

Verbal Episodic Memory in Young Hypothyroid Patients

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Abstract

Context: Hypothyroidism affects cognitive functions especially memory. However, most of the previous studies have generally evaluated older hypothyroid patients and sample size of these studies varied in terms of age range. **Aims:** To see whether hypothyroidism affects memory in young patients. **Settings and Design:** The sample consisted of 11 hypothyroid patients with an age of 18–49 and 8 healthy controls matched on age and education. **Subjects and Methods:** Verbal episodic memory was assessed using Hindi adaptation of Rey-Auditory Verbal Learning Test. **Statistical Analysis Used:** An independent *t*-test was used to see the difference between mean performance of the patient group and healthy control on memory measures. **Results:** Results indicated nonsignificant difference between verbal episodic memory of patient group and healthy controls. **Conclusions:** On the basis of these findings, it was concluded that hypothyroidism may not affect younger patients in terms of episodic verbal memory the same way as it does in the older patients.

Keywords: Cognition, hypothyroidism, Rey-Auditory Verbal Learning Test, verbal episodic memory

INTRODUCTION

Ample research has been conducted on the effect of thyroid hypofunction and on specific memory deficits. Studies have found that hypothyroidism can cause various forms of memory deficits such as verbal memory,^[1-4] short-term memory,^[5] visual memory,^[2] logical memory,^[6,7] working memory,^[8,9] and spatial working memory.^[10] Studies on both animals and humans have also revealed that adult-onset hypothyroidism causes structural and functional changes in the brain areas related to memory.^[11-14]

Recent studies have demonstrated impaired verbal memory in patients with a primary form of hypothyroidism^[1-4,8] and decrement in delayed recall with a specific deficit in the retrieval process of memory among patients with hypothyroidism.^[1,3] Wekking *et al.*^[4] found poor performance on immediate recall of verbal items and tasks assessing attention among hypothyroid patients. It has been found that overt form of hypothyroidism causes verbal memory problem whereas the subclinical form of hypothyroidism makes only subtle changes in the verbal memory.^[15] Furthermore, studies have shown that patients with subclinical form of hypothyroidism perform poorly on prose recall measures of verbal memory.^[2,6,7]

The above-mentioned studies have shown that there is some verbal memory deficit associated with the adult form of hypothyroidism. However, the age range of the sample included in these studies was very broad. For instances, Burmeister *et al.*^[1] and Wekking *et al.*^[4] had participants with the age range of 23–52 years and 18–17 years, respectively. While in case of Correia *et al.*^[2] and Miller *et al.*^[3] it was 18–65 years and 18–55 years, respectively. Moreover, some studies have only included middle-aged adults. It seems that such characteristics of the sample used in earlier studies preclude drawing definite conclusions about the effect of hypothyroidism on memory performance. Furthermore, little is known about the effect of hypothyroidism on memory performance among young hypothyroid patients. In view of the above, the present study was conducted to see if hypothyroidism induces memory problem among young hypothyroid patients. On the basis of previous research, we hypothesize that hypothyroidism would negatively affect memory functions among young hypothyroid patients.

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SUBJECTS AND METHODS

Eleven hypothyroid participants were recruited from the outpatient department of the Department of Endocrinology and Metabolism, Institute of Medical Sciences, Banaras Hindu University, Varanasi, and eight healthy controls matched on age and education were included in the study. Written consent was taken from the participants. A detailed medical history was taken from the healthy participants to rule out any significant medical condition. In case of patient group, the history was taken from the consulting endocrinologist, and the diagnosis was made before the subject was contacted for the study. The inclusion criteria were primary form of hypothyroidism with an age range of 18–31 years, and at least 12 years of basic education. The exclusion criteria for the study were secondary form of hypothyroidism, pregnancy, thyroid stimulating hormone suppressed due to over medication, past or present history of any psychiatric, neurological, or other comorbid medical condition. Table 1 shows the characteristics of patient and control group, age and education are expressed in mean ± standard deviation (SD).

Hindi adaption of Rey-Auditory Verbal Learning Test of NIMHANS battery^[16] was used to assess memory. The test yields a number of measures, however, two measures have been found to be very sensitive in tapping verbal memory, i.e., delayed recall and total number of words recalled across trials.^[17]

RESULTS

The data were analyzed using Statistical Package for Social Sciences Version 20.0 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0 Armonk, New York: IBM Corp, United States of America). Independent samples *t*-test for two different measures of memory was applied to see whether there was any statistical difference between hypothyroid participants and healthy controls.

