied.
- Recording visual acuity with Snellen`s chart .
- Intraocular pressure is measured using Goldman applanation tonometry .

- Blood pressure measured using sphygmomanometer. Systolic BP, diastolic BP and pulse pressure measurement.
- The difference between mean arterial blood pressure (diastolic BP+1/3, systolic BP-diastolic BP) and systolic and diastolic blood pressure was described as pulse pressure.
- Difference between (systolic, diastolic, mean arterial) blood pressure and IOP defined as ocular systolic perfusion pressure, ocular diastolic perfusion pressure and mean ocular perfusion pressure.
- Slit lamp examination done with appasamy slit lamp to evaluate the anterior segment.
- Fundus examination will be done with indirect ophthalmoscope.
- Patients underwent dilation with eye drops tropicamide 1% and Pupil dilatation more than 5 mm.
- Signal strength more than 6.
- Photography of the RNFL finding will be captured using OCT.

Results

A total of 100 patients, 50 patients with systemic hypertension and 50 normotensive patients matched for age (above 40 years) were studied.

Table 1: Age distribution of hypertensives and normotensives.

Age group (years)	Hypertensive (n=50) No.(%)	Normotensives (n=50) No. (%)
40-50	10 (20%)	10 (20%)
51-60	16 (32%)	16 (32%)
61-70	24 (48%)	24 (48%)
Total	50 (100%)	50 (100%)

Table 2: Characteristics feature of study population.

Parameters (Average)	Study groups
Age (years)	59.03 ±8
Duration of Hypertension (years)	8.43 ±4.32
SBP in Hypertensives (mm of Hg)	112 ±10.7
DBP in Hypertensives (mm of Hg)	75 ±8
MOPP in Hypertensives (mm of Hg)	45.5 ±8.5
MOPP in Normotensives (mm of Hg)	55 ±4.5
IOP in Hypertensives (mm of Hg)	15.4 ±2.3

Table 3: Rnfl thickness, average mopp, average bp correlation with duration.

Duration of hyper-tension (Years)	Number of hyper-tensives patients	Average MOPP (mm of Hg)	Average Blood pressure(mm of Hg)	Average RNFL (µm)
1). <5 Years	11	68	150/92	107
2). 6-10 Years	17	55	120/80	100
3). >10 years	22	36	100/60	92

Table 4: Corelation between age and average rnfl thickness between the hypertensive and normotensive groups

Age (years)	Average RNFLT in µm (Hypertensives)	Average RNFLT in µm (Normotensives)
40-50	107.58	113.67
51-60	100.67	105.82
61-70	92.69	95.37

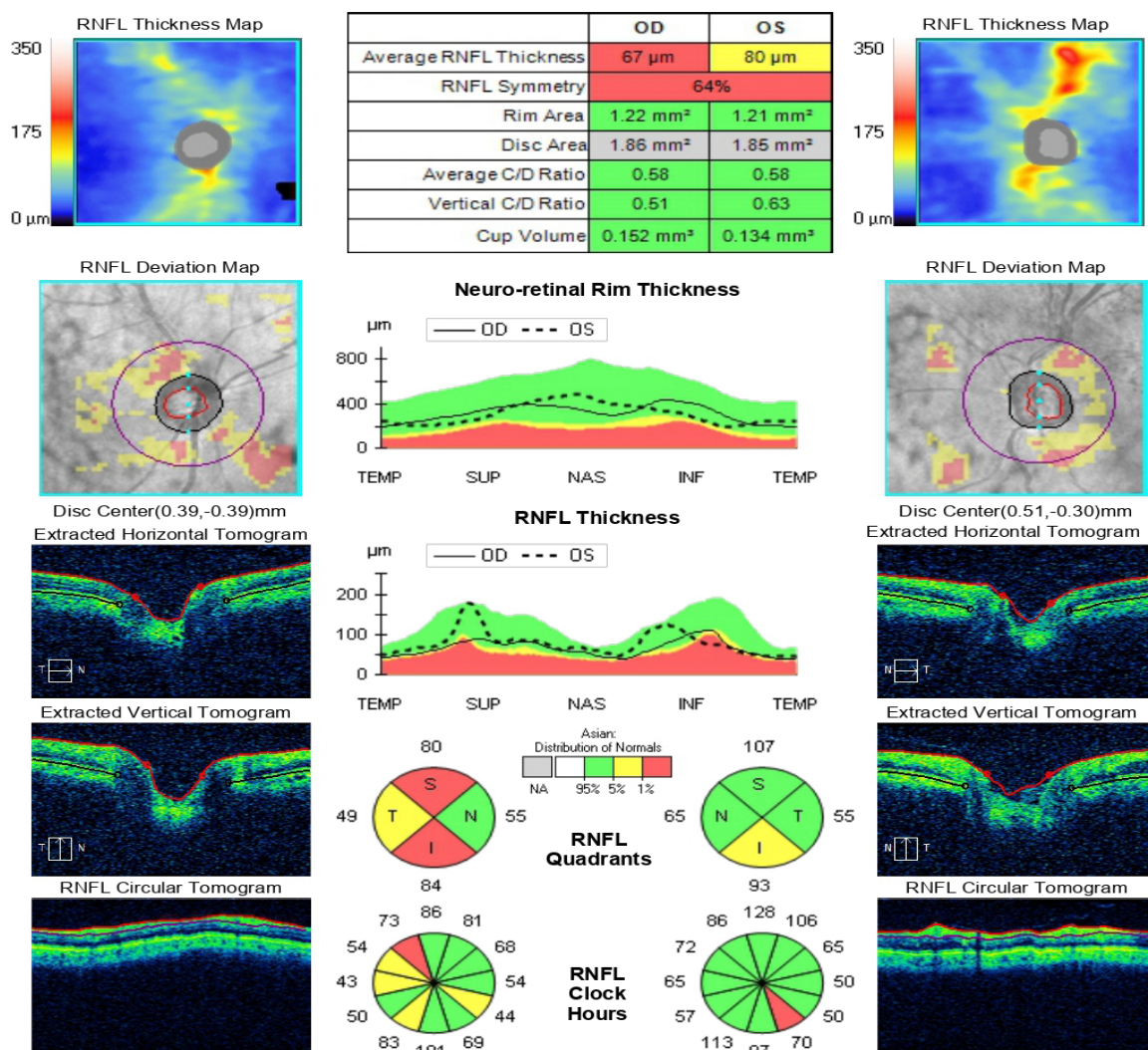
Table 5: Different quadrant wise average peripapillary rnfl thickness in hypertensive and normotensive groups.

