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Effect of Ageing on Cognitive Functions in India

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Abstract

There are few studies done in India on neuropsychological functioning of elderly using culturally sensitive and indigenous neuropsychological test. The study examined the effect of age on cognitive functions among the elderly in India. A community sample of 90 healthy normal men and women participants between the age of 65 years and above, both literate and illiterate, were included in the study. Participants were screened for dementia and psychiatric illness using Hindi mental Status Examination, Mini-international neuropsychiatric interview (MINI Screen) and Everyday Abilities Scale for India. Participants selected after screening were administered NIMHANS Neuropsychological Battery for elderly (Tripathi et al, 2012).ANOVA was used to test the level of significance between the groups. Result confirmed that there was certain age related cognitive decline across the age groups on story memory, digit span, spatial span, word list learning, and recognition, stick construction and Go/No-Go tests. The current study found that there are cognitive decline with age.

Keywords: Age, Cognitive Functions, Neuropsychological Assessment.

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Across the globe, increased longevity due to better health care has resulted in higher proportions of older persons. It is estimated that older persons are likely to increase to two billion by 2050[1]. Ageing is associated to various physical, social, psychological and cognitive issues. As there is increase in age there is age-related decline in cognitive functioning [2,3]. However cognitive health is one of the understudied areas in the developing countries [4]**.**

The speed of processing, executive functions, episodic memory, working memory and long-term memory are reported to decline with age[5, 6]. The executive functions which declines with increasing age are concept formation [7] abstraction[8] planning/problem solving [9, 10, 11] inhibition of irrelevant information, and the updating of information in working memory [12]. One of the theories proposed to explain the decline in the cognitive functioning with age is Processing-Speed theory [13]. According to the theory, increased age in adulthood is associated with a decrease in the speed with which many processing operations can be executed. This reduction in speed leads to impairments in cognitive functioning. Other theories state decrease in inhibitory function of prefrontal lobe [14]and changes in sensation i.e., deficits in vision and hearing [15] lead to cognitive impairment in old age.

All people manifest the same behaviour to the same stimulus in the brain [16]. Therefore western Caucasian-oriented methods of neuropsychological assessment were used to understand the cognitive functioning of individuals from other societies. It has led to partial or incorrect understanding of cultural effects on human behaviour and cognitive functioning [17]. The cross-cultural difference in testing which can be easily misinterpreted in neuropsychological testing such as the concept of time, attitude toward testing, language, values and meanings and different modes of knowing varies with different cultures [17]. Many of the neuropsychological assessment tools used in Asia, including India are adapted or translated from the Western tests [18]. Its adaptation to the Indian setting is questionable and varied [19]. In recent times, NIMHANS Neuropsychological Battery for Elderly (NNB-E) was developed to identify early dementia in India [20]. They found that NNB-E was able to differentiate normal controls from AD patients, and it can therefore be an ecologically valid tool for Indian older adults.

The present study aims to examine the effect of age on the cognitive functions of the elderly in India.

Method

The sample consisted of three age groups of elderly comprising of 15 males and 15 females in the age range of 65-70 years, 71-75 years and 76 and above years. The inclusion criteria was that participants should be above the age range of 65 years, with no history of dementia and mild cognitive impairment as confirmed by HMSE and should speak either English or Hindi or Kannada. Participants with history of any psychiatric illness or substance abuse or neurological or neurosurgical illness were excluded from the study. Participants with sensory/motor/speech deficit rendering them not amenable for testing were also not included in the present study. Written informed consent was taken from the patient and ethical guidelines were followed. The tools used in the present study were as follows:

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- Socio-Demographic Proforma: The socio demographic proforma was used to enter the demographic details such as age, gender, socioeconomic status etc., along with the details of physical illness and treatment taken.
- Edinburgh Handedness Inventory: This ten items questionnaire was used to ascertain the handedness of the patients.
- Everyday Abilities Scale for India: This is a 12 items brief measure of activities of daily living, with norms and is appropriate for use in evaluating dementia (along with other tests) in elderly people in India.
- Hindi mental Status Examination: HMSE is similar to that of Mini Mental Status Examination and validated for the Indian population. It takes about 15-20 minutes for administration.
- Mini-international neuropsychiatric interview (MINI Screen): It is a brief structured diagnostic interview, designed to diagnose DSM-IV and ICD-10 psychiatric disorders
- Clinical Dementia Rating Scale: It assesses a patient's cognitive and functional performance in six areas: memory, orientation, judgment & problem solving, community affairs, home & hobbies, and personal care
- NIMHANS Neuropsychology Battery- Elderly: It is a comprehensive battery used to assess the cognitive function of elders, usually takes 60 minutes (approx) to administer. It includes Story Memory Test, Stick Construction, Digit Span, Corsi Block Tapping Test, Tower of Hanoi, Category Fluency, Word List, Go-No-Go Test and Parietal Focal Signs.

Results

Total 90 participants between the age- range of 65 and above years completed the assessment. The mean age of the participants was 72.98 (SD= 5.28). On an average, they had completed 10 years of formal schooling (Mean= 10.40; SD= 4.88).The sample was divided into three categories in terms of age: 1) 65-70 years of age, 2) 71-75 years of age and 3) 76 and above years of age. Further sample was divided based on gender (males and females), 15 participants each in both the gender of the three age category.

