STUDY OF RETINAL NERVE FIBER LAYER THICKNESS IN HIV POSITIVE PATIENTS

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ABSTRACT

BACKGROUND

Human Immune Deficiency Virus (HIV) infection continues to be major public health problem in United States with 56,000 new HIV infections per year. Worldwide the HIV pandemic continues with 33 million infected people and an annual infection rate of 2.7 million with 2 million deaths. Survival rate in HIV is increased due to Highly Active Combination Anti-Retroviral Therapy(HAART) The main pathological change causing optic changes are Retinal Nerve Fiber Layer (RNFL) thickness with secondary papillary changes and few other changes such as cotton wool spots, cytomegalovirus retinitis, abnormalities in visual function, decrease contrast sensitivity, color vision changes and visual field loss. These changes can be mediated by HIV associated neuro retinal disorder (HIV-NRD) which is characterized by changes in RNFL. RNFL thinning increase with time and decrease in CD4 count. If early diagnosed and started on treatment the decrease in vision can be prevented. Some studies have shown RNFL thinning in HIV infections correlates with more driving errors. So if early diagnosed it can help in selecting career options of young patients.

METHODS

It is a cross sectional study conducted from November 2019 to May 2021, where detailed ocular examination of HIV positive patients on HAART were done. Per papillary RNFL thickness measured using SD OCT in HIV positive patients and was analyzed.

RESULTS

The study included 100 HIV positive patients on HAART showed significant RNFL thinning in temporal quadrant of optic disc.

CONCLUSION

The study concluded that HIV is associated with per papillary retinal nerve fiber layer thinning without having any other ocular manifestations.

KEYWORDS

HIV INFECTION, PERIPAPILLARY RNFL, HAART, SDOCT (Spectral Domain Optical Coherence Tomography)

INTRODUCTION

HIV continues to be major public health problem in United States with 56,000 new HIV infections per year. Worldwide the HIV pandemic continues with 33 million infected people and an annual infection rate of 2.7 million with 2 million deaths. Survival rate in HIV is increased due to Highly Active Combination Anti-Retroviral Therapy (HAART).[1]

Earlier opportunistic infections were the common ocular manifestations in HIV. But nowadays such infections are rare but subtle manifestations will be commonly seen. The main pathological change causing optic changes are Retinal Nerve Fiber Layer (RNFL) thickness with secondary papillary changes and few other changes such as cotton wool spots, [2] cytomegalovirus retinitis, abnormalities in visual function, decrease contrast sensitivity, colour vision changes and visual field loss. These changes can be mediated by HIV associated neuro retinal disorder (HIV - NRD) which is characterized by changes in RNFL.[3]

RNFL thinning increase with time and decrease in CD4 count. If early diagnosed and started on treatment the decrease in vision can be prevented. Some studies have shown RNFL thinning in HIV infections correlates with more driving errors. So if early diagnosed it can help in selecting career options of young patients.

METHODS

Source of Data
Outpatient Department (OPD) cases coming to Department of ophthalmology, in Hospitals attached to Bangalore medical college and research institute, Bangalore.

Methods of Collection of Data
A. Study design: cross sectional study.
B. Study period: 1.5 years (NOV 2019 - MAY2021).
C. Place of study: Department of ophthalmology in hospitals attached to Bangalore medical college and research institute, Bangalore.
D. Sample size:
Based on study conducted by Rudrajit Paul et al, the proportion of cases having RNFL thinning is 21 %.[1]

Formula: $N = \dfrac{Z^2 pq}{d^{2l}}$

$= \dfrac{(1.96)^2 (21)(79)}{(8)^2}$

= 99.58

Where N = sample size

Z = standard table value

For 95 % CI, q = 100-p

D = absolute

p = proportion of cases

Total sample size: 100 cases

E. Inclusion Criteria:
1. Patient willing to give informed consent.
2. Patients aged 18 - 60 years of either sex.
3. Previously diagnosed to be HIV positive and on HAART.

F. Exclusion Criteria:
1. Patient not willing to give informed consent.
2. Patients with more than 60 years and less than 18 years of age.
3. History of Posterior segment surgery or laser.
4. History of glaucoma / congenital ocular disease / Diabetic mellitus / hypertension / oculotoxic drugs (chloroquine).
5. History of ocular trauma.

