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Original Research Article

Relationship between visual acuity and hypertension with associated factors among adult population

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Abstract:

Introduction: Visual impairment of hypertensive patients is an important health problem in both developed and developing countries. It affects quality of life and numerous serious medical, psychological, social and economic problems**.** Associated factors like history of diabetes, ocular trauma, drinking of alcohol and smoking also play a vital role to produce visual impairment in hypertensive patients. **Objective:** To determine the relationship between visual acuity and hypertension with associated factors among adult population. **Methodology:** An institution based cross-sectional study was conducted among 500 study participants, which were selected by systematic random sampling technique. The study was performed at Burdwan Medical College, Burdwan, West Bengal, India. Blood pressure was measured in resting condition using a sphygmomanometer. Systolic blood pressure ≥ 140 mm Hg and/ or diastolic blood pressure ≥ 90 mm Hg in adults 18 years or older recorded as hypertensive patient. Visual acuity test was done in each eye separately using Snellen's illiterate 'E' chart. History of ocular trauma, diabetes, drinking of alcohol and smoking was taken in a structured questionnaire form. **Results:** Study shows, total 137 (27.4%) subjects, out of 500 hypertensive patients, had visual impairment. 76 (27.9%) out of 272 male patients and 61 (26.7%) out of 228 female patients shows visual impairment, visual acuity measured <0.5. Associated factors like diabetes (73.2%), ocular trauma

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(71.4%), drinking of alcohol (67.9%), and smoking (36.3%) shows visual impairment of hypertensive patients.

Conclusion: Study shows approximate one-third of hypertensive patients were visually impaired. Diabetes, ocular trauma, drinking of alcohol, smoking of hypertensive patients plays very crucial role to produce visual impairment.

Keywords: Visual acuity, Hypertension and risk factors.

Introduction

Visual impairment of hypertensive patients is an important health problem in both developed and developing countries.[1] According to the World Health Organization (WHO) in 2020; 2.2 billion people globally are visually impaired. Visual impairment is more prevalent in low and middle income countries; accounting for 80 – 90% of the world's visually impaired people.[2,3] Visual impairment is the source of numerous serious medical, psychological, social and economic problems.[4] An estimated 1.28 billion adults with hypertension globally, most (two-thirds) living in low and middle income countries and India alone is home to an estimated 220 million adults with hypertension. Raised blood pressure is among the most important risk factors for cardiovascular diseases. Hypertension is diagnosed if, systolic blood pressure is ≥ 140 mm Hg and/ or diastolic blood pressure is ≥ 90 mm Hg**.**[5,6] High blood pressure damages the heart, kidney and eyes, resulting in vision loss.[7,8] Systemic hypertension has been linked to a variety of major eye diseases and can affect the structure and function of the eye.[9,10] Visual impairment is a condition in which the presenting distance visual acuity of the better eye is worse than 6/12.[11] The present study was designed to determine the relationship between visual acuity and hypertension with associated factors.

Objective

To determine the relationship between visual acuity and hypertension with associated factors among adult population.

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Materials and methods

An institution based cross-sectional study was conducted among 500 study participants, which were selected by systematic random sampling technique. The study was performed at Burdwan medical College, Burdwan, West Bengal, India. Study participants whose ages were 18 and above and diagnosed with hypertension, were included in this study and study participants who were severely ill and psychological disorder were excluded from this study. Consent was taken from patients and structured questionnaire was given regarding age, sex, duration of hypertension, Family history of eye problem, history of diabetes, ocular trauma, chronic alcoholic, smoker or not. Blood pressure was measured in resting condition using a sphygmomanometer. Systolic blood pressure ≥ 140 mm Hg and/ or diastolic blood pressure ≥ 90 mm Hg in adults 18 years or older recorded as hypertensive patient.[12,13,14]

The goal of the visual acuity test is to determine clarity or sharpness of vision. Visual acuity testing examines a patient's ability to distinguish different optotypes (recognizable letters or symbols) at a standard distance.[15,16]

Visual acuity test was done in each eye separately; Snellen's illiterate 'E' chart was used by hanging on a wall at a distance of 6 meters in a well-illuminated room at a height 2 meters. During the test, participants were sitting 6 meter away from the chart and cover one eye and they read and determine the direction of the letters they see with their uncovered eyes. They repeated this process with another eye. The examiner will ask them to read smaller and smaller letters until they can no longer accurately distinguish letters.[11,17]

Results

Table 1: Age and Gender wise distribution of Hypertensive patients and their mean Systolic and Diastolic blood pressure.

