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Assessment of Blood Pressure and Cognitive Dysfunction in Pune Urban Elderly Population

Gayatri Godbole[1], Shrirang Godbole[2], Jayshree S Kharche[3], Pranita Ashok[4], Anuradha Joshi[5]

[1]Assistant professor, Department of Physiology, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune, [2]JR 2 Department of Orthopedics, MIMER Medical College, Talegaon, [3]Associate Professor, Department of Physiology, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune, [4]Assistant Professor, Department of Physiology, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune, [5]Professor & Head, Department of Physiology, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune

Abstract

Objective: Elderly population in India is increasing sharply. The medical problems like neurocognitive disorders are on rise. Screening tests used for detection of such disorders is Mini Mental State Examination (MMSE). Cerebrovascular diseases can lead to neurocognitive disorders and hypertension is one of the risk factor for cerebrovascular diseases Therefore blood pressure was correlated with Mini Mental State Examination.

Method: 300 (males and females) aged more than 60 years were screened. Subjects were administered Mini Mental State Examination (MMSE) questionnaire and blood pressure was measured. MMSE score was correlated with Blood Pressure.

Result: It was found that systolic blood pressure was increased in subjects with cognitive impairment though the rise is statistically insignificant. Whereas diastolic blood pressure was less in subjects with cognitive impairment as compared to normal subjects.

Conclusion: The systolic blood pressure was increased in subjects with cognitive impairment though the rise was statistically insignificant.

Keywords: *Blood Pressure, Dementia, Cognitive dysfunction, MMSE.*

Introduction

India is facing demographic transition. There has been a sharp increase in the number of elderly people between 1991 and 2001 and it has been projected that by the year 2050, the number would rise to about 324 million. This statistics for the elderly in India introduces a new set of medical, social, and economic problems.[1]

Neurocognitive disorder characterized by a progressive loss of intellectual and judgmental functions of the brain like thinking, reasoning and remembering. Dementia occurs when these functions decrease significantly than what occurs with normal aging. It is one of the age related condition affecting self-care and quality of life. Such disorder places great burden on the individual, relatives and ultimately on the society.[2] These Neurocognitive disorders can result from a variety of diseases and injuries that primarily or secondarily affect the brain, such as Alzheimer's disease or cerebrovascular diseases. [3, 4] Hypertention is one of the risk factor for cerebrovascular diseases.

There is less awareness about this condition in the population at large. The symptoms are neglected thinking of it as a natural, age related process. This results in gradual worsening which can be prevented by early detection.

Corresponding Author:
Jayshree S Kharche
Department of Physiology, Bharati Vidyapeeth
(Deemed to be University) Medical College, Pune
e-mail: jskharche@gmail.com
Mobile No.: 9823535324

Variety of screening tests are used for early detection of cognitive disorders. The Mini Mental State Examination (MMSE) is one such test. The MMSE is a simple and practical tool used for early detection and assessment of cognitive functions of the brain or dementia.[4]

Various studies have highlighted relationship of blood pressure (BP) with cognitive decline. [5, 6] while some researchers have suggested reduction in BP may worsen cerebral perfusion causing an increased risk of cardiovascular diseases. [7] Thus it was more complex to study the role of blood pressure on the brain. Therefore, the purpose of the study was to correlate blood pressure with Mini Mental State Examination test of dementia.

Material and Method

It was a cross sectional study. Institutional ethics committee approval was obtained. 300 (males and females) aged more than 60 years were screened. Known cases of depression, dementia, stroke and subjects with severe hearing impairment were excluded.

History was taken and detailed physical examination was done. Subjects were administered mini mental state examination (MMSE) questionnaire. [8] which assesses cognitive function in relation to orientation, memory, attention and calculation, language and visual construction. The maximum possible score is 30. MMSE scores above 23 indicate normal cognitive function and score of <23 indicate both the likelihood of cognitive impairment and the need for further evaluation. Blood pressure of subjects with MMSE score <23 was compared.

Blood pressure recording (BP): Blood pressure of the entire population was recorded with their consent using the guidelines mentioned by the American Heart Association (AHA). The instrument used was the standard mercury manometer. Blood pressure of the selected population was be recorded at a fixed time in the day to avoid the diurnal variation.