Table 2 shows the results of *t*-test for the measures of memory. The mean performance score on total number of words recalled by the hypothyroid group was only marginally low (mean = 48, SD = 6.55) in comparison to the performance of healthy control group (mean = 48.13, SD = 9.58). While in case of delayed recall, the mean performance score of hypothyroid patients was higher (mean = 12.36, SD = 2.02) than the performance of the healthy control group (mean = 9.63, SD = 3.77). There was a nonsignificant difference between the performance of hypothyroid group and healthy controls on total number of words recalled (*t* = 0.29, *df* = 17, *P* > 0.05). Similarly, for delayed recall, a nonsignificant difference was found between hypothyroid group and healthy control (*t* = 1.68, *df* = 17, *P* > 0.05).

The marginal and nonsignificant difference between hypothyroid group and healthy control group on total number of words recalled can be due to more number of subclinically hypothyroid patients in the patient group. Furthermore, the

Table 1: Demographic information

Demographic variables	Hypothyroid group	Healthy controls	<i>P</i>
Number of patients	11	8	
Age	31.91±8.39	27.25±5.092	0.18
Years of education	14.72±1.95	14±2.27	0.82
Gender (male/female)	1/10	1/7	0.46
Disease duration in years	2.5	0	

Table 2: T-test results comparing performance of hypothyroid group and healthy control group on measures of memory (Hindi adaptation of Rey-Auditory Verbal Learning Test)

Measures	Mean±SD		<i>t</i> (<i>df</i> =17)
	Hypothyroid (<i>n</i> =11)	Healthy controls (<i>n</i> =8)	
Total number of words recalled	48.00±6.55	48.13±9.58	0.29
Delayed recall	12.36±2.02	9.63±3.77	1.68

SD: Standard deviation

hypothyroid group outperformed the healthy controls on delayed recall measure of verbal memory, which can be explained in terms of comparably low number of participants in the healthy controls to that in the patient group.

DISCUSSION

The aim of the current study was to see whether hypothyroidism causes verbal memory deficit in young patients. In view of the recent studies on the effect of hypothyroidism on memory,^[1,3,4] it was hypothesized that hypothyroidism would negatively affect memory functions among young hypothyroid patient. Present results indicated nonsignificant difference between mean performance scores of two groups on the verbal memory measures. Similar findings have been reported by few studies on the subclinical group.^[18,19] However, few studies have reported contradictory findings. For example, Burmeister *et al.*^[1] have reported that a brief and severe form of hypothyroidism may affect verbal memory, Miller *et al.*^[3] also reported a deficit in memory retrieval processes among hypothyroid patients. Similarly, Wekking *et al.*^[4] have reported verbal memory deficit among euthyroid patients with disease duration of 5 years.

There are few plausible explanations for the contradictory results in earlier studies which need to be considered. The mean age of our sample (31.91 years) was less in comparison to that of Burmeister's and Miller's study. In case of Wekking *et al.* study the patients had mean disease duration of 5.5 years while mean disease duration of the present study was only 2.5 years. Furthermore, unlike Miller's study, we included patients irrespective of whether they had cognitive complaint. Presumably, the inclusion of subclinical patients in our sample resulted in the absence of memory deficits. These demarcations may point that other variables such as age and disease duration

may play an important role in producing verbal memory deficit in hypothyroidism.

CONCLUSIONS

Hypothyroidism in young adults may not affect verbal episodic memory. Furthermore, disease duration may play an important role in producing verbal episodic memory deficit among young hypothyroid patients. However, there are few limitations of the study. First, our sample size is low to generalize our findings. Second, the study included mostly female patients though this was not deliberate during our sampling we could not find many male patients suitable for our inclusion criteria.

Further studies with a more augmented sample size are warranted. Furthermore, more research is needed to see the longitudinal changes in verbal episodic memory that may occur following treatment. It is also our view that current tests may not be sensitive enough to tap subtle changes in verbal memory following hypothyroidism. Thus, a careful modification of the current test may be a fruitful way to tap memory functions among young hypothyroid patients.

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Conflicts of interest

There are no conflicts of interest.

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