



Evaluating the Association of Remote Memory, Recent Memory and Mental Balance With Hb Concentration Using PGI Memory Scale in Elder Adults

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ABSTRACT

Objective: A cross sectional observational study to evaluate the association of Recent memory, Remote memory and Mental Balance of healthy elder population (aged 50 and above) with their Hb concentration.

Methods: 60 healthy volunteers (46 females and 16 males) from 240 participants of an Urban health camp, were selected for the study. Their memory scores were evaluated using PGI memory scale and their Hb concentrations were recorded from their medical report. Then values of Recent memory, Remote memory and Mental balance scores were compared against Hb concentration.

Result: Remote memory and Mental balance showed strong positive correlation ($P < 0.001$), whereas recent memory did not show any association ($P > 0.05$).

Conclusion: Hb concentration significantly influences Remote memory and Mental balance; whereas no association has been found with Recent memory. Further extended investigations are required to prove this association.

KEYWORDS : Memory, PG Institute (Chandigarh) memory scale (PGIMS), Haemoglobin (Hb) concentration.

Introduction:

The elderly people are highly prone to mental morbidities due to aging of brain and problems associated with physical health, cerebral pathology, socio-economic factors and decrease in economic independency. Cognitive decline along with limited physical activities affect the mortality rate of elderly population significantly¹. Normal cognitive changes of aged population results in an intermediate stage called 'Mild Cognitive Impairment' (MCI), which is a serious risk factor for clinical conditions like Dementia and Alzheimer's disease^{2,3}. So it becomes important to screen the elderly people for mild memory related problems in order to prevent Alzheimer type of lethal conditions.

Apart from normal aging related neuronal damages, so many other reasons have been found to be associated with memory decline. Anemia is one such well established causing factor for developing cognitive impairment, especially memory loss in elder population^{4,5}. But which type of memory loss is observed in anemic condition is still not clear. As each type of memory is related with different neural circuits and neural structures, such information will give a better insight over the patho-physiology of memory related clinical conditions. So this study is performed to associate three different types of memory (Recent memory, Remote memory and Mental balance) with Hb concentration of healthy elderly population aged between 50 to 70 years, using PGI memory scale (PGIMS)⁶.

Methodology:

This descriptive cross sectional study was conducted in an Urban Health centre at Koothampakkam, in Kanchipuram district, TamilNadu. Sixty (N=60) healthy subjects were selected from 240 participants who had visited for a Health Camp. Among the selected subjects, there were 46 females and 14 males. The following inclusion criteria were used for selecting the subjects. Inclusion criteria: 1) volunteers aged between 50-70 years; 2) volunteers not undergoing any medical treatment. It includes cardio-pulmonary disorders, hormonal/endocrinal disorders and neurological disorders; 3) patients without any previous history of stroke or neurological disorders; 4) women who had attained menopause; 5) subjects who hasn't got communication problems.

PGIMS was tested and validated by Post Graduate Institute of Medical Education and Research (Chandigarh), for assessing different components of memory. This scale can be used for people with any type of educational and language background. Memory evaluation was performed using PGIMS⁶. Remote memory, Recent memory and Mental

balance were recorded with the maximum score of 6, 5 and 3 respectively. The Hb concentrations of all subjects were collected from their routine blood test report, which was a part of their health checkup.

Results:

	Total population (N=60)	Females (N=46)	Males (N=14)
Hb concentrations (gm %)	11.61±0.14	11.90±0.10	12.60±0.40

Table 1: Shows Hb concentrations of total population. For females (N=46) the average value is 11.06 gm% and for males (N=14) it is 12.60 gm%.

Independent variable	Dependent variable	Intercept	Slope	R Value	Probability
Hb Concentration	Remote memory	-3.06	0.67	0.50	<0.001
Hb Concentration	Recent memory	NS			
Hb Concentration	Mental balance	-5.38	1.04	0.44	<0.001

Table 2: Shows association of Remote, Recent memory and Mental balance with Hb concentration. Among the three, Remote memory and Mental balance shows significant correlation with R values of 0.50 and 0.44 respectively. Whereas correlation of Recent memory with Hb concentration is not significant.

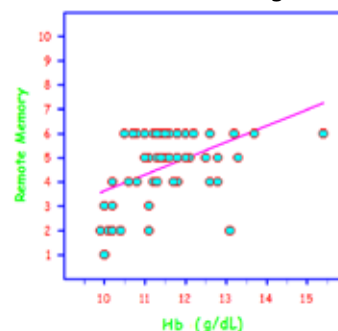


Figure 1: Showing positive association between Remote memory and Hb concentration

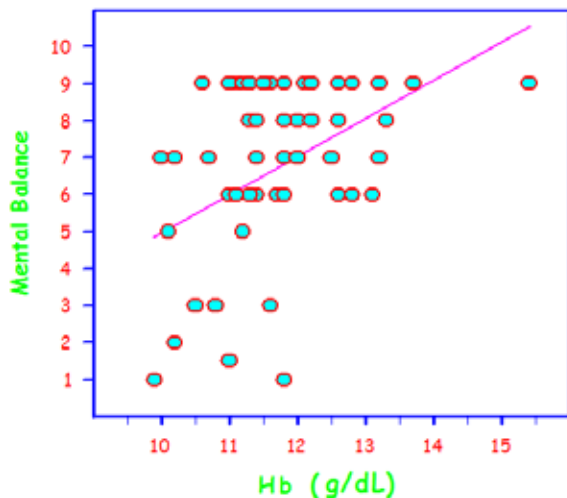


Figure 2: Showing positive association between Mental balance and Hb concentration

Discussion:

Mild cognitive problem is the earliest clinical manifestation of general age related neurological diseases including Alzheimer's disease⁷. The association between low Hb concentration and cognitive function is a well established hypothesis, as it is related to brain oxygenation. But which component of the cognition/memory is chiefly affected by Hb level is yet to be explored.

In this cross sectional study out of total subjects (N=60), majority of them were females (N=46). The average Hb concentration of all subjects participated was $11.61(\pm 0.14)$ gm%. When individual scores of HB concentrations were plotted against corresponding scores of Remote memory, it shows a significantly positive association ($P < 0.001$). So it indicates the tendency of dependency of remote memory with Hb. Similar significant association is found with a slope of 1.04, while plotting scores of Mental balance with corresponding Hb level. But for recent memory the values are not significantly correlating.

These results evoke doubts about the role of Hb concentration on general cognitive decline. As neuronal components for each type of memory are different, their differential sensitivity to Hb level questions their metabolic dependency on Hb. Hence it stresses the importance of studying specific type of memory loss exclusively in elder population.

Conclusion:

According to this study, the Hb concentration significantly influences Remote memory and Mental balance; whereas no association has been found with Recent memory. But, as other factors like educational, emotional and economical conditions may influence the memory of an individual, further extended studies should be carried out in the future

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