Quadrants	RNFLT in Hypertensives Average \pm SD (μ m)	RNFLT Normotensives Average \pm SD (μ m)	P-value
Inferior	127.36 \pm 8.89	132.23 \pm 9.24	0.001
Superior	115.5 \pm 6.45	119.7 \pm 11.40	0.004
Nasal	81.86 \pm 5.47	86.07 \pm 10.84	0.002
Temporal	68.5 \pm 9.41	72.07 \pm 4.77	0.007
Average	98.31 \pm 7.01	102.51 \pm 8.72	0.001

Name: **gautam, satyanarayan** OD OS
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 DOB: 5/17/1959 Exam Time: 3:25 PM 3:30 PM
 Gender: Male Serial Number: 500-33976 500-33976
 Technician: Operator, Cirrus Signal Strength: 6/10 6/10



ONH and RNFL OU Analysis: Optic Disc Cube 200x200 OD OS



Comments

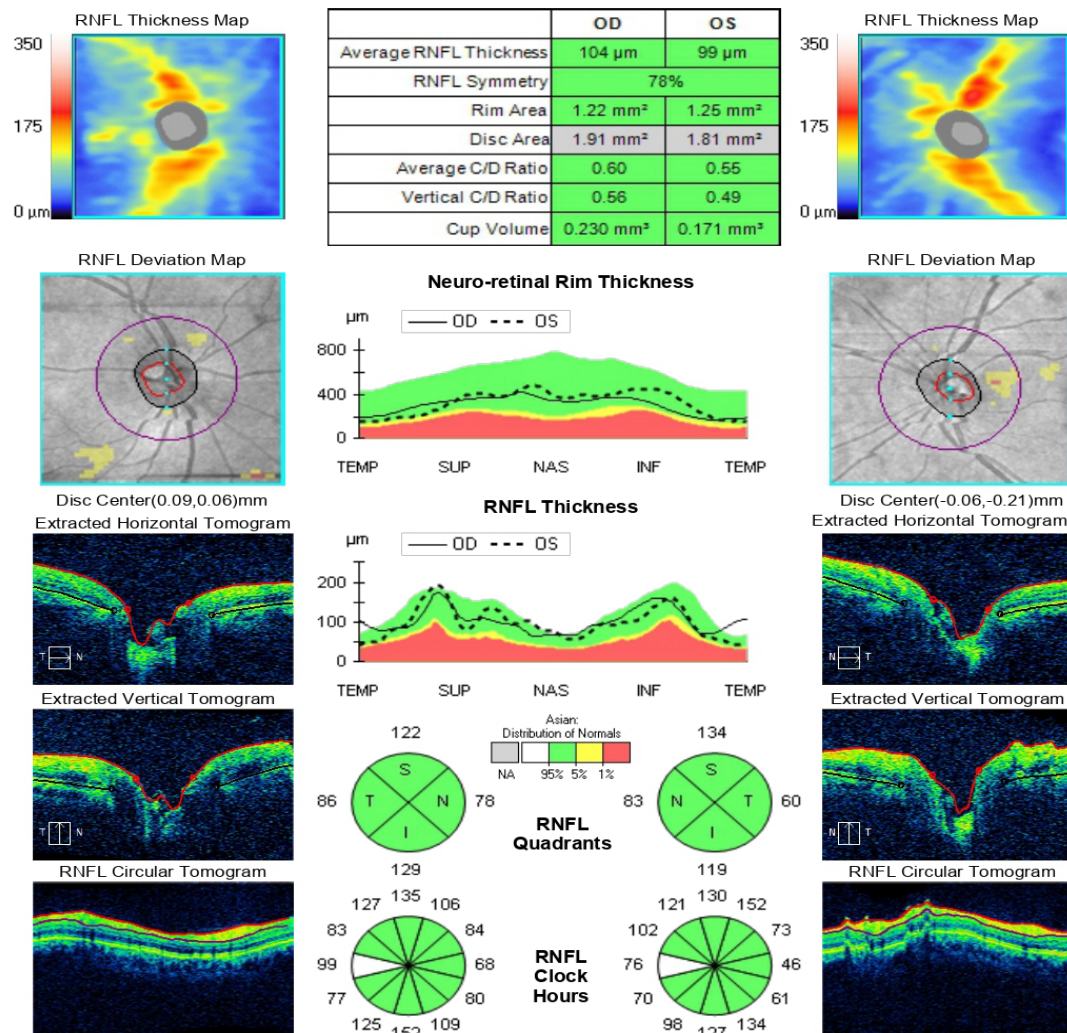
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 Page 1 of 1

Name: **ushva, chaya** OD OS
 ID: CZMI724517027 Exam Date: 7/22/2024 7/22/2024 CZMI
 DOB: 9/2/1984 Exam Time: 2:25 PM 2:22 PM
 Gender: Female Serial Number: 500-33976 500-33976
 Technician: Operator, Cirrus Signal Strength: 7/10 8/10



ONH and RNFL OU Analysis: Optic Disc Cube 200x200 OD ● ● OS



Comments

Doctor's Signature

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Discussion

In our study out of 50 hypertensive patients, under 5 year duration average BP 150/92 mm of Hg , average MOPP 68 mm of Hg , average RNFL 107μm . [9-12] Duration of hypertension 6 to 10 years average BP 120/80 mm of Hg , average MOPP 55 mm of Hg , average RNFL 100μm and duration >10 years as average BP 100/60 mm of Hg, average MOPP 36mm of Hg, average RNFL 92μm . [13,14]

RNFL thickness in patients on Calcium Channel Blockers was and combination of antihypertension treatment (Calcium channel blocker with Beta blockers and Diuretic with Beta blockers) was more