G. Methodology
1. After obtaining approval and clearance from the institution ethical committee patients living with HIV attending hospitals attached to Bangalore medical college and research institute, Bangalore who fulfill inclusion and exclusion criteria will be selected and informed consent will be taken.
2. Detailed ophthalmic evaluation is done including vision, anterior segment examination fundoscopic examination and SD OCT for RNFL thickness. RNFL thickness will be documented.CD4 count will be noted. Reading will be correlated and statistically analyzed.

Statistical Analysis
1. The data collected will be analyzed statistically using descriptive statistics namely mean, standard deviation, percentage wherever applicable.
2. Appropriate Parametric and non-parametric tests will be used.

RESULTS

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Age years	100	37	19	56	30.97	8.3768

Table 1: Age distribution of study population

Age distribution population was found to be from 19 - 56 years with, Mean deviation of 30.970 and Standard deviation of 8.3768.

		Sex	Percent
	F	47	47
	M	53	53
Valid	Total	100	100

Table 2 : Gender distribution of study population
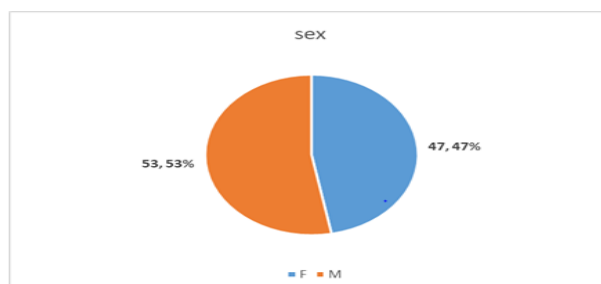
Fig.1: Gender Distribution of Study Population Was Found

To Be 47% Female And 53% Males

VA-RE		
	VA-RE	Percent
6/12.	6	6
6/18.	7	7
6/24.	4	4
6/6.	83	83
Valid Total	100	100

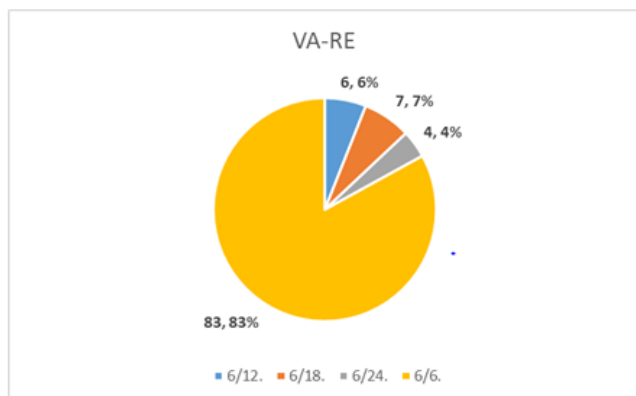**Table 3: Vision distribution of RE study population**

Fig.2: RE Vision Distribution in Study Population

Vision distribution in RE of study population of RE was found to be 83.83 % has 6 / 6 , 6 % has 6 / 12 , 7 % has 6 / 18 , 4 % has 6 / 24 .

VA-LE		
	VA-LE	Percent
6/12.	10	10
6/18.	4	4
6/24.	2	2
6/6.	84	84
Valid Total	100	100

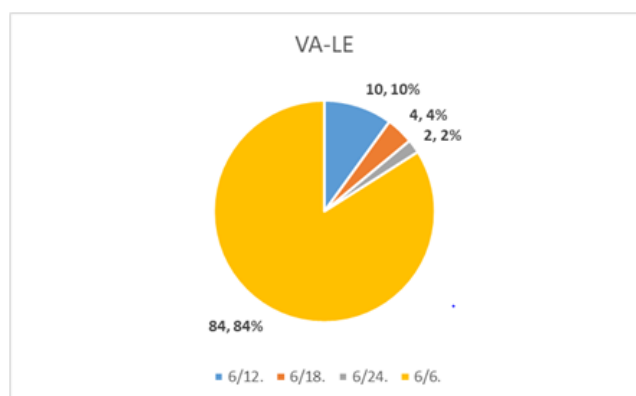**Table 4: Vision distribution in LE of study population**

Fig. 3: Vision Distribution in Left Eye in Study Population

Vision distribution in left eye in study population found to be 84% has 6/6, 10% has 6/12,4% has 6/18, 2% has 6/24.

