EVALUATION OF RETINAL NERVE FIBRE LAYER THICKNESS USING OPTICAL COHERENCE TOMOGRAPHY IN PATIENTS WITH HUMAN IMMUNODEFICIENCY VIRUS INFECTION

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INTRODUCTION

HIV infection is a major public health disease affecting approximately more than 70 million people arround the world and about 35 million people have died from the disease [1]. In Malaysia, about 115,263 people living with HIV infection (from 1986-2017) and 42,864 patients died due to AIDS related disease [2]. HIV decreased the human immune systems causing opportunistic infections such as cytomegalovirus infection to take place and may eventually lead to blindness.

OBJECTIVES

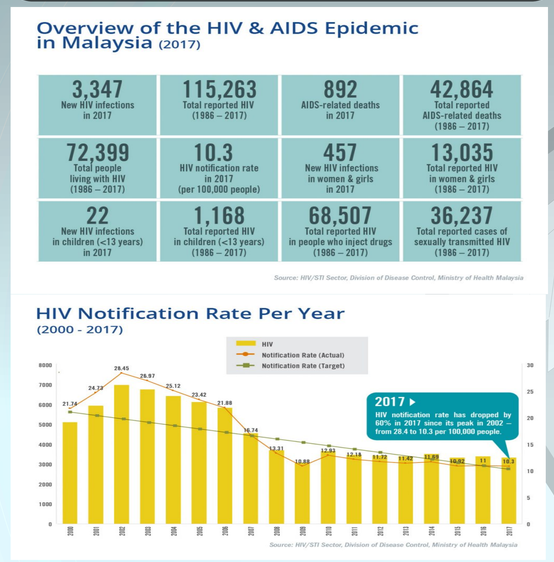
In the new era of modern technology, the introduction of antiretroviral therapy has markedly decreased the prevalence of retinal opportunistic infections in HIV infected patients. However despites the absence of retinal opportunistic infection, studies have proven abnormalities in the visual functions. In this study , we aim to analyse the Retinal Nerve Fibre Layer (RNFL) thickness and visual functions in Malaysian adults with HIV infection on antiretroviral treatment.

METHODS

In this case control study, 202 HIV infected patients without retinal opportunistic infection and 182 age-matched, HIV seronegative individuals were enrolled. HIV patients were invited from the infectious disease clinic of University Malaya Medical Centre and the controls were among the hospital staffs and volunteers. RNFL thickness were measured with spectral domain coherence tomography in all four quadrants. Visual functions including visual acuity using LogMAR chart and contrast sensitivity were also tested using Pelli-Robson Chart. All significant variables were analysed using statistical tests to identify significant correlation by ANOVA test.

RESULTS

A total of 202 patients were HIV infected individuals and 182 were HIV seronegative individuals were recruited. Mean age of both groups was similar (46.1 vs. 44.5), p = 0.14). All HIV infected patients were on ART and 75.6% have a CD4 count more than 400 cell/µl. The contrast sensitivity was lower in HIV infected patients compared to HIV seronegative individuals (1.89 vs 1.93, p = 0.032). For RNFL thickness measurement, univariate analysis showed a statistically significant difference between the case and control group in the temporal quadrant (68.89 µm vs 74.08 µm, p = 0.001).



Characteristics		HIV+ n = 202	CONTROL n = 182	p-value
Gender, n (%)	Male	162 (80.2)	119 (65.4)	0.001
	Female	40 (19.8)	63 (34.6)	
Age, n (%)	Mean	46.06 ± 0.69	44.45 ± 0.84	0.137
	25 - 29	8 (4.0)	17 (9.3)	0.105
	30 - 39	42 (20.8)	45(24.7)	
	40 - 49	87 (43.1)	67(36.8)	
	≥ 50	65 (32.2)	58 (29.1)	
Race, n (%)	Malay	38 (18.8)	60 (33.0)	0.011
	Chinese	142 (70.3)	103 (56.6)	
	Indian	19 (9.4)	18 (9.9)	
	Others	3 (1.5)	1 (0.5)	
Comorbids, n (%)	Nil	148 (73.3)	153 (84.1)	0.07
	Diabetes	10 (5.0)	7 (3.8)	
	Hypertension	14 (6.9)	12 (6.6)	
	Both	13 (6.4)	7 (3.8)	
	Other	17 (8.4)	1 (0.5)	

Table 1: Characteristic of study participants between HIV and control group

	HIV + n = 202	CONTROL n = 182	P - value
Contrast sensitivity (SE)	1.89 (0.009)	1.93 (0.009)	**0.032**

Table 3 : Univariate analysis of contrast sensitivity between HIV and control groups

Characteristics		HIV+ n = 202 (%)
CD4 count (cells/µl)	<400	46 (22.9)
	>400	152 (75.6)
Viral load (Copies/ml)	ND	137 (68.2)
	<20	48 (23.9)
	>20	16 (8.0)
ART duration (months)	<24	28 (14.4)
	24-48	41 (21.0)
	49-72	38 (19.5)
	73-120	44 (22.6)
	>120	44 (22.6)
ART group	NNRTI	149 (73.8)
	PI	23 (11.4)
	INSTI	2 (1.0)
	Others	1 (0.5)

Table 2: HIV related parameters of study participants

RNFL QUADRANT	RNFL Thikness in µm (SE)		P- value
	HIV + n =202	CONTROL n =182	
Average	95.61 (0.77)	95.87 (0.77)	0.89
Superior	119.42(1.32)	118.58 (1.39)	0.40
Inferior	124.93 (1.38)	124.60 (1.45)	0.69
Nasal	69.33 (0.79)	69.18 (0.83)	0.89
Temporal	**68.89 (0.94)**	**74.08 (0.99)**	**0.001**

Table 4 : Univariate analysis of RNFL thickness by quadrant between HIV and control group

DISCUSSION

- This study showed that HIV infection strongly affect the structural loss in the RNFL thickness.
- With the evidence of structural loss it also showed that the visual function of the contrast sensitivity was also affected in HIV infected patients [3,4,5].
- Various study proved that HIV infection triggered a neuroretinal disorder by evidence of abnormalities in the structural and functional components of the optic nerve in the absence of the retinal opportunistic infections [5,6].
- It believe that theory of accelerated biological aging was seen in HIV infected patients whereby RNFL changes occur at an earlier age compared to those of similar age [5,6].
- Previous study demonstrate that CD4 counts, viral loads and type of ART treatment play an important factor in the RNFL changes [6].
- However from the study we can't find any positive relationship between the above mention.

CONCLUSIONS

1. Despite effective viral suppression and absence of retinal opportunistic infections, RNFL changes did occur in HIV infected patients.
2. The changes does not only affect the structural component but it also causing functional visual disturbance in HIV infected patients.
3. Functional loss of abnormal contrast sensitivity can be more troublesome than visual acuity loss which can lead to long term morbidity in HIV infected patients.
4. As the life span of the HIV infected patients were increase due to early introduction of ART, this ophthalmic indicator can be as a tool measure of the visual function in HIV patient in an absence of non infectious retinopathy.

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