

# Association of Age with Montreal Cognitive Assessment Test Scores: A Cross-Sectional Survey

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## ABSTRACT

Old age is characterised by multiple changes in the body. The neurological changes seen in this period are numerous; targeting the executive functions as well. Worsening of these functions can impact quality of life. This study presents secondary analysis of data collected. The mean value of MoCA was found to be  $23.97 \pm 4.09$ ; the median value was 25. The MoCA scores are correlated with age using Spearman's correlation. This showed that as age progresses, MoCA scores reduced. The MoCA values are comparable to previous studies.

**Keywords:** MoCA, neurological changes in ageing, MoCA scores.

## INTRODUCTION

Old age in India is considered to be from 60 years.<sup>[1]</sup> The individual is then termed as a senior citizen. This old age is characterised by multiple changes in the body across all systems.<sup>[2]</sup> The various systems where changes are noted first are the cardio-vascular and the musculoskeletal systems,<sup>[2, 3]</sup> with many elderly individuals receiving medications for conditions related to these two systems.<sup>[2]</sup>

Another major system that undergoes age-related changes is the neurologic system, with various executive functions showing variations. Assessing these functions shows that the results vary from those of a young age group. Executive functions like speech, intelligence, memory, cognition and orientation can change drastically over the years.<sup>[4]</sup> Surrounding environment, physical activity levels, social interactions play a major role in the maintenance of these functions.<sup>[4,5]</sup>

Any worsening of these functions manifests as loss of quality of life and an inability to lead life with complete independence.<sup>[5]</sup> These changes can be part

of the umbrella term dementia or can also be a response to changes in other systems of the body, like loss of orientation which is related to altered electrolytes in the body.<sup>[4]</sup>

The changed executive functions can be assessed using various outcome measures like the Mini mental state examination scale,<sup>[6,7]</sup> the Montreal Cognitive Assessment scale.<sup>[6-10]</sup> Both these scales assess the executive functions of the brain, with items for cognition, memory, basic arithmetic, visuo-spatial perception included in the assessment. Though easy to administer, these scales take up to 10 minutes for the respondent to answer fully. The assessor has to be present throughout the test and in fact has to ask the questions on the test. Though the MMSE has been used extensively in clinical practice, the MoCA is now being shown as a better scale to identify cognitive function and is more sensitive to the presence of impairments.<sup>[6, 7, 11, 12]</sup>

Typically, literature suggests that executive functions worsen with age.<sup>[11, 12]</sup> Indian values have been presented for English as well as non-English language

respondents.<sup>[13, 14, 15]</sup> This article adds to the present base of knowledge regarding MoCA scores of the Indian population.

**MATERIALS AND METHODOLOGY**

This is a secondary analysis of data taken from another project. 366 individuals aged 60 and above, of both genders were

administered the MoCA over a period of two years. Their responses were collected and tabulated in an Excel workbook. A descriptive analysis was performed for these scores. The MoCA scores were then correlated with age using Pearson’s correlation. The correlation was represented using a line chart.

