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INDO AMERICAN  
JOURNAL OF  
PHARMACEUTICAL  
RESEARCH

## INFLUENCE OF MARITAL STATUS AND DIABETIC DURATION TO COGNITIVE FUNCTION IN DIABETIC PATIENTS

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### ARTICLE INFO

#### Article history

Received 23/01/2013

Available online  
31/03/2013

#### Keywords

MMSE scale,  
cognitive dysfunction,  
marital status,  
diabetic duration.

### ABSTRACT

The objective of the study was to evaluate the association between marital status and diabetic duration with regard to Cognitive dysfunction in Diabetic patients. The study carried out on 500 diabetic patients of various socio demographic characteristics over a period of eighteen months with Mini Mental State Examination (MMSE scale). The objective of the research was to investigate the cognitive effects of different factors associated with health care in diabetes management in their course over time. The results of the studies show that diabetes and its complications along with socio demographic factors impart a significant impairment in cognitive domains. It is highly necessary that subjects with diabetes be screened for cognitive functioning at the earliest, considering the fact that diabetes requires high level of self management especially for better compliance. Through the research conducted the result shows that there is no significant difference in TMMSE base, 1<sup>st</sup> follow up and second follow up. There is a significant difference in cognitive function on the basis of duration of diabetes. Result concluded that patients who have diabetes for more than 2 years have a significantly decline in cognitive function.

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Please cite this article in press as *Rajesh Venkataraman et.al. Influence of marital status and diabetic duration to cognitive function in diabetic patients. Indo American Journal of Pharm Research.2013:3(3).*

## INTRODUCTION

The prevalence of diabetes varies markedly among countries, and this is attributed to a combination of ethnic, cultural, environmental economic and social risk factors such as diet, level of obesity, physical activity and age distribution [1]. Diabetes mellitus is not a single disorder and its definition depends on one's perspective. From a medical perspective, it represents a series of metabolic conditions associated with hyperglycaemia and caused by defects in insulin secretion or insulin action. The increasing incidence of diabetes mellitus in the industrialized world represents one of the most serious challenges facing the medical profession today. Diabetes and its complications have been estimated to cost >\$130 billion every year in the United States, and this figure is likely to grow as a sedentary lifestyle and aging population drive up the incidence and prevalence of disease [2]. The figures underscore the massive economic and societal burden associated with diabetes and its complications, and clearly indicate the need for action.

With cognitive dysfunction and dementia becoming increasingly prevalent in western populations emphasis on the identification of risk factors and development of primary prevention strategies for promoting cognitive health remains a question mark. With diabetic patients of more than two years of diabetic history, the study has alarmed the diabetic individuals for a potential threat that requires special attention for a proper and stable diabetes care.

No uniform norms exist for disease management establishing the need for a minimal biased health care system in the country. Awareness for better diabetes management among patients needs a satisfactory literacy level, with the study proving the impact of marital status and diabetic duration to cognitive function in diabetic patients ; it is to be a real concern to health care providers that patients be individualized as per there diabetic duration.

## METHODOLOGY

The prospective study was done among diabetic cohort, both men and women living in and around the district of Coimbatore, Tamilnadu, India. Data collection forms were designed with respect to marital status and diabetic duration of 500 patients of varying age groups [below 30, 30 to 60, above 60] were being recruited for the study.

## MINI-MENTAL STATE EXAM (MMSE)

The Mini-Mental State Exam (MMSE) was originally designed to provide a brief, standardized assessment of mental status that would serve to differentiate between organic and functional disorders in psychiatric patients. As experience with the test has increased over the years, its major function has now become to detect and track the progression of cognitive impairment associated with neurodegenerative disorders such as Alzheimer's disease [3, 4].

### Description

The MMSE is a fully structured scale that consists of 30 points grouped into seven categories: orientation to place (state, county, town, hospital, and floor), orientation to time (year, season, month, day, and date), registration (immediately repeating three words), attention and concentration (serially subtracting 7, beginning with 100, or, alternatively, spelling the word world backward), recall (recalling the previously repeated three words), language (naming two items, repeating a phrase, reading aloud and understanding a sentence, writing a sentence, and following a three-step command), and visual construction (copying a design). Several shortened forms of the MMSE have been developed on the basis of linear regression analyses that used the individual test items to predict the total score. Although these versions vary somewhat, they are generally limited to the orientation, attention and concentration, and recall items. There are also at least two telephone versions: the Telephone-Assessed Mental State (TAMS) and the Telephone Interview for Cognitive Status (TICS).

