Original Research Open Access

Cognitive impairment assessment by Mini cog test in Egyptian elderly patients and the relation with comorbidities and functional impairment

Sweed HS[1], Tawfik HM[1], Mohamed MM[2]

1Geriatric Medicine & Gerontology department, Faculty of Medicine, Ain Shams University, Cairo, Egypt.
2Internal Medicine department- Suez Canal University, Ismailia, Egypt.

Abstract

Background: Mini Cog is a simple screening test for cognitive impairment.

Aim: To assess cognition among Egyptian elderly

Methods: a case control study recruiting 90 patients from Suez Canal University and Ain-Shams University hospitals. Cognitive assessment was performed using Mini cog test and patients were classified into cases and controls according to their performance of the test. History taking and functional assessment were done.

Results: Age of our patients ranged from 62-72.Cases had lower level of education. Stroke, heart failure and hypertension were significantly more prevalent in cases than controls ($p < 0.001$, 0.017, 0.011) respectively. Cases showed lower functional status level when comparing items of activities of daily living (ADL) between cases and controls ($p< 0.001$).

Conclusions: Lower education level, heart failure, hypertension and stroke are associated with cognitive impairment. Impairment of functional activities of daily living can be associated with lower scores in Mini cog test.

Keywords: Mini cog- Heart disease- Function- Elderly- Egyptians

Background

Aging of the population increased dramatically with increasing the incidence of cognitive impairment (CI)[1] . An early detection of CI could lead to early dementia diagnosis, and delay or reversion of cognitive deterioration [2]. The Mini-Cog assessment is a validated very short cognitive assessment measure that was developed as a screening tool for dementia, and it takes about 3 minutes to administer [3]. Mini-Cog is considered a valid tool to detect clinically significant cognitive impairment [4]. Many researches are done now to study the relation between cognitive impairment and cardiovascular diseases. It was found that reduced cerebral blood flow (CBF) due to heart disease of any kind worsens the vascular homeostasis of the brain, and magnifies any cognitive problems caused by the buildup of tau and Aβ proteins. A recent study has shown that dementia patients with a prior history of heart disease are more likely to have structural and functional cardiac abnormalities compared with controls [5]. Different hypotheses have been offered to find a link between hypertension and dementia. These include vascular alterations causing lacunar infarcts and leukoaraiosis, and accumulation of β-amyloid inpatients with hypertension, leading to increase the occurrence of

dementia. More specifically, hypertension may lead to hypoperfusion, or hypoxia of the brain, which can lead to Alzheimer's disease pathology [6,7].

.

Methods

90 patients recruited from Suez Canal University and Ain-Shams University hospitals after approval to participate in the study. Cognitive assessment was done by history taking from the patient and a reliable caregiver and by performing Mini cog test. Mini cog test was performed and patients were classified into cases and controls according to their performance of the test. The test includes three items recall test for memory scored 3 points and clock drawing scored 2 points with a total score out of 5 points [3]

Cases were considered to have cognitive impairment mostly dementia if they had a total score less than 3 points in Mini cog test, whereas controls had good cognitive function with Mini cog score 3-5. Good history taking was done and functional assessment using activities of daily living was done (ADL) [8]. Patients were considered to have hypertension if systolic blood pressure was ≥140 mmHg or diastolic blood pressure was ≥ 90 mmHg or both on two different occasions after complete physical or mental rest, or patients previously informed they have hypertension or receiving treatment for hypertension. Patients were considered to have diabetes mellitus if they have fasting blood sugar ≥ 126 mg/dl on two occasions, HbA1c ≥ 6.5 or were on anti-diabetic medications. Patients who refused to participate and patients with severe dementia were excluded from the study.

Statistical Analysis

Analysis of data performed by using SPSS package version 15.0.

Description of data in the form of mean (M) and standard deviation (SD) for all quantitative variables and frequency and percentage for all qualitative variables. Comparison of qualitative variables was done using chi-square test (X2). Significance levels measured according to P value (probability) P>0.05 insignificant, P<0.05 significant, P<0.01 highly significant.

Results

Our study included 90 elderly patients divided as 45 cases and 45 controls with mean age 65-67. The study included 49 male and 41 female patients as shown in Table 1. Cases had lower level of education, with no one in cases had more than preparatory school education (p 0.030). Table 2 showed that stroke was significantly higher in cases than controls, no one in controls had stroke (p < 0.001). Also heart failure and hypertension were more prevalent in cases (p 0.017, 0.011) respectively, however diabetes mellitus prevalence showed no significant changes between cases and controls. Regarding functional status, cases with impaired cognitive function showed lower functional status level when comparing items of ADL, as shown in Table 3 with highly significantly statistical results (p< 0.001)

Table 1: Demography of the study population

		Cases	Controls
Age Mean ±SD		67± 5	65±3
Sex	Male	25	24
	Female	20	21
Education			
Primary school		44 98.0%	38 85.0%
Prep. school		1 2.0%	5 11.0%
High school		0 0.0%	2 4.0%

Table 2: Comorbidities in cases and controls

Comorbidity	Cases		Controls		p-value
	No.	%	No.	%	
Heart Failure	15	33.0%	5	11.0%	0.017
Hypertension	35	78.0%	23	51.0%	0.011
Diabetes Mellitus	21	47.0%	20	44.0%	0.761
Stroke	12	27.0%	0	0.0%	<0.001

Table 3: Functional status in cases and controls using activities of daily living

Functional assessment Using ADL	Cases		Controls		p-value
	No.	%	No.	%	
Impaired one item of ADL	45	100	22	49	<0.001
Impaired 2 items of ADL	45	100	18	40	<0.001
Impaired more than 2 items of ADL	34	76	10	22	<0.001