Systolic and diastolic blood pressure was measured in the right arm in supine position by using a mercury-column sphygmomanometer positioned near heart level after 5 min rest. Two readings of Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) were recorded. [9]

Results of blood pressure was interpreted as follows as per the guidelines of American Heart Association:[10]

Normal: Less than 120/80 mm Hg

Elevated: Systolic between 120-129 and diastolic less than 80

Stage 1: Systolic between 130-139 or diastolic between 80-89

Stage 2: Systolic at least 140 or diastolic at least 90 mm Hg

Hypertensive crisis: Systolic over 180 and/or diastolic over 120

Statistical analysis: According to the information collected the data was analyzed using percentage and correlation coefficient test. From correlation coefficient r value was calculated and then p value computed from it. P value less than 0.05 was considered as statistically significant.

Observations and Results

Table 1: Anthropometric measurements in study subjects

Parameter	Total (n=300) (Mean±SD)
Age in years	70.44±8.95
Height (cm)	156.57±9.28
Weight (Kg)	60.26±11.57

The above table showed that the mean age of the study population was 70.44 years. Mean height and weight was 156.57 cm and 60.26 Kg respectively.

Table 2: Correlation of systolic and diastolic blood pressure with MMSE in study

Parameter	MMSE Group	N	Mean± SD	P-value
(n = 300)	> 23	234	0.90 ± 0.08	
SBP	≤ 23	66	141.53 ± 18.71	0.395 (NS)
	> 23	234	139.36 ± 16.43	
DBP	≤ 23	66	83.48 ± 11.00	0.302 (NS)
	> 23	234	86.57 ± 40.66	

NS = Not Significant

The above table showed that the systolic blood pressure was increased in subjects with cognitive impairment though the rise is statistically insignificant. Whereas diastolic blood pressure was less in subjects with cognitive impairment as compared to normal subjects.

Discussion

Table 1 shows demographic characteristics of study population in which mean age was70.44 years. [Table1].

Table 2 in the present study showed that, the systolic blood pressure was increased in subjects with cognitive impairment though the rise is statistically insignificant. Whereas diastolic blood pressure was less in subjects with cognitive impairment as compared to normal subjects.

Similar observation was found in a 6 year observational study conducted by Chengxuan Qiu et al. [11] They found both low diastolic and high systolic pressure are associated with an increased risk of dementia in elderly population. The association may be attributed to atherosclerotic process in cerebral blood vessels. In addition, low diastolic blood pressure may increase dementia risk by affecting cerebral perfusion. [11]

Various studies have examined the relationship between blood pressure and risk of dementia. [12, 13] Though the findings were inconsistent, an association between elevated blood pressure and increased incidence of dementia was observed. Thus, high systolic pressure in elderly may be a risk factor for dementia.

Various studies [11, 14]suggested that low diastolic blood pressure is associated with an increased incidence of dementia. Possible suggested mechanisms could be either cerebral hypoperfusion seems to precede the neurodegenerative pathological changes[15] or increased large arterial stiffness and widespread atherosclerosis in elderly people. [16]

Trial data on the benefits of reducing SBP on cognitive outcomes is not conclusive; however, all the research in this domain is based on older adults and whether better control of blood pressure at younger ages modifies risk for dementia is unknown. Probable suggested mechanism could be that, cerebral small vessel disease is likely to be an important mechanism underlying the association of high blood pressure and cognitive dysfunction. [17]

Several observational studies have analyzed the relationship between hypertension and the risk of dementia. In a one of the study conducted in Sweden study higher systolic and diastolic blood pressure was correlated with dementia in population aging 70 years and above.[18] Honolulu-Asia Aging Study suggests elevated levels of blood pressure in middle age can increase the risk for late age dementia in men never treated with anti-hypertensive medication. However, some studies did not report any association. [19, 20]

Limitations of the study: The limitation of this study is that it was a cross-sectional study and a limited duration study. The study needs to be conducted in a larger population with supportive laboratory investigations and follow up.

Conclusions: Our study showed that the systolic blood pressure was increased in subjects with cognitive impairment though the rise was statistically insignificant. Therefore regular assessment and timely management of blood pressure is necessary to prevent complications.

Ethical Clearance: Taken from Bharti Vidyapeeth Medical College, Pune ethical committee.

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Conflict of Interest: NIL

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