

## A comparative study of cognitive function by using MOCA score and functional physical activity by using 6 minute walk test among elderly diabetic and non-diabetic

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### Abstract

**Introduction and Objective:** The prevalence and incidence of DM increase with aging. DM is associated with increased risk for mild cognitive impairment in elderly and have low exercise capacity in higher age, so it necessitates this study. The objective was to assess, compare and correlate MOCA score and 6 minute walk distance among elderly diabetic and elderly non diabetics.

**Materials and Methods:** This study included 50 cases and 50 controls who fulfilled the inclusion and exclusion criteria. Both cases and control were asked to perform the 6 minute walk test according to American thoracic society guidelines and distance walked in 6 minutes is noted in meters and they were asked to answer some written and oral questionnaire using Montreal cognitive assessment score (MOCA) and score obtained were noted. The distance walked is compared among diabetic and non diabetic elderly by independent 't' test and MOCA score are compared among diabetic and non diabetic elderly using chi square test.

**Results:** The result showed that there is no statistical significant difference in cognitive function assessment by using MOCA score among diabetic and non diabetic elderly (using chi square test, p value =0.41). There is statistical significant difference (with p value < 0.001) in distance walked in 6 min walk test among diabetic and non diabetic elderly. There is no significant correlation between MOCA score and 6 min walk test among the both groups.

**Conclusion:** The cognitive function test by MOCA score is not correlated with the functional physical activity among diabetic and non diabetic elderly population.

**Keywords:** 6 Minute Walk test, Cognitive function test- MOCA, Elderly Diabetic, Elderly Non diabetic.

**Received:** 21<sup>st</sup> June, 2017

**Accepted:** 06<sup>th</sup> February, 2018

### Introduction

Diabetes mellitus is a non communicable disease and it is major global health problem.<sup>1</sup> India is "Diabetes capital of the world".<sup>2</sup> The incidence of diabetes has been increasing because of dramatic change in life styles and combined with longer life span as a result of advances in modern technology. This has brought about increase in the number of elderly diabetics.

According to WHO above 60 years of age are considered as elderly age group and elderly population is expected to be 10% of the total population by 2021 from 6.7% in 1991.<sup>3</sup> Elderly the usually have impaired activity of daily living and cognitive dysfunction which contributes for the huge expenditure in caregiver's. Aging and diabetes together contribute for cognitive dysfunction compared to non diabetic elderly.

Diabetes patients have greater risk of cognitive decline and have greater rate of decline in cognitive functions.

6 min walk test is the functional status test in outpatient clinical setting. This test may be used clinically to measure the impact of multiple comorbidities, including cardiovascular disease, lung disease, arthritis, diabetes and cognitive dysfunction and depression on exercise capacity and endurance in older adults. The 6 minute walk test is a useful assessment instrument for the exercise capacity of the elderly person. The six minute walk test is a valid alternative evaluating the exercise capacity at levels corresponding more to efforts commonly performed by elderly during daily activities. Type 2 diabetes mellitus patients had lower exercise capacities as assessed by the 6 minute walk test than their non diabetic counter parts and this was lower in women, older and obeses. Low exercise capacity in patients with Type 2 diabetes mellitus was associated with higher age.<sup>6,7</sup> It accelerated cognitive decline and increase risk of dementia.<sup>10,11</sup> In elderly there is decrease of muscle power, cognition and exercise capacity.<sup>4</sup>

There is decrease in cognition and exercise capacity in non diabetic elderly and also in

diabetic elderly. So whether cognition and exercise capacity in elderly correlated:

1. Diabetes elderly patients: decrease in exercise capacity<sup>6,7</sup> & cognition.<sup>10,11</sup>
2. Non diabetic elderly: decline in cognition & exercise capacity.<sup>4</sup>

### Objectives

1. To assess and compare the cognitive function using MOCA among diabetic elderly and non diabetic elderly.
2. To assess and compare the 6 minute walk distance in diabetic and non diabetic elderly using 6 minute walk test.
3. To correlate the 6 minute walk distance and MOCA score among diabetic and non diabetic elderly.

### Materials and Methods

It is a cross sectional study. After taking the ethical committee clearance from the institution and informed consent from willing volunteer's cases and controls were selected. Total sample size=100, out of which 50 (25male+25female) were case [diabetic elderly] and 50 (25 male+25female) were control [non-diabetic elderly], matched for both age and gender. Age criteria 60 to 80 years were included. Cases were picked from OPD of K.R.Hospital of MMCRI, Mysore. Control were picked in and around Mysore.

**Inclusion criteria:** Case include diabetic elderly patients since 5 years on treatment, presently not having complications. Control include Non diabetic elderly subjects who have no history of diabetes mellitus .Age > 60 years upto 80 years. Both Male and female subjects are included.

Both the control and case should be literate [English OR Kannada].

**Exclusion criteria:** Patients of hypertension and Cardiovascular disease. History of Head injury, history of drug intake which results in reduction of cognition. Patients of Neurological and psychiatric disorders. Patients of Skeletal deformity, Muscular disorders, Arthritis, Vertigo or Difficulty in maintaining body balance. After general physical examination and clinical examination, if no abnormalities were detected. Assessment of cognitive function using MOCA<sup>13</sup> which is a written and oral questionnaire method of assessing cognition in elderly. Of the score obtained if it is >26 out of 30, then considered to be having normal cognitive function and if <26 score is considered to have mild cognitive impairment.

Subjects are asked to perform the six min walk test .The distance walked in 6 minutes in their own pace in 10 meter wide and 50 meter long flat corridor. It is a single trial without any encouragement, not running just walking in any pace and as per guidelines of American thoracic society.