Hypertensive patient (n= 500)	Male (272)		Female (228)	
Age group (18 – 30)	7	Mean SBP – 148 ± 6	2	Mean SBP – 146 ± 5
		Mean DBP – 95 ± 3		Mean DBP – 96 ± 4
(31- 50)	86	Mean SBP – 152 ± 8	70	Mean SBP – 150 ± 6
		Mean DBP – 98 ± 3		Mean DBP – 98 ± 4
>50	179	Mean SBP – 161 ± 10	156	Mean SBP – 159 ± 8
		Mean DBP – 98 ± 6		Mean DBP – 96 ± 4

SBP = Systolic blood pressure in mm Hg, DBP = Diastolic blood pressure in mm Hg.

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Table 2: Frequency distribution of the visual acuity of both right and left eyes of the subjects with hypertension

Visual acuity in decimal	Male (Right and left eyes)		Female (Right and left eyes)	
	Frequency	Percentage of frequency	Frequency	Percentage of frequency
0 – 0.1	8	0.01%	5	0.01%
0.11 – 0.25	61	11.2%	48	10.5%
0.26 – <0.5	83	15.2%	69	15.1%
0.5 – 1.0	392	72.0%	334	73.2%
Total	544	100%	456	100%

0 – 0.1 corresponds to a visual acuity of 6/60, Visual acuity of 0.25, 0.5 and 1.0 corresponds to a visual acuity of 6/24, 6/12 and 6/6 respectively.

Table 3: Relationship of visual acuity and other risk factors of Hypertensive patients

Variables	Total Hypertensive patient (n= 500)	Visual acuity <0.5 decimal
Age	18 – 30 years (9)	0 (0%)
	31 – 50 years (156)	7 (0.04%)
	>50 years (335)	130 (38.8%)
Sex	Male (272)	76 (27.9%)
	Female (228)	61 (26.7%)
Duration of hypertension	>5 years (292)	104 (35.6%)
	<5 years (208)	33 (15.8%)
History of diabetes	Yes (161)	118 (73.2%)
	No (339)	19 (0.05%)
History of ocular trauma	Yes (7)	5 (71.4%)
	No (493)	132 (26.7%)
Chronic alcoholic	Yes (53)	36 (67.9%)
	No (447)	101 (22.4%)
Chronic smoker	Yes (88)	32 (36.3%)
	No (412)	105 (25.4%)

Discussion

Visual impairment has a huge impact on hypertensive patients. It affect one's quality of life, independence, mobility and has been associated with falls, injuries and deterioration in mental health, memory, social function, jobs and educational attainment.[18] Hypertension causes arteriosclerosis, resulting in increased resistance to blood flow and decreased perfusion of eye structures causing visual impairment.[19,20,21] In our study, Table 1 shows, out of 500 subjects

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examined, 272 (54.4%) were males and 228 (45.6%) were females. Most hypertensive patients were more than 50 years of age group. Table 2 shows, the decimal visual acuity of 500 subjects (1000 eyes) with hypertension. A total of 544 eyes from 272 male subjects and 456 eyes from 228 female subjects were recorded. From the table, a decimal visual acuity of 0 – 0.1 corresponds to a visual acuity of 6/60 or worse in the Snellen's chart. A decimal visual acuity of 0.25, 0.5 and 1.0 corresponds to a visual acuity of 6/24, 6/12 and 6/6 respectively. The frequency and percentage frequencies are shown for each decimal visual acuity range. In our study, 8 (0.01%) eyes of male subject and 5 (0.01%) eyes of female subjects had a very poor or absent visual acuity falling within the range of 0 – 0.1. Table 2 also shows, 392 (72.0%) eyes of the male subjects and 334 (73.2%) eyes having a good visual acuity within the range of 0.51 – 1.0.

Table 3 shows, total 137 (27.4%) subjects, out of 500 hypertensive patients, had visual impairment. Most of them (130 patients) were more than 50 years of age group.76 (27.9%) out of 272 male patients and 61 (26.7%) out of 228 female patients shows visual impairment, visual acuity measured <0.5. Our study correlates with some studies [11,22] and higher value shows than other studies.[23,24,25]

When we come to factors associated with visual impairment, a duration of hypertension >5 years, very important factor, where 104 subjects out of 292 (35.6%) patients shows visual impairment which is supported by other studies.[12,20,26]

In hypertensive patients, Diabetes is very important precipitating factor for visual impairment. Our study shows, according to history, out of 161 diabetic patients, 118 (73.2%) patients shows visual impairment. Similarly, the history of ocular trauma was associated with visual impairment (71.4%).

The history of chronic alcoholic and chronic smoking of hypertensive patients was positively associated with 67.9% and 36.3% of visual impairment respectively. Our study correlates with other studies.[27,28,29,30,31,32]

Conclusion

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In this study approximate one-third of hypertensive patients were visually impaired. Study shows associated factors like duration of hypertension, history of ocular trauma, diabetes, drinking of alcohol and smoking acts as precipitating factors for visual impairment. Testing the visual acuity thoroughly, detect the visual problem early, management of hypertensive patients and associated factors may prevent from visual impairment.

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