Discussion

Like our study, previous studies conducted in developing countries suggest that educational level influences cognitive performance in different neuropsychological tests, especially executive and working memory tasks [9,10.] Our study found that cardiovascular diseases were more prevalent in patients with CI. Hypertension was more prevalent in cases, which is in agreement with Yamada and colleagues who found that elderly individuals with increased hypertension and SBP had increased risk of vascular dementia [11.] Also heart failure (HF) was significantly associated with cognitive impairment which is a finding of many studies, reporting that HF is associated with both cognitive impairment and dementia [12, 13]. In HF, low cardiac output may result in decreased CBF and is also a risk factor for multiple cerebral emboli, which could lead to cognitive impairment and dementia [14,15.] We didn't find a relation between diabetes mellitus prevalence and cognitive impairment. This can be explained by the small sample size of our study. Stroke is a well-known risk factor for vascular cognitive impairment and vascular dementia as found in our study and previous studies [16,17.] Mini-Cog scores were related to functional indicators using ADLs. Cognitive impairment assessed by the Mini-Cog is a more powerful predictor of impaired ADLs than disease burden in older adults [18.]

Conclusion:

Lower education level, the presence of heart failure, hypertension and stroke are associated with cognitive impairment. Impairment of functional activities of daily living also can be associated with lower scores in Mini cog test.

References

1-Luck T, Luppa M, Briel S, Riedel-Heller SG. Incidence of mild cognitive impairment: a systematic review. *Dementia and Geriatric Cognitive Disorders*. 2010;29(2):164–175.

2-Etgen T, Sander D, Bickel H, Förstl H. Mild cognitive impairment and dementia: the importance of modifiable risk factors. *Deutsches Arzteblatt International*. 2011;108(44):743–750.

3-Borson S, Scanlan JM, Chen P, Ganguli M. The Mini-Cog as a screen for dementia: validation in a population-based sample. *J Am Geriatr Soc*. 2003;51:1451–1454.

4-Borson S, Scanlan JM, Watanabe J, Tu SP, Lessig M. Simplifying detection of cognitive impairment: comparison of the Mini-Cog and Mini-Mental State Examination in a multiethnic sample. *J Am Geriatr Soc*. 2005;53:871–874.

5-Reitz C, Brickman AM, et al. Frequency of subclinical heart disease in elderly persons with dementia. Am J Geriatr Cardiol. 2007; 16(3):183–188.

6-Kalback W, Esh C, Castaño EM, et al. Atherosclerosis, vascular amyloidosis and brain hypoperfusion in the pathogenesis of sporadic Alzheimer's disease. Neurol Res. 2004;26:525–539.

7- Hoffman LB, Schmeidler J, Lesser GT, et al. Less Alzheimer disease neuropathology in medicated hypertensive than nonhypertensive persons. Neurology. 2009;72(20):1720–1726.

8-Katz S, Ford AB and Moswowitz RW.Studies of illness in the aged the index of ADL: Standardized measure of biological and psychological function, JA.A. 1963; 185-914.

9- Jorm AF, Korten AE.Assessment of cognitive decline in the elderly by informant interview. Br J Psychiatry.1988;152:209–13.

10- Foss MP, Vale Fde A, Speciali JG. Influence of education on the neuropsychological assessment of the elderly: Application and analysis of the results from the Mattis dementia rating scale (MDRS) Arq Neuropsiquiatr.2005;63:119–26.

11-Yamada M, Kasagi F, Sasaki H, Masunari N, Mimori Y, Suzuki G. Association between dementia and midlife risk factors: the Radiation Effects Research Foundation Adult Health Study. J Am Geriatr Soc. 2003;51:410–414.

12- Lavery L, Vander Bilt J, Chang CC, Saxton JA, Ganguli M. The association between congestive heart failure and cognitive performance in a primary care population of elderly adults: the Steel Valley Seniors Survey. *Int Psychogeriatr*. 2007;2:215–225.

13- Sauve MJ, Lewis WR, Blankenbiller M, Rickabaugh B, Pressler SJ. Cognitive impairments in chronic heart failure: a case controlled study. *J Card Fail*. 2009;15:1–10.

14-Jefferson AL, Poppas A, Paul RH, Cohen RA. Systemic hypoperfusion is associated with executive dysfunction in geriatric cardiac patients. Neurobiol Aging. 2007;28(3):477–483.

15-Triposkiadis F, Karayannis G, Giamouzis G, Skoularigis J, Louridas G, Butler J. The sympathetic nervous system in heart failure. Physiology, pathophysiology, and clinical implications. J Am Coll Cardiol. 2009;54(19):1747–1762.

16- Kirsch W, McAuley G, Holshouser B, Petersen F, Ayaz M, Vinters HV, Dickson C, Haacke EM, Britt W 3rd, Larseng J, Kim I, Mueller C, Schrag M, Kido D. Serial susceptibility weighted MRI measures brain iron and microbleeds in dementia. J Alzheimers Dis. 2009;17:599–609.

17- Lee DY, Fletcher E, Martinez O, Ortega M, Zozulya N, Kim J, Tran J, Buonocore M, Carmichael O, DeCarli C. Regional pattern of white matter microstructural changes in normal aging, MCI, and AD. Neurology. 2009;73:1722–1728.

18-Scanlan JM, Binkin N, Michieletto F, Lessig M, Zuhr E, Boorson S. Cognitive Impairment, chronic Disease Burden, and functional Disability: a population Study of older Italians, Am J Geriatr Psychiatry.2007; 15(8):716-24.