Table1.0 Performance of the three age groups on cognitive functions.

	Age In Years							
Variables	65-70 years N=30		71-75 years N=30		76 & above years N=30			
	Mean	SD	Mean	SD	Mean	SD	F	p
StorymemoryIR	8.47	2.16	9.00	1.96	7.20	2.18	5.77	.004
StorymemoryDR	8.03	2.07	7.37	1.47	6.07	2.03	8.48	.000
Stickcopy	23.80	0.66	23.73	0.64	23.27	1.01	4.04	.021
StickIR	18.90	3.01	16.60	3.82	14.93	4.57	8.01	.001
StickDR	16.20	2.78	13.87	3.11	11.93	4.27	11.49	.000
Digitforward	5.67	0.88	4.87	0.73	4.73	0.86	11.08	.000
Digitbackward	4.63	0.96	3.87	0.77	3.87	0.73	8.53	.000
Corsiforward	5.33	0.60	4.43	0.67	4.40	0.81	16.92	.000
Corsibackward	4.43	0.85	3.77	0.62	3.53	0.73	11.81	.000
Categoryfruits	9.70	2.66	8.77	1.67	9.13	2.75	1.13	.325
Categoryanimals	11.13	3.29	9.27	1.72	10.37	3.35	3.15	.048
Categoryvegetables	10.63	2.22	9.30	2.00	9.50	2.63	2.92	.059
Wordlist1	5.87	1.59	5.23	1.10	4.50	1.13	8.34	.000
Wordlist2	6.50	1.33	5.90	1.18	5.30	1.62	5.57	.005
Wordlist3	7.50	1.33	6.70	1.26	6.13	1.54	7.35	.001
Wordlisttotal	19.80	3.67	17.70	2.90	15.93	3.82	9.23	.000
WordlistDR	6.93	1.57	6.53	1.10	5.57	1.38	7.92	.001
Totalmoves1	3.17	0.46	3.90	1.29	4.77	1.99	6.92	.002
Totalmoves2	8.77	3.03	10.57	2.78	12.10	4.38	13.71	.000
Totalmoves3	20.97	7.06	24.47	4.83	29.60	7.10	19.28	.000
Totalmoves4	43.70	11.49	50.43	10.86	61.30	10.86	15.17	.000
Totaltime1	26.23	11.98	40.03	14.27	47.33	18.26	6.52	.002
Totaltime2	57.50	30.12	70.50	22.05	90.80	49.92	13.37	.000
Totaltime3	145.67	53.70	160.60	48.13	212.33	55.10	19.23	.000
Totaltime4	317.70	95.83	293.23	118.41	444.83	88.22	14.15	.000

Table 1.0 shows the comparison of performance between age groups (65-70 years, 71-75years and 76 and above years) on test of Story Memory Test, Stick Construction, Digit Span, Spatial Span, and Fluency for Fruits, Animals and Vegetables, Word List and Tower of Hanoi. Results show there was statistically significant differences between the three groups on all the neuropsychological tests expect on Category Fluency (fruits and vegetables).

Discussion

The present study aimed to examine the effect of age on cognitive functions. The age was a significant predictor of performance for all the 8 tests expects category fluency fruits and vegetables (table 1.0). The younger participants performed better on story memory, digit span, spatial span, word list learning, and recognition, stick construction and Go/No-Go tests. This is consistent with previous studies that have indicated significant differences across age groups [21, 22]. Few studies found that increasing age was associated with lower scores on executive functioning, verbal fluency, and memory in elderly participants [21]. Similarly in another study younger age was associated with better performance on word list learning, word list recall, constructional praxis and recall [22]. The study on Indian population found that there was significant difference in the neuropsychological performance of participants with age on word list, story memory, stick construction and Tower of Hanoi [20]. The present study found no significant difference between the three age group on category fluency (fruits and vegetables) which is consistent with WHO study on ageing and adult health (SAGE) in Ghana, India, and Tanzania. Total of 1446 participants aged 50 years and above took part in the study [23]. They found that verbal fluency is less influenced by age before 80 years of age. Similarly other studies suggest that verbal fluency is well preserved till late in life and that any age-related decline appears to be mainly due to declines in speed of information processing [24].

The present study incorporated some indigenous tests which were developed by Tripathi et al (2012), which was found to be appropriate and culturally sensitive in their study for literate and illiterate population of India. There was an attempt to recruit both men and women of diverse age group and educational backgrounds. However the study used relatively small sample size (N=90) of participants. Despite making an attempt to include illiterate individuals in the sample, there is an underrepresentation of illiterate group in the study. The study found that age is strong determinant of cognitive functions among the elderly. The future research studies should attempt to include illiterate population from rural India to make the sample more representative of the general population.

Conclusion:

The current study found that there were certain age related cognitive decline across the three age groups. The increasing age is associated with decline in speed of processing, memory, executive and visuo-spatial functioning. However there was no significant change in category fluency with age.

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