Several expanded versions of the MMSE have been developed to assess a greater range and depth of cognitive functioning or to increase the test's sensitivity to subtle cognitive deficits that may occur in specific

neurological diseases such as multiple sclerosis (e.g., the Cognitive Abilities Screening Instrument [CASI], the Modified Mini-Mental State [3MS] Examination, and the expanded MMSE).

The MMSE is scored in terms of the number of correctly completed items; lower scores indicate poorer performance and greater cognitive impairment. The total score ranges from 0 to 30 (perfect performance). Although scoring for most MMSE items is simple and straightforward, several different scoring methods have been used for the attention and concentration item. The most commonly used procedure is to present both the serial subtraction and backward spelling items and use the higher of the two scores in calculating the MMSE total score. Comprehensive normative data ( $N = 18,056$ ) on the MMSE collected through the Epidemiologic Catchment Area (ECA) study provide age- and education-related median, upper quartile, and lower quartile scores that can be used to identify abnormal performance. An initially recommended MMSE cut off score of 23 or 24 provides good sensitivity and specificity for the detection of dementia; however, several recent studies suggested that this cut off score may be too low, particularly with highly educated individuals. These studies showed that dementia can be clinically diagnosed with good accuracy in many individuals who score between 24 and 27 on the MMSE. However, these figures are focused on accuracy in community populations. For clinical purposes, even a score of 27 may be insufficiently sensitive to detect dementia in individuals with extensive education, whereas a cut off score of 24 may be insufficiently specific in individuals with little education [5, 6].

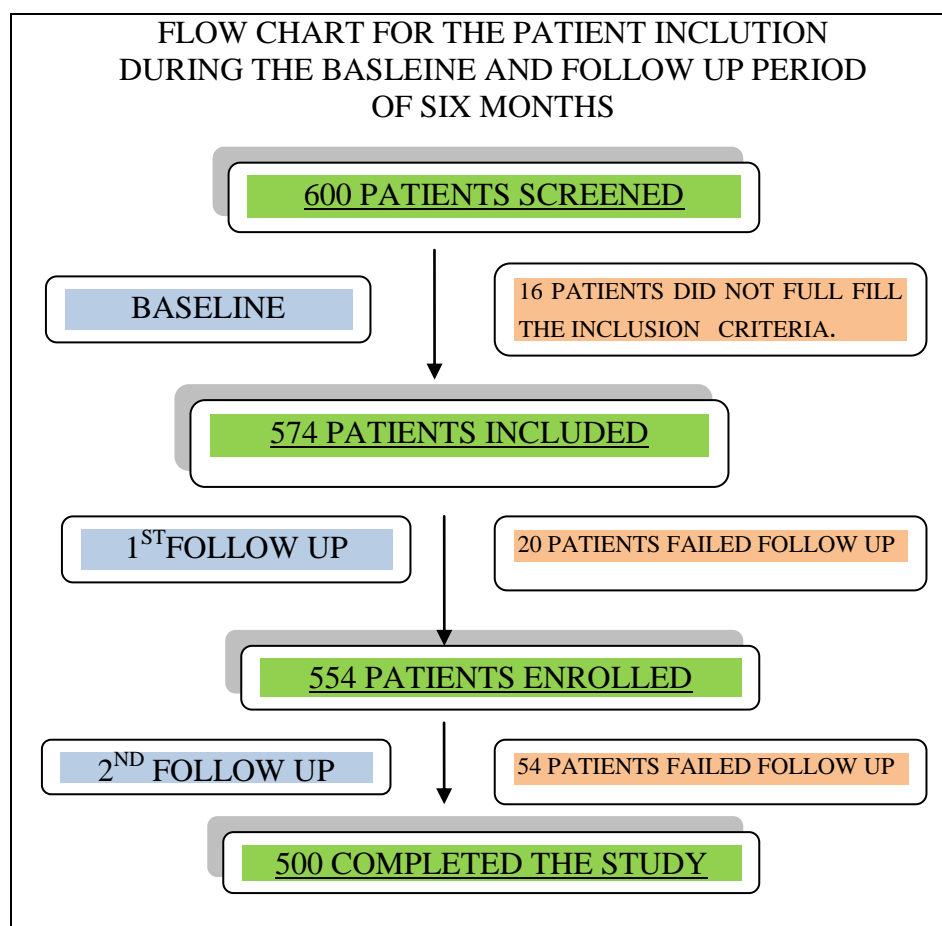
### **Practical issues**

It takes approximately 5–10 minutes to administer the MMSE. The test is designed to be easily administered by any health care professional or trained technician who has received minimal instruction in its use. The MMSE is not commercially available, but the test items, instructions for administration, and extensive normative data have been published.