**RESULTS**

**Table 1: Table showing descriptive analysis of MoCA scores.**

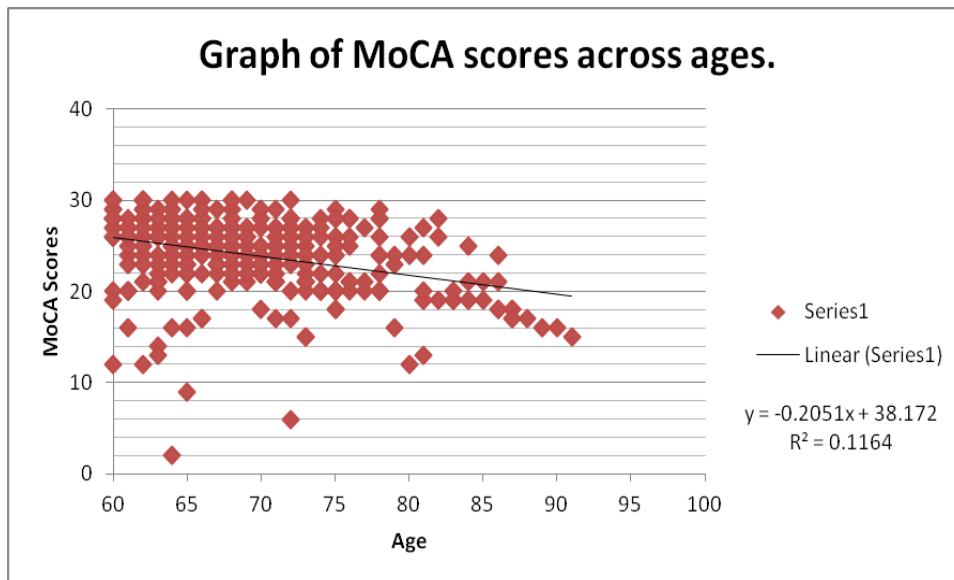
Sr. No.	MoCA scores (n = 366)	Value
1.	Mean	23.97 ± 4.09
2.	Median	25
3.	No. of individuals with MoCA scores above 26 (cut-off scores for MoCA)	216 (59.01%)
4.	No. of individuals with MoCA scores below 26 (cut-off scores for MoCA)	150 (40.98%)

On correlating age with MoCA scores, the following was found:

**Table 2: Table showing descriptive and correlation analysis of age and MoCA scores.**

Sr. No.	Item	Age	MoCA
1.	Mean	69	24
2.	Median	68	25
3.	Mode	68	26
4.	Standard deviation	6.807767	4.093338
5.	Correlation r-value (Instat ver. 3.02)	-0.3247	
6.	95% CIs	-0.4160 to -0.2269	
7.	2-tailed p value for Spearman’s correlation	<0.0001	

*\*Spearman’s correlation used to offset skewing.*



**Graph 1: Graph showing distribution of MoCA scores across ages.**

The graph shows a negative trend of age when correlated with the MoCA scores.

**DISCUSSION**

Montreal Cognitive Assessment test (MoCA) is a tool describing the cognitive status of an individual.<sup>[9]</sup> It has been found to be exceptionally reliable and valid in

older adults.<sup>[10- 15]</sup> It is slowly replacing the MMSE, as a clinical tool of choice to assess mental functions.<sup>[11, 12]</sup>

Neurological changes characteristically seen in old age are

reduction in calculating ability, poor recall of past events and emotional lability. The brain's ability to create new circuits and engrave new patterns reduces. This has an effect on how the brain works during daily activities. The elderly individual might start forgetting things or might not be able to recall the appropriate method of performing tasks.<sup>[2-5]</sup> With a decline in the brain's ability to perform optimally, the individual's physical function reduces. This can lead to a reduction in the familial or societal participation of the individual. The individual will hence have a compromised quality of life.<sup>[2, 3]</sup>

The items of MoCA test for various functions of the brain: perception, simple arithmetic, associations, recall, orientation to time and place.<sup>[9]</sup> Dementia, an umbrella term for conditions in which the brain's cognitive functions are affected, can be reliably identified using the MoCA. The scale's scores can indicate the severity of the affection. In most of these individuals, the severity can be reversed or mitigated with appropriate medical care. The MoCA is very useful to identify mild cognitive impairment.

Various studies that have assessed MoCA have identified a decline in scores as age of the individual increases. These studies have been carried out in different conditions. The mean scores reported by many studies range from 23 to 25.<sup>[11]</sup>

This study reports a mean MoCA score of  $23.97 \pm 4.09$  (Table 1). The median score is 25. These scores are comparable to the scores from other studies.

This study reiterated findings of previous studies: as age progresses, mental function deteriorates. The rate of deterioration might vary for individuals. We also need to consider that medical care, physical activity and diet can play a major role in the brain's functioning.

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