

Comparison of Cognitive Functioning Among Hypertensive and Non-Hypertensive Person

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ABSTRACT

Background: Cognitive skill is also called cognitive functioning; cognitive capacities and cognitive abilities are brain-based skills, which are important for manipulation of acquired information, acquisition of knowledge and reasoning. The literature suggests cognitive impairment is common in older population. **Aim of the study:** To compare the level of cognitive functioning among hypertensive and non-hypertensive person. **Method:** Quantitative research descriptive comparative design with the sample size of 100 in each group of hypertensive and non-hypertensive person to see the results of cognitive functioning among them. Non probability convenient sampling technique was used. Face to face interview was conducted by the researchers with the Mini Mental Status Examination (MMSE) tool. **Results:** The findings reveal that the majority subjects about 55% among the hypertensive group has mild to severe cognitive impairment as compared to non-hypertensive subjects that is 14%. The findings revealed that statistically significant difference exists between both the groups as the p value is 0.000 (calculated 't' value 7.416 ± 198) and which is lesser than the 0.05 level of significance. On observation of overall mean scores of MMSE also suggests that the non-hypertensive individuals 26.19 ± 2.64 (mean percentage of 87.3) have higher mean score than hypertensive individuals 23.29 ± 2.86 (mean percentage 80.31%) with mean difference of 2.89. **Conclusion:** The study generates the research hypothesis that there is significant difference in the cognitive impairment among hypertensive and non-hypertensive persons. And on observation the point of concern is that hypertensive individuals are more susceptible to suffer with decline in cognitive functioning.

Keywords: Cognitive functioning, Hypertensive, Non-hypertensive,

INTRODUCTION

Occurrence of psychological and physical changes with maturation is called as aging, where as the term refers to the changes which can happen at any stage of life and commonly refers to the changes that occur in midlife and into old life. This include physical as well as mental decline that normally occurs as the part of growing old: aging is associated with loss of physical strength, intellectual decline, loss of dexterity and physical strength and health problem.¹

Cognitive skill is also called as cognitive functioning; cognitive capacities and cognitive abilities are brain based skills, which are important for manipulation of acquired information, acquisition of knowledge and reasoning. Cognitive functions encircle the domains of perception, attention, memory, learning, decision making and language abilities²

Cognitive impairment is common in growing old. Identification of potential risk factor for cognitive decline may ameliorate the burden of disease.³

Mild memory, language, thinking and logical decision making, are characteristics of mild cognitive impairment. Various causes associated with cognitive impairment and all or some of those factors are amenable for causing mild cognitive functioning in selected individual. A factor that decreases the cognitive function and develops mild memory impairment is cause for mild cognitive impairment. Reduced blood flow, abnormal clumps, levy bodies, shrinkage of brain parts, enlargement of brain parts, emotional health, aging, mental trauma and other medical conditions such as hyperthyroidism, diabetes, neurological disorders, kidney disorders.⁴

In India the elder population is 138 million, including 67 million men and 71 million women.⁵ Common health problems including cancer, diabetes, obesity, hypertension, coronary heart disease, and rheumatic

heart disease which is quite common.⁶ Overall the prevalence for hypertension in India is 29.8%⁷ and in Maharashtra the overall prevalence of hypertension is 25%^{8,9,10}

Blood pressure is force exerted by circulating blood against the walls of the arteries which is present in the body. Hypertension is occurs when blood pressure is too high. Blood pressure is written as two numbers. The 1st (systolic) number represents the pressure in the blood vessels when the heart contracts or beats and the 2nd (diastolic) number represent the pressure in the vessels when the heart rests between beats. Hypertension is diagnosed if, blood pressure is measured on two different days the systolic blood pressure readings on both different days is greater than or equal to 140 mmHg and diastolic blood pressure readings on both different days is greater than or equal to 90 mmHg.

The mechanism underlying the associations between blood pressure and cognitive decline or dementia remains unclear. High blood pressure level may lead to white matter hyper intensities or magnetic resonance imaging or lacunar brain infarcts, which in turn may lead to cognitive impairment or dementia.^{11,12}

Materials and Method

Quantitative research Descriptive comparative design with the sample size of 100 in each group of hypertensive and non-hypertensive person to see the results of cognitive impairment in between them. Non probability convenient sampling technique was used. Face to face interview was conducted by the researcher.