### **Clinical utility**

The MMSE is a very brief, easily administered mental status examination that has proved to be a highly reliable and valid instrument for detecting and tracking the progression of the cognitive impairment associated with neurodegenerative diseases. Consequently, the MMSE is the most widely used mental status examination in the world. The test has been translated into many languages and has been used as the primary cognitive screening instrument in several large-scale epidemiological studies of dementia. The test is also used widely in clinical practice and is often reported in research studies as a benchmark of the severity of dementia that can be used to compare patient cohorts across studies. This prominence of the MMSE as a cognitive screening instrument is attested to by its inclusion along with the Diagnostic Interview Schedule (DIS), in the National Institute of Mental Health ECA study and by its listing as a recommended measure of cognitive functioning in the diagnostic criteria for Alzheimer's disease developed by the consortium of the National Institute of Neurological and Communication Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association.

Extensive psychometric data on the MMSE confirm that the test has very good test-retest and joint reliability and excellent validity as measured against independent clinical diagnosis of dementia and Alzheimer's disease, measures of functional impairment, or performance on other (often more rigorous) neuropsychological tests and against neuropathological features of Alzheimer's disease. Because performance on the MMSE can be adversely affected by low education in psychiatrically healthy elderly individuals, some investigators recommend the use of age- and education-adjusted cut off scores for the detection of dementia. The MMSE has been shown to be sensitive to cognitive decline in patients with Alzheimer's disease; scores decline an average of 1.8–3.2 points per year. This feature of the scale has led to its use as a primary or secondary outcome measure in some studies that have examined the efficacy of pharmacological agents that might slow the progression of cognitive deterioration in patients with Alzheimer's disease. The MMSE is also somewhat effective in differentiating between dementing disorders that differ in their etiology and sites of predominant neuropathology. For example, in one study, it was reported that Alzheimer's disease and Huntington's disease patients differed in the profile of deficits they produced on the individual MMSE items.



### ETHICAL CLEARANCE

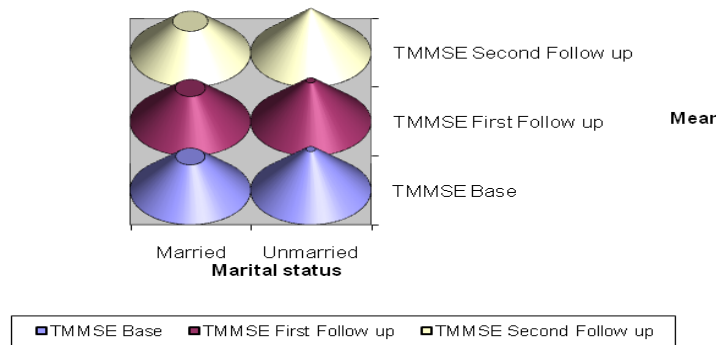
The study was approved by the Ethics Committee of M.S. Chellamuthu Trust and Research Foundations, Madurai, Tamil Nadu, India. Patients were informed that the information they provided was confidential and would be presented only as group information without any identifying characteristics. Written informed consent was provided by all patient participants prior to entry into the study.

### Impact of marital status on cognitive functioning

Through the research conducted the result shows that there was no significant difference in TMMSE base, 1<sup>st</sup> follow up and second follow up because of the obtained p values are not significant.  $P > 0.05$ .

**Table 1:** t-test for TMMSE Score Vs Marital status

Marital status	TMMSE Base					
	N	Mean	SD	SE <sub>M</sub>	t-value	P Value
Married	492	24.92	4.51	0.20	0.566	0.589 (Not Significant)
Unmarried	8	26.00	5.35	1.89		
TMMSE First Follow up						
Married	492	24.88	4.46	0.20	0.590	0.573 (Not Significant)
Unmarried	8	26.00	5.35	1.89		
TMMSE Second Follow up						
Married	492	24.60	4.48	0.20	0.991	0.354 (Not Significant)
Unmarried	8	26.50	5.40	1.91		



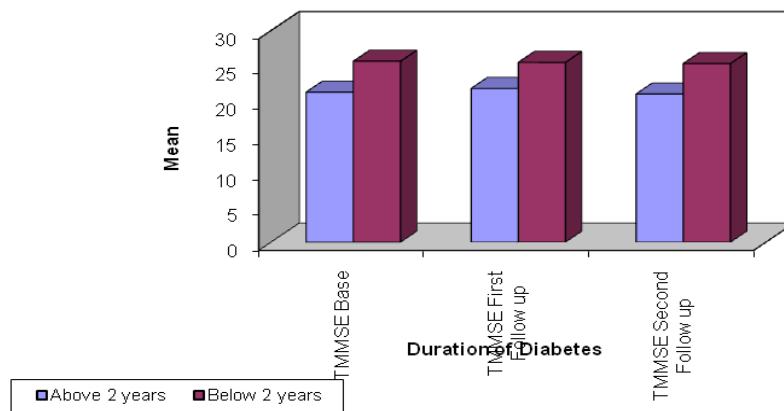
**Figure 1:** Mean score TMMSE Score on the basis of Marital status.