significant reduced than other antihypertension medication.

Maximum thickness was seen in the age group 40-50 years, while least in 61-70 years. The average RNFL thickness 40-50 years age group was 107.58 μm in hypertensives, in normotensives 113.67 μm and average RNFL thickness 51-60 years age group was 100.67 μm in hypertensives, in normotensives 105.82 μm and also average RNFL thickness 61-70 years age group was 92.69 μm in hypertensives, in normotensives 95.37 μm. [15]

In our study average RNFL thickness was detected in hypertensives patients on antihypertension treatment was 98.31±7.01 , when compared to the normotensives patients average RNFL thickness

was 102.51 ± 8.72 (0.001). The RNFL thickness in hypertensives patients on antihypertension statistically significant reduced than average RNFL thickness in normotensives patients.

Conclusion-

In our study low systolic, diastolic and mean ocular perfusion pressure have lead to increased risk of developing optic nerve damage. In addition various studies have shown that antihypertensive agents would decrease the ocular perfusion pressure which in turn could have a potentially damaging effect on the ONH perfusion. In the hypertensives group, the average RNFL thickness showed the reduction was significant over time ($P < 0.001$).

Statistically significant average RNFL thickness was detected in hypertensives on antihypertension treatment 98.31 ± 7.01 , when compared to the normotensives 102.51 ± 8.72 (0.001). All four quadrant in the hypertensives group showed significant reduction rate in RNFL thickness than those in the control group, and most of them showed significant interactions between group and duration.

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