Descriptive Statistics						
	N	Range	Minimum	Maximum	Mean	Std. Deviation
OCTRNFLthickness	0					
NasalRE	100	46	56	102	73.37	11.5712
NasalLE	100	54	56	110	79.85	11.3283
temproalRE	100	64	33	97	63.84	12.3646
TemproalLE	100	68	26	94	66.47	13.4077
SuperiorRE	100	95	31	126	86.78	18.1506
SuperiorLE	100	79	31	110	86.01	15.5476
InferiorRE	100	61	60	121	89.98	12.7683
InferiorLE	100	70	59	129	91.12	10.4353
Valid N (listwise)	0					

Table 5: per papillary RNFL thickness in both eyes in study population
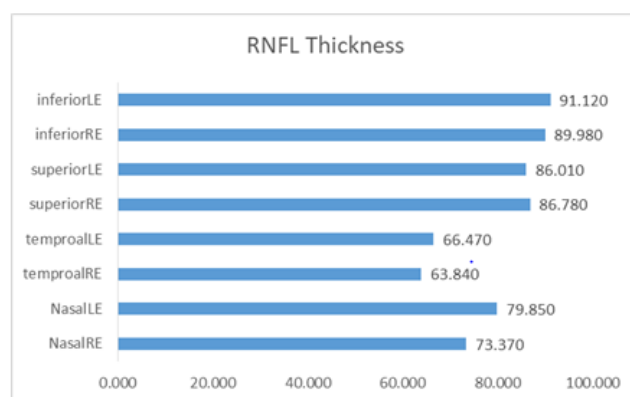

Fig .4: Per papillary RNFL Thickness in Both Eyes in Study Population

Per papillary RNFL thickness in both eyes in study population shows left eye, inferior quadrant of mean thickness 91.12 ± 10.43, superior quadrant of mean thickness 86.01 ± 15.54, nasal quadrant mean thickness 79.85 ± 11.32, temporal quadrant mean thickness 66.47 ± 13.40. RNFL thickness in RE , inferior quadrant of mean thickness 89.98 ± 12.76, superior quadrant of mean thickness 86.78 ± 18.15, nasal quadrant of mean thickness 73.37 ± 11.57, temporal quadrant mean thickness 63.84 ± 12.34.

DISCUSSION

Thinning of the RNFL is known ocular complication of HIV infection due to axonal degeneration.[1]
In this study 100 HIV positive patients on HAART were included. The mean age group was 30 years (18 - 60 years) with gender distribution 47 % females and 53 % males. Vision distribution in RE of study population of RE was found to be 83.83 % has 6 / 6 , 6 % has 6 / 12 , 7 % has 6 / 18 , 4 % has 6 / 24 v. Vision distribution in left eye in study population found to be 84 % has 6 / 6, 10 % has 6 / 12,4 % has 6 / 18, 2 % has 6 / 24.

Rudrajit Paul et al in Sept 2016 evaluated 17 HIV positive patients i.e., 34 eyes to study retinal nerve fiber layer thickness and by doing HRA OCT [4] shows average thickness of temporal quadrant 66.6 ± 17.8, nasal quadrant 75.1 ± 20.6, superior quadrant 127.8 ± 13.5, inferior quadrant 120.5 ± 22.8.[5]

Kozak IGOR et al in their study in Feb 2005, objective analysis of retinal damage in HIV positive patients in HAART era using OCT with sample size of 113 eyes of 65 patients and they concluded that RNFL thinning was seen in HIV positive patients without CMV and with low CD4 count when compared to other subgroups.[6]

Peripapillary RNFL thickness in both eyes in our study population shows left eye, inferior quadrant of mean thickness 91.12 ± 10.43, superior quadrant of mean thickness 86.01 ± 15.54, nasal quadrant mean thickness 79.85 ± 11.32, temporal quadrant mean thickness 66.47 ± 13.40. RNFL thickness in RE , inferior quadrant of mean thickness 89.98 ± 12.76, superior quadrant of mean thickness 86.78±18.15, nasal quadrant of mean thickness 73.37 ± 11.57, temporal quadrant mean thickness 63.84 ± 12.34.

CONCLUSION

HIV positive patients on HAART treatment on SD OCT showed per papillary RNFL thinning more significantly on temporal quadrant. This thinning can be noted even before clinically apparent manifestations or opportunistic infection. Early examination will aid in prediction of consequences of nerve damages in HIV patients.

REFERENCES

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