**Impact of Diabetes Duration on cognitive function**

It was inferred from the table that there was a significant difference in cognitive function on the basis of duration of diabetes.  $P < 0.05$ . Result concluded that patients who have diabetes for more than 2 years have a significantly decline in cognitive function.

**Table 2:** t-test for TMMSE Score Vs Duration of Diabetes

Duration of Diabetes	TMMSE Base				t-value	P Value
	N	Mean	SD	SE <sub>M</sub>		
Above 2 years	70	21.28	4.66	0.22	2.01	0.04 (Significant)
Below 2 years	430	25.66	3.50	0.42		
TMMSE First Follow up						
Above 2 years	70	21.80	4.60	0.22	2.34	0.03 (Significant)
Below 2 years	430	25.50	3.55	0.42		
TMMSE Second Follow up						
Above 2 years	70	21.02	3.61	0.22	2.62	0.02 (Significant)
Below 2 years	430	25.34	3.64	0.43		



**Figure 2:** Mean score for TMMSE Score on the basis of Duration of Diabetes





## ETHICS COMMITTEE

### M.S.CHELLAMUTHU TRUST & RESEARCH FOUNDATION

(An Institute of Mental Health & Rehabilitation)

(Regn. No. 400/92)

The members present, represented a quorum, being at least 50% plus one of all the members, and having at least one medically qualified person and at least one lay person

Of members present all voted for approval, none voted against. After consideration the committee has approved your study.

The present approval is valid only for 24 months, Research Scholar must take the re approval after 24 months.

The Research Scholar is requested to submit the progress report after 12 months to IEC for review. Any change, modification or deviation in the protocol, must be informed to Ethics committee. Any protocol modification or amendment must receive IEC approval.

It is also confirmed that our ethics committee is constituted and functions as per Good Clinical Practice guidelines issued by Central Drug Standard Control Organization and Ethical guidelines for biomedical research on Human subjects, issued by Indian Council of Medical Research.

*G. Padmini*  
(Dr.G.Padmini)

Chairperson

ETHICS COMMITTEE  
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## DISCUSSION

Present study was done in Kovai Diabetes Speciality Centre & Hospital, Coimbatore. Although several studies have examined the association between cognition and various factors like marital status, duration of diabetes etc which proven significance of the research on impact of these factors on cognitive decline it is clearly evident for better screening points to be initiated during diagnosis of Diabetes for its complications. The increasing incidence of diabetes mellitus in the industrialized world represents one of the most serious challenges facing the medical profession today [7, 8]. With cognitive dysfunction and dementia becoming increasingly prevalent in western populations emphasis on the identification of risk factors and development of primary prevention strategies for promoting cognitive health remains a question mark. With diabetic patients of more than two years of diabetic history, the study has alarmed the diabetic individuals for a potential threat that requires special attention for a proper and stable diabetes care. Cognitive function being a major criterion that alters the self management in diabetic patient's cognition is not considered as a risk factor among diabetic individuals, it is necessary that health care providers impart a more pronounced awareness among diabetic patients regarding the possible effects of cognitive functioning and causes of its decline [9].

There has been some speculation that there is a characteristic personality and family profile in unstable diabetics and (Simonds 1977) has shown that poorly controlled diabetic children have significantly more interpersonal conflicts than well controlled diabetics. It would be necessary to show that stress has relatively larger effects on control in unstable diabetics compared to other factors such as exercise or infection [10, 11].

## CONCLUSION

Evidence of significant decrease in cognitive functioning of diabetic patients with regard to marital status and duration of diabetes impose the importance of many factors that have yet to be identified crucial in management of diabetes and its complications. The rising prevalence of diabetes poses a major clinical, economical and social burden to developing country like India. With long term complications of the diabetes being extremely alarming the health care requires a renewal with regard to individualized patient care in diabetes management with regard to cognitive dysfunction a potential threat among diabetic individuals.

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