Sampling selection criteria:

- **Inclusion criteria :**

A) For hypertensive person: Person who is

1. Aged 55 years and above
2. Having history of hypertension for at least 5 years and on treatment.
3. Available at the time of data collection.

B) for Non-hypertensive person :Person who is

1. Aged 55 years and above

2. Not having history of hypertension and no any ongoing treatment with related to hypertension.
3. Available at the time of data collection.

- **Exclusion criteria for both hypertensive and Non-Hypertensive person:**

Person who is

1. Having history of Cerebrovascular accident.
2. Having history of Central Nervous System diseases like lesions, seizures.
3. On psychotropic medications.
4. Not willing to participate.

Procedure of data collection:

The permission was taken from the hospitals of Sangli, Miraj, Kupwad namely Bharati hospital, Sangli and Paramshetti hospital, Miraj for the final data collection in the OPDs. According to the inclusive and the exclusive criteria samples were selected. The 100 samples of the patient having the hypertension who was aged above 55 years age and having History of Hypertension since minimum at least 5 years and doesn't having any mental problems and the any other complications according to the inclusive and exclusive criteria. And 100 samples of the patients doesn't have hypertension according to the inclusive and exclusive criteria.

After selecting the sample before performing the procedure the explanation is given to each and every subjects related to the aim and intent of the study. Then informed consent was taken from each and every patient. Confidentiality and anonymity was ensured. Then Face-to-Face interview was taken by the researchers to know the cognitive abilities by administering the MMSE Tool. The collected data then consolidated, and the findings are generalized based on the criteria of interpretation.

Results

Section-I Description of Demographic data of hypertensive and non-hypertensive subjects

Among the hypertensive subject's, the age distribution showed that the most 35%(35) of them were in the age group of 60 to 64 and followed by that the 31% (31) of subjects were in the age group of 55 to 59 years. The age group of 65 to 69 years were constituted to be of 25% (25) and 70 to 74 years were

about 09% (09) and no one were in the age from 75 and above. Whereas, among the non-hypertensive subjects the findings suggest that 40% (40) were in the age group of 55 to 59 years. Eighteen percent (18) of participants were in each age group of 60 to 64 years and 65 to 69 years. Notably 70 years and above age group involved were 24% (24) the bifurcation of the same is as follows: 70 to 74 years 13% (13), 75 to 79 years 09% (09) and 80 years and above 02% (02).

The distribution of gender showed near to equal distribution in both the hypertensive and non-hypertensive group i.e. among hypertensive subject's males constituted to be 53% (53) and females 47% (47). Whereas among the non-hypertensive group males were 56% (56) and females were 44% (44).

Among the hypertensive group the education status of the subjects revealed that majority of them had primary education i.e. 43% (43) and followed by that

26% (26) had education up to high school. Also, the subjects had junior collegiate level about 14% (14), and the graduates constituted were 13% (13), and 04% (04) had no formal education. Contrarily, among the group of non-hypertensive subjects the majority had education up to primary level i.e. 35% (35) and 29% (29) had education up to high school level. Notably 15% (15) had no formal education. Whereas 13% (13) had junior college level of education, and 07% (07) had graduate level of education.

Among the hypertensive participants majority 43% (43) of them had been diagnosed since 7 to 8 year and 23% (23) were diagnosed 5 to 6 years and 9 to 10 years each. There were about 11% (11) participants; those had history of hypertension since 11 years and above.

Section II: A. Assessment of of cognitive impairment in hypertensive person

TableNo 1: Level of cognitive impairment among hypertensive person

n=100

SN	Level of Cognitive Impairment	F	%
1	No Cognitive Impairment (24-30)	45	45
2	Mild Cognitive Impairment (18-23)	52	52
3	Severe Cognitive Impairment (0-17)	03	03

Table no. 01 depicts the level of cognitive impairment among hypertensive persons. The findings reveal that more than half i.e. 52% (52) were in the category of mild cognitive impairment. The MMSE scores were between 18 to 23 out of

maximum 30 score. Followed by that only 03% (03) of subjects had severely impaired cognitive functioning that mean the scores were between 0 to 17 out of maximum 30 score on MMSE scale. About 45% (45) were not having the cognitive impairment.

