

Original Research Article

Prevalence of Mild Cognitive Impairment and Dementia in Saudi Arabia: A Community-Based Study

Muath Alkhunizan · Abdullah Alkhenizan · Loay Basudan

Department of Family Medicine and Polyclinics, King Faisal Specialist Hospital and Research Centre, Riyadh, Kingdom of Saudi Arabia

Keywords

Cross-sectional studies · Dementia · Mild cognitive impairment · Neurocognitive disorders · Saudi Arabia · Montreal Cognitive Assessment

Abstract

Introduction: The age of the population in Saudi Arabia is shifting toward elderly, which can lead to an increased risk of mild cognitive impairment (MCI) and dementia. **Objective:** The aim of this study is to determine the prevalence of cognitive impairment (MCI and dementia) among elderly patients in a community-based setting in Riyadh, Saudi Arabia. **Methods:** In this cross-sectional study, we included patients aged 60 years and above who were seen in the Family Medicine Clinics affiliated with King Faisal Specialist Hospital and Research Centre. Patients with delirium, active depression, and patients with a history of severe head trauma in the past 3 months were excluded. Patients were interviewed during their regular visit by a trained physician to collect demographic data and to administer the validated Arabic version of the Montreal Cognitive Assessment (MoCA) test. **Results:** One hundred seventy-one Saudi patients were recruited based on a calculated sample size for the aim of this study. The mean age of included sample was 67 ± 6 years. The prevalence of cognitive impairment was 45%. The prevalence of MCI was 38.6% and the prevalence of dementia was 6.4%. Age, low level of education, hypertension, and cardiovascular disease were risk factors for cognitive impairment. **Conclusion:** Prevalence of MCI and dementia in Saudi Arabia using MoCA were in the upper range compared to developed and developing countries. The high rate of risk factors for cognitive impairment in Saudi Arabia is contributing to this finding.

© 2018 The Author(s)
Published by S. Karger AG, Basel

Abdullah Alkhenizan
Consultant, Family Medicine
King Faisal Specialist Hospital and Research Centre
MBC 62, PO Box 3354, Riyadh 11211 (Saudi Arabia)
E-Mail Alkhenizan@kfshrc.edu.sa

Introduction

The age of the Saudi population is shifting toward elderly. In 2016, the number of people over 60 years of age was 1.3 million (6.5 percent) and by 2050, this age group will exceed 10 million, representing 25% of the total population [1, 2]. In addition, the life expectancy in the country is expected to move from 74 to 82 years [1]. With this rise in longevity, the risk of developing cognitive impairment is expected to increase [3]. Moreover, the prevalence of dementia worldwide is expected to triple over the next two decades [4].

Mild cognitive impairment (MCI) is a transitional stage prior to dementia, with preserved daily life activities [5]. The annual conversion rate to dementia reaches up to 20% [6]. Early diagnosis of dementia can help in slowing the progress of the disease, which can result in significant benefits for both the patient and the caregiver [7].

The studies evaluating prevalence of dementia and MCI in Arab countries and the Gulf region is scarce. There are no published studies about the prevalence of MCI and dementia in Saudi Arabia. Our aim in this study is to evaluate the prevalence of MCI and dementia using a validated Arabic version of the Montreal Cognitive Assessment (MoCA) test [8, 9]. In addition, we aim to identify important risk factors for MCI and dementia among the Saudi population.

Materials and Methods

In this cross-sectional study, patients were recruited from the Family Medicine Clinics affiliated with King Faisal Specialist Hospital and Research Centre (KFSHRC) during the patients' regular visit. We included male and female individuals aged 60 years and above. Patients with delirium, active depression, and patients with a history of severe head trauma in the past 3 months were excluded. Verbal consent was obtained from all participants and the study was approved by the Institution Review Board and Ethics Committee at KFSHRC.