### Result

The participants comprised of 50 diabetic elderly and 50 non diabetic elderly who's age (p=0.58) and gender(p>0.05) matched. The distance walked in 6 minutes in meters in their own pace in single trial without encouragement is significantly less (p<0.001) in diabetic elderly (375.78±103.6) compared to non diabetic elderly (569.12±105.6). There is no statistical significant difference (P=0.41) observed among the diabetic elderly and non diabetic elderly in cognitive function assessed by MOCA by using Chi square test.

**Table 1: Descriptive Data**

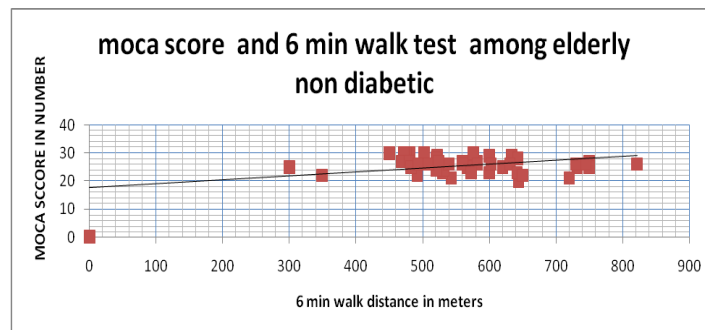
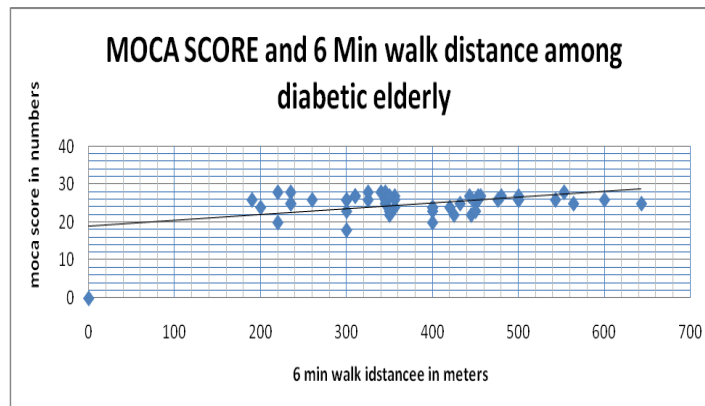
Variable	Diabetic elderly {mean±SD}	Non diabetic elderly {mean±SD}
Age in years	66.9±4.14	66.4±4.89
Weight in kg	54.8±2.56	56.12±3.508
Height in meters	1.528±0.09	1.523±0.07
BMI	23.10±3.11	23.83±2.7
Waist circumference in cm	90.8±5.57	90.78±5.70
Hip circumference in cm	94.98±8.102	95.1±8.2
Waist hip ratio	0.99±0.04	0.957±0.037

**Table 2: MOCA score and 6 minute walk distance among Diabetic elderly and Non diabetic elderly**

Variable	Diabetic elderly	Non diabetic elderly	P value
Mild Cognitive impairment(<26 in MOCA)¶	18	14	0.41 by chisquare test
Normal Cognition (>26 in MOCA) ¶	32	36	
6 minute walked distance in mt	375.78±103.6	569.12±105.6	<0.001* by t – test

\*highly significant ¶ in number of subjects

There is no linear relation between the MOCA score and 6 Min walk distance in meters among diabetic elderly coefficient of correlation  $r = 0.106$  and  $p = 0.45$  and non diabetic elderly co-efficient of correlation  $r = 0.169$  and  $p = 0.24$ .

**Graph 1****Graph 2**

## Discussion

In this study there was no difference among diabetic elderly and non diabetic elderly in cognitive function using MOCA. Diabetes mellitus has been found to be a risk factor for cognitive impairment but with weak significance level amongst urban older adults.<sup>14</sup> It is unclear in which stage of diabetes the cognitive decrements become manifest and how they progress over time.<sup>10</sup> In community dwelling womens, diabetes was related to lower scores on several aspects of cognitive function. Longer duration of diabetes may be associated with

poorer scores, but hypoglycemic therapy may ameliorate scores.<sup>17</sup>

In this study there is significant difference in mean distance walked in 6 minute walk test among diabetic elderly and non diabetic elderly. The distance walked by diabetic elderly is less compared to matched non-diabetic elderly. Low exercise capacity in patients with Type 2 diabetes mellitus associated with higher age was shown when assessed with 6 min walk test.<sup>6</sup> Diabetes mellitus seems to accelerate the decline of submaximal capacity evaluated through the 6 minute walk test.<sup>7</sup> The older T2DM patients compared to the younger ones have significant difference in distance walked in 6 minute walk

test, it could be due to the gradual reduction of skeletal muscle mass and strength that generally occurs with aging.<sup>18</sup>

No correlation between cognitive function {MOCA score} and functional physical activity {6 min walk test} neither in diabetic nor in non-diabetic elderly. Higher levels of aerobic fitness are associated with increased hippocampal volume in older humans, which translates to better memory function.<sup>19</sup> However it is not supported by our study.

## Conclusion

The functional physical activity is decreased in diabetic elderly when compared with non diabetic elderly matched for age and gender.

However So it has to be addressed in the early stage of diabetes and cautious exercise prescription is necessary. However the two most important findings of this study

1. No cognitive impairment in diabetic elderly compared to non diabetic elderly.
2. No correlation between cognitive impairment and functional physical activity.

This is contradicts several previous studies. This need further study with much bigger sample size.

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