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ASSESSMENT OF COGNITIVE PERFORMANCE IN FIRST-DEGREE RELATIVES OF PATIENTS WITH ALZHEIMER'S DISEASE

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ABSTRACT **Background:** The specific cause of Alzheimer's disease (AD) is unknown, but this disease is strongly associated with genetic loading, and the clinical presentation of early onset is frequently misdiagnosed. **Aim:** The present study aimed to find out the socio-demographic profile and domains of cognitive performance in first-degree relatives of a patient with AD and those findings were also compared with first-degree relatives of a person without AD. **Methodology:** A hospital-based cross-sectional comparative study was carried out on two study groups; 50 subjects (first-degree relatives of a patient with AD) as group 1 and 50 subjects (a first-degree relative of a person without AD) as group 2. Subjected who fulfilled the inclusion and exclusion criteria were selected by convenient sampling and interviewed using a semi-structured interview schedule consisting of PRMQ, PGI memory test, ACE-III R, and Trail making tests A & B. **Results:** Findings of all four scales revealed that first-degree relative of a patient with AD had scored significantly lower ($p < 0.001$) than first degree relative of a person without AD in all cognitive domains. **Conclusion:** There is a high risk of cognitive decline among first-degree relatives of a patient with AD as compared to a first-degree relative of a person without AD.

KEYWORDS : Cognitive performance, first-degree relative, Alzheimer's disease, Dementia, Memory

INTRODUCTION:

Alzheimer's disease (AD) is a progressive neurodegenerative condition that is the main cause of dementia. It begins with a clinical cognitive deficiency in an individual. AD has been becoming a major public health concern especially related to the elderly population in most developing and developed countries, where the population of elderly people getting increasing rapidly. It is being assumed that by the year 2025 the population of elderly in India will reach up to 158.7 million, which will be around 15% of elderly people belonging to all other developing countries.[1,2]

There are two major risk factors for AD such as increasing age and first-degree family history of dementia. Family history of dementia includes heritable and nonheritable risk factors for AD.[3] Family study of dementia implies that there is a risk of early onset of dementia in the relatives, especially in the offspring.[4] In general, symptoms of AD begin with a deficit in recent memory and executive functions. When the process advances, impairment spreads to other functions, such as semantic memory, language, and Visuospatial ability.[5] Some previous studies on AD have reported that there is a greater risk of dementia among the first-degree relatives of patients with AD as compared to the relative of healthy control.[6]

Family history of dementia had been reported as it has an association with multiple cognitive domains among children (up to age 13 years) and young adults (aged 35 years), but there are a few changes in cognitive functions have been reported in middle adulthood (36-to 53 years) and late adulthood or older (age 65 years to 78 years).[7,8] First degree of relative of patient with AD have been reported with high risk of cognitive dysfunctions or impairment in studies conducted in other countries [3] but there are very few Indian studies have focused on this issue. Hence, the present study was conducted to find out the socio-demographic profile and domains of cognitive performance in first-degree relatives of a patient with AD and those findings were also compared with first-degree relatives of a person without AD.

METHODOLOGY

In the present study, two study groups; including group1 (First-degree relatives of a patient with AD) and group 2 (First-degree relatives of a person without AD) were compared on the basis of their cognitive performance, memory, and the risk of AD in the future. The ethical approval (No. Dean/2018/EC/499 on date; 23 Feb 2018) was taken from the Ethical Committee of Institute of Medical Sciences, Banaras Hindu University, Uttar Pradesh, India. All the methods used in the present study adhere to the 2008 revision of the Helsinki Declaration and the ethical guidelines of the relevant national and institutional committees on human experimentation.

Sample size: Based on the results of a pilot study on 20 samples each group using PRMQ scale; 45.45 ±6.25 and 41.74 ±5.13, and taking the level of significance 5% at two tail and power 90% the sample size would be 49.22 (approximately 50). The sample size was considered 50 in each study group.

Selection criteria

- **Inclusion criterion:** Group 1- male or female aged between 18 to 60 years - the first-degree relative (son/daughter and siblings) of patients with AD. Group 2: male or female aged between 18 to 60 years -the first-degree relative (son/daughter and siblings) of a person without AD.
- **The Exclusion criterion was:** history of any chronic physical, neurological and psychiatric disorders, having education below primary level, not willing to participate in the study, and not giving written consent.

Tools: Following tools were applied for this study

1. ICD 10 DCR for diagnosis of AD and other psychiatric disorders
2. Assessment Tool: An interview schedule consisting of socio-demographic questionnaire, Prospective and retrospective Memory Questionnaire[9], PGI memory scale[10], ADDENBROOK's cognitive examination (ACE III)[11], and Trail making test (A and B)[12] was prepared by the researcher.

Sampling procedure:

Subjects were selected from geriatric psychiatry OPD on specified days. They were informed (Written) about the aim and objective of the study, and then they were asked to give a written consent; "I have read the explanation about study and have been given opportunity to discuss if and to ask questions. I hereby consent to take part in the study." They were also given an opportunity that they can leave the study, if they need. The diagnosis of patients was done by a psychiatrist based on ICD 10 criteria and their relational verification with patients was done based on a valid i. d. Proof. Then the selected subjects were interviewed and assessed by a trained researcher using the semi-structured interview schedule consisting of the assessment tools mentioned above.

Statistical analysis: The data was arranged by using MS Excel and analyzed by using the statistical package of social scientist version 14 (SPSS trial version 14). Study groups were compared on each Socio-demographic variable by using the Chi-square test. The Unpaired t-test was applied to assess the comparison of variables between study groups. P-value at 5% at the two-tailed test is considered significant.