Table No 2: Domain wise mean percentage and standard deviation of MMSE Scores among hypertensive person

n=100

SN	Domains	Score obtained		Mean	SD	Mean%
		Minimum	Maximum			
1	Orientation	04	10	7.78	1.38	77.8
2	Registration	01	03	2.60	0.57	86.67
3	Attention and Calculation	00	05	3.75	1.05	75
4	Recall	01	03	2.14	0.73	71.33
5	Language	04	10	6.75	1.17	67.5
6	Copying	00	01	0.27	0.45	27
Total MMSE		15	29	23.29	2.86	80.31

The table no. 02 depicts the domain wise mean± SD and the mean percentage of hypertensive person’s cognitive impairment. The findings showed the area of concern that is lowest mean percent of 27% (0.27±0.45) was observed in the domain of copying the image, followed that the mean percentage in domain of language was 67.5% (6.75±1.17). Other domains such as recalling the things, attention and calculation, registration and lastly orientation showed

71.33 (2.14±0.73), 75(3.75±1.05), 77.8 (7.78±1.38), and 86.67 (2.60±0.57) respectively. Which were considered to be the good sign among the hypertensive subjects.

The overall MMSE scores mean percentage was 80.31% (23.29± 2.86).

Section II: B. Level of cognitive impairment among non-hypertensive person

Table No 3: Assessment of cognitive impairment in non-hypertensive person

n=100

SN	Level of Cognitive Impairment	F	%
1	No Cognitive Impairment (24-30)	86	86
2	Mild Cognitive Impairment (18-23)	13	13
3	Severe Cognitive Impairment (0-17)	01	01

Table no. 03 depicts the level of cognitive impairment among non-hypertensive persons. The findings revealed that majority that is 86% (86) subjects had no significant impairment in the cognitive functioning (the MMSE scores were between 24 to maximum score of 30), whereas,13%

subjects showed the mild impairment in the cognitive functioning (the MMSE scores were between 18 to 23 out of maximum 30 score) and only 01% (01) had severe impairment in the cognitive functioning(the MMSE scores were between 00 to 17 out of maximum 30 score).

Table No. 4: Domain wise mean percentage and standard deviation of MMSE Scores among Non-hypertensive person

n=100

SN	Domains	Score obtained		Mean	SD	Mean %
		Minimum	Maximum			
1	Orientation	04	10	9.44	1.11	94.4
2	Registration	02	03	2.79	0.41	93
3	Attention and Calculation	00	05	3.79	1.67	75.8
4	Recall	00	03	2.66	0.59	88.67
5	Language	03	08	6.82	1.15	85.25
6	Copying	00	01	0.69	0.46	69
Total MMSE		17	30	26.19	2.64	87.3

The table no. 04 depicts the domain wise mean ±SD and the mean percentage of non- hypertensive

persons cognitive impairment. The findings showed that the lowest mean percent of 69% (0.69±0.46) was

observed in the domain of copying the image and the rest of the domains ie. Orientation, Registration, Attention and Calculation, Recall and Language showed the mean percentage between 75.8 to 94.4%. The overall MMSE scores mean percentage was 87.3% (26.19±2.64) which suggests that the non-

hypertensive individuals have higher mean percentage than the hypertensive individuals with mean percentage difference of 6.99.

Section III: Comparison of Cognitive impairment among Hypertensive and non-hypertensive person

Table No. 05: Difference between hypertensive and non-hypertensive person in relation to mean±SD score of cognitive impairment

N=200 (100+100)

SN	Subjects	Mean	SD	Mean Diff.	df	t	P	Inference
1	Hypertensive	23.29	2.86	2.89	198	7.416	0.000	Significant
2	Non-Hypertensive	26.18	2.64					

*Level of Significance at p=<0.05

The findings in table no.05 depicts the comparison of cognitive impairment between hypertensive and non-hypertensive person. The findings revealed that there is statistically significant difference exists between both the groups as the p value is 0.000 (calculated ‘t’ value 7.416, df 198) and which is lesser than the 0.05 level of significance. On observation of overall mean scores of MMSE also suggests that the non-hypertensive individuals 26.19± 2.64 (mean percentage of 87.3) have higher mean score than hypertensive individuals 23.29± 2.86 (mean percentage 80.31%) with mean difference of 2.89.

