

Original Article

Evaluating the Effect of Hypertension on Visual Pathway using Visual Evoked Potential

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Abstract

Purpose: Blood Pressure (BP) is the pressure of circulating blood against the walls of blood vessels, and high blood pressure or hypertension is the condition in which the blood pressure is too high. Hypertension may affect different body organs. The visual system, mainly the visual pathway, may be affected by hypertension. The aim of the present study is to find out the possible effect of hypertension on the visual pathway using visual evoked potential.

Materials and Methods: Twenty-five patients (50 eyes) from 11 male and 14 female patients suffering from hypertension, were selected for the purpose of the present study. The patients were 47-67 years old. The patients had normal Best Corrected Visual Acuity (BCVA). Visual evoked potential (VEP) was tested including Latency (msec) and amplitude (μ v) of VEP P100 peak were measured in the patients. The same procedure was done for 25 patients (50 eyes) from a control group with ordinary blood pressure, matched in terms of age, sex and BCVA. The results obtained in the two groups were compared to look for possible differences.

Results: There was a statistically significant difference between the case and control groups as far as latency of VEP P100 was concerned ($P < 0.001$), whereas no statistically significant difference was observed in amplitude between the case and control groups ($P = 0.78$).

Conclusion: Hypertension might affect the visual pathway of patients, which might be observed using VEP.

Keywords: Hypertension; Visual Pathway; Visual Evoked Potential.

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Introduction

Hypertension is an important public health problem all over the world due to its high prevalence and association with cardiovascular diseases and premature death ¹.

Approximately 73 million U.S. adults (35 million men and 38 million women) had hypertension in 2006. The estimated total number of adults with hypertension in the world in 2000 was 972 million: 333 million in economically developed countries and 639 million in economically developing countries ². An extensive study in Iran showed that the incidence rate of hypertension (HTN) was 21.54 per 1000 person per years, with females exhibiting a higher incidence than males. Several possible predictors of HTN were identified. In men possible risk factors include age, high waist-to-height ratio, smoking and opium use. In women possible predictors included age, contraceptive drug use, high waist-to-height ratio and kidney stones ³.

High blood pressure can quietly damage the body for years before symptoms appear. Hypertension affects organs of the body. Heart and kidney are the organs that may be damaged by HTN. Eye is an organ that may be also damaged by HTN. Damage to blood vessels in the retina (retinopathy), fluid buildup under the retina (choroidopathy), and nerve damage (optic neuropathy) are among the possible eye damages due to HTN ⁴.

Visual pathway is a segment of the visual system that may be affected by HTN. Visual evoked potential is a technique to survey the visual pathway ^{5,6}. In the present study, we evaluate the effect of blood pressure on VEP findings.

Material and Method

Fifty eyes (25 patients), including 11 male and

14 female patients with high blood pressure, were included in the present study. The patients were 47-67 years old. The patients were newly diagnosed with HTN and before starting any treatment were referred to the Basir Eye Clinic, Tehran, Iran, for VEP recording. The patients were selected who had normal BCVA and clear fundus. As the patients' visual acuity was normal, checkerboard pattern was used to record VEP. The procedure recommended by ISCEV was used to perform the VEP test. Latency (msec) and amplitude (μ V) of VEP P100 were measured in the case group. The same procedure was followed for 25 control subjects (50 eyes) from normal people with no HTN and sex, age and BCVA matched with the case group. The results obtained in the two groups were compared to look for possible differences between the case and control groups.

Result

According to table 1, there was no statistically significant difference between the case and control groups in demographic specifications, including age, sex and BCVA.

Based on table 2, the difference between the patient and the control groups was significant in the case of VEP P100 latency, whereas no difference was observed in amplitude of VEP P100 peak.

Discussion

Management of hypertension is an important task because it is largely asymptomatic, especially in early stages, leading to its description as a silent killer.

Hypertension may affect different organs of the human body, including the visual pathway. In the present work after screening the effect

Table1: Comparison of age, BCVA and sex between the age and control groups

Variable	Number of participants	groups (Mean $\pm$ SD)		P value*
		Control	Case	
Age	50	60.08 $\pm$ 6.53	58.12 $\pm$ 6.52	0.231
BCVA (LogMAR)	50	0 $\pm$ 0	0 $\pm$ 0	1
Sex	Male	11 (44 %)	11 (44 %)	1
	Female	14 (56 %)	14 (56 %)	1

* Based on Mann-Whitney
U Test

Table2: Comparison of VEP findings between the case and control groups

Variable	Number of participants	groups (Mean $\pm$ SD)		P value*
		Control	Case	
Amplitude (μ v)	52	8.12 $\pm$ 1.61	8.2 $\pm$ 1.38	0.78
Latency (msec)	52	99.76 $\pm$ 2.66	106 $\pm$ 5.03	0

* Based on Mann-Whitney U Test

of hypertension on visual pathway using visual evoked potential pathological changes in VEP, P100 was observed, which can be an indication of visual pathway disturbances.

Shanmugan et al., ⁷ performed a study comparing patients with hypertension and healthy individuals with no hypertension. They recorded VEP in these two groups and observed prolongation of the VEP, P100 peak in case group.

Achuthan et al., ⁸ worked on VEP in patients with hypertensive retinopathy and found a statistically significant delay in the VEP P100 peak in the case group, which is an indication of visual pathway disturbances in these patients.

Conclusion

Hypertension might affect visual pathway of the patients in early stages of which can might be diagnosed by visual evoked potential testing.

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Conflict of interest:

The authors have no conflict of interest with the subject matter of the present study.

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