RESULTS

A total of 50 subjects in each study groups were assessed in this study and most of them in both study groups were male and belong to age group 30 to 49 years. Both study groups were comparable on each socio-demographic variable (Table 1).

The mean PRMQ score was found comparatively higher in the group 1 group (44.97 ±6.179) than the group 2 group (41.88 ±4.654). There was a significant difference (P<0.05) in PRMQ scores between group 1 and group 2 groups. The mean of PGI memory scale (78.02 ±4.955) and ACE-III test (78.76±6.684) was found lower in group1 than group 2. There was a significant difference (P<0.001) in mean score of PGI memory scale and ACE-III test. On comparing the mean score of Trail making test (A & B) between study groups, the mean score of Trail making test A was found higher in group 1 groups (43.48±5.654) than group 2 groups (39.52±3.418) and It was found significantly different (P<0.001). Similarly, the mean of Trail making test B score was found higher in group 1 (119.02±15.231) than group 2 (113.58 ±19.453) and there was a significant difference (P<0.05) between study groups (Table 2).

Table 1: Socio-demographic characteristics of the participants

	GROUP 1 GROUP		GROUP 2 GROUP		TOTAL		X^2	P value
	N	%	N	%	N	%		
Age							1.405	0.704 NS
18-29	6	12	8	16	14	14		
30-39	20	40	17	34	37	37		
40-49	20	40	23	46	43	43		
50-59	4	8	2	4	6	6		
Gender								
Female	23	46	23	46	46	46	0.040	0.841 NS
Male	27	54	27	54	54	54		
Education								
primary school certificate	3	6	2	4	5	5	0.248	0.993 NS
middle school certificate	14	28	14	28	28	28		
high school certificate	10	20	11	22	21	21		
intermediate, diploma	5	10	5	10	10	10		
graduate or post graduate	18	36	18	36	36	36		
Marital status								
Married	47	94	47	94	94	94	0.177	0.674 NS
Unmarried	3	6	3	6	6	6		
Socio-economic status								
Upper	6	12	6	12	12	12	0.093	0.999 NS
Upper middle	9	18	8	16	17	17		
Lower middle	14	28	15	30	29	29		
Upper lower	20	40	20	40	40	40		
Lower	1	2	1	2	2	2		
Domicile								
Urban	13	26	16	32	29	29	0.194	0.659 Ns
Rural	37	74	34	68	71	71		
Family setup								
Nuclear	42	84	42	84	84	84	0.074	0.785 NS
Joint	8	16	8	16	16	16		

S- Significant; NS; Non Significant; Level of Significant*P<0.05, **P<0.01, ***P<0.001

Table 2: Comparison of various cognitive functioning and domains between group 1 and group 2

Scale/Test	Study Groups	Mean score (SD)	Unpaired T test (P value)
PRMQ	Group 1 Group 2	44.98(6.179) 41.88(4.654)	-2.834 (0.006)** S
PGI memory scale	Group 1 Group 2	78.02(4.955) 81.12(3.606)	-3.577 (0.000)***S
ACE-III TEST	Group 1 Group 2	78.76(6.684) 83.66(3.378)	-5.57 (0.000)***S
Trail making test A	Group 1 Group 2	43.48(5.654) 39.52(3.418)	4.238 (0.000)***S
Trail making test B	Group 1 Group 2	119.02(15.231) 113.58(19.453)	2.082 (0.040)*S

SD-Standard deviation; S- Significant; NS; Non Significant; Level of Significant *P<0.05, **P<0.01, ***P<0.001

Discussion:

In the present stud, a hospital based cross-sectional comparative study was conducted to find out the socio-demographic profile and domains of cognitive performance in first-degree relatives of a patient with AD and those findings were also compared with first-degree relatives of a person without AD. In the present study, a total of 50 participants (relative of patient with AD) as group 1 and 50 participants (relative of person without AD) as group 2 were interviewed with a semi structured interview schedule. A majority of the study participants of both study groups belonged to age group 30-49 years. And Most of them were males. Both study groups were matched according to socio-demographic variables such as age, gender, marital status, education, socioeconomic status, domicile, and family setup.

In this study, PRMQ test was used to measure prospective and retrospective memory of study subjects where a higher score represents more frequent memory failure. There was a significance difference (P<0.05) in PRMQ score between group 1 and group 2. The mean of PRMQ was found higher in among the first degree relatives of patient with dementia than first degree relatives of individual without dementia. Similarly on comparing the mean score of other scales applied in the study, there was a significance difference in the mean score of PGI memory scale (P<0.001), ACE-III Test (P<0.001), Trail making test A (P<0.001) and Trail making test B (P<0.05) between both study groups. Cognitive functions were found comparatively lower among the first degree relatives of patient with dementia than first degree relatives of individual without dementia. These findings are corresponds to some previous studies.[13,14]

Result of the study suggests that neuropsychological differences may exist long before its clinical expression in individuals at genetic loaded subjects (in their first degree relatives).This prediction approved by a study in which it was found that even cognitively normal subject during scanning, shown, accelerated RCBF (Regional Cerebral Blood flow) changes seen within regions, considered to be critical for the maintenance of cognitive function. [15]

Conclusion:

The present study suggests that there was a significant difference in various domains of cognitive functions between the first degree relative of a patient with dementia and a healthy control. However, results also suggest that neuropsychological differences may exist long before its clinical expression in individuals at genetic loaded subjects (in their first degree relatives).

Limitations: The present study was a hospital-based study therefore random sampling was not feasible. This study did not represent the normal population as sample collected from tertiary hospital. It was a exploratory study, hence there is a need of study on large sample required for the confirmation of the findings. Recall biased and second generation of family history of Alzheimer's disease among group 2 group could not be ignored.

Declaration of Interest: None

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