Discussion

Among the hypertensive subject’s, the age distribution showed that the most 35%(35) of them were in the age group of 60 to 64 and followed by that the 31% (31) of subjects were in the age group of 55 to 59 years. The age group of 65 to 69 years were constituted to be of 25% (25) and 70 to 74 years were about 09% (09) and no one were in the age from 75 and above.

Whereas, among the non-hypertensive subjects the findings suggest that 40% (40) were in the age group of 55 to 59 years. Eighteen percent (18) of participants were in each age group of 60 to 64 years and 65 to 69 years. Notably 70 years and above age group involved were 24% (24) the bifurcation of the same is as follows: 70 to 74 years 13% (13), 75 to 79 years 09% (09) and 80 years and above 02% (02).

The distribution of gender showed near to equal distribution in both the hypertensive and non-

hypertensive group i.e. among hypertensive subject’s males constituted to be 53% (53) and females 47% (47). Whereas among the non-hypertensive group males were 56% (56) and females were 44% (44).

The level of cognitive impairment among hypertensive persons. The findings reveal that more than half i.e.. 52% (52) were in the category of mild cognitive impairment i.e. The MMSE scores were between 18 to 23 out of maximum 30 score. Followed by that only 03% (03) of subjects had severely impaired cognitive functioning that mean the scores were between 0 to 17 out of maximum 30 score on MMSE scale. About 45% (45) were not having the cognitive impairment.

The domain wise mean±SD and the mean percentage of hypertensive persons cognitive impairment. The findings showed the area of concern that is lowest mean percent of 27% (0.27±0.45) was observed in the domain of copying the image, followed that the mean percentage in domain of language was 67.5% (6.75±1.17). Other domains such as recalling the things, attention and calculation, registration and lastly orientation showed 71.33 (2.14±0.73), 75 (3.75±1.05), 77.8 (7.78±1.38), and 86.67 (2.60±0.57) respectively. Which were considered to be the good sign among the hypertensive subjects. The overall MMSE scores mean percentage was 80.31% (23.29± 2.86).

The level of cognitive impairment among non-hypertensive persons. The findings revealed that majority that is 86% (86) subjects had no significant impairment in the cognitive functioning (the MMSE

scores were between 24 to maximum score of 30), whereas 13% subjects showed the mild impairment in the cognitive functioning (the MMSE scores were between 18 to 23 out of maximum 30 score) and only 01% (01) had severe impairment in the cognitive functioning (the MMSE scores were between 00 to 17 out of maximum 30 score).

The findings in table no.05 depicts the comparison of cognitive impairment between hypertensive and non-hypertensive person. The findings revealed that there is statistically significant difference exists between both the groups as the p value is 0.000 (calculated 't' value 7.416, df 198) and which is lesser than the 0.05 level of significance. On observation of overall mean scores of MMSE also suggests that the non-hypertensive individuals 26.19 ± 2.64 (mean percentage of 87.3) have higher mean score than hypertensive individuals 23.29 ± 2.86 (mean percentage 80.31%) with mean difference of 2.89.

The results of the study indicated that the cognitive impairment is mostly seen in the hypertensive persons as compared to non-hypertensive persons.

Therefore, the study suggests that all preventive measures should take by each and every people to prevent hypertension which causes more cognitive impairment above the peoples of 55 years of age.

CONCLUSIONS

The findings reveal that the majority of subject about 55% among the hypertensive group has mild to severe cognitive impairment as compared to non-hypertensive subjects that is 14%.

The findings in table no.06 revealed that there is statistically significant difference between both the groups as the p value is 0.000 (calculated 't' value 7.416, df 198) and which is lesser than the 0.05 level of significance. On observation of overall mean scores of MMSE also suggests that the non-hypertensive individuals 26.19 ± 2.64 (mean percentage of 87.3) have higher mean score than hypertensive individuals 23.29 ± 2.86 (mean percentage 80.31%) with mean difference of 2.89.

Recommendations

- A similar study can be conducted on the large-scale sample size.
- A similar study can be conducted with different settings.

- Cross sectional study can be planned to find the difference in the cognitive impairment among hypertensive and non-hypertensive of rural and urban population.
- The exploration of the psychosocial aspects leading to the cognitive impairment among the population above 55 years of age can be done through qualitative study.

Conflict of interest : No Conflict of interest.

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Ethical considerations: Ethical clearance was obtained from IEC BVUDUCON, Sangli

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