The MoCA instrument is one of the validated instruments for the screening and diagnosis of MCI and dementia. In addition, the Arabic version of MoCA that we used was validated [9]. MoCA score ranges between 0 and 30. One point is added if years of education are less than 12 years. Scores below 26 and 17 indicate MCI and dementia, respectively [7, 10, 11]. Permission for using MoCA has been granted by the author group. The MoCA questionnaire was completed by a trained physician for each included patient.

Our sample size was calculated based on an estimated prevalence of MCI of 20% [12], with type I error rate of 5% and 95% confidence with 6% error margin. The required sample size was 171 patients.

The investigators explained the study for each participant and obtained their verbal consent. If the patient agreed to participate in the study, one of the investigators (M.A.) interviewed the patient and filled out a questionnaire about their demographic data and medical history, and then administered the validated Arabic version of the MoCA test.

Statistical Analysis

All statistical analysis of data was done by using the software package SPSS, version 20. Descriptive statistics for the continuous variables were reported as means and standard deviations, and categorical variables were summarized as frequencies and percentages. Continuous variables were compared using the Student *t* test, while categorical variables were compared using the χ^2 test. Regression was used to evaluate potential risk factors for cognitive impairment. The level of statistical significance was set at $p < 0.05$.

Table 1. Study population demographics and characteristics ($n = 171$)

Demographics	Number	Percentage
Gender		
Male	97	56.7
Female	74	43.3
Marital status		
Single	1	0.6
Married	129	75.4
Widowed	30	17.5
Divorced	11	6.4
Education		
Illiterate	40	23.4
Educated	131	76.6
Education years		
1–6 years	34	19.9
>7 years	97	56.7
Occupation		
Employed	9	5.3
Self-employed	16	9.4
Retired	75	43.9
Unemployed	70	40.9
Location of living		
Urban	161	94.2
Rural	10	5.8
Living status		
Alone	3	1.8
With family	167	97.7
Memory complaints		
Yes	64	37.4
No	107	62.6
Personal assistance		
Yes	11	6.4
No	159	93.0
Family history of dementia		
Yes	20	11.7
No	151	88.3

Results

The study included 171 subjects, 57% of them were males and 43% were females. We found that 23% of subjects were illiterate. Almost a third of the subjects had memory problem complaints, 12% had a positive family history of dementia, and about 7% of the subjects had personal assistance (Table 1).

The prevalence of several risk factors for dementia (Table 2) was high among the included sample. Hypertension prevalence was 75%, diabetes was 60%. Using regression analysis (Table 3), we found age, low level of education, hypertension, and cardiovascular disease to be important risk factors for cognitive impairment.

Using MoCA standard cutoff point less than 26 for MCI and 17 for dementia showed that 46 and 26% of included subjects had MCI and dementia, respectively. Overall, the prevalence of cognitive impairment was 72.5% based on the standard MoCA cutoff point. The original validation of the MoCA score was conducted in a highly educated population. To adjust for the level of education, a validated education-adjusted cutoff score was applied in our study [13].

Table 2. Prevalence of risk factors among participants (*n* = 171)

Risk factors	Number	Percentage
Chronic diseases		
Yes	167	97.7
No	4	2.3
Hypertension		
Yes	127	74.3
No	44	25.7
Diabetes		
Yes	103	60.2
No	68	39.8
Dyslipidemia		
Yes	103	60.2
No	68	39.8
COPD		
Yes	3	1.8
No	168	98.2
Coronary artery diseases		
Yes	23	13.5
No	148	86.5
Hypothyroidism		
Yes	31	18.1
No	140	81.9
Obesity		
Yes	59	34.5
No	112	65.5
Smoking		
Yes	14	8.2
No	157	91.8

Table 3. Regression analysis of important risk factors of dementia (*n* = 171)

	<i>p</i> value	OR
Demographics		
Age	0.005	1.077
Marital status	0.624	1.101
Education years	0.025	0.949
Location of living	0.334	1.901
Personal assistance	0.014	13.731
Family history of dementia	0.998	0.999
Risk factors		
Chronic diseases	0.431	2.505
Hypertension	0.018	2.422
Diabetes	0.611	1.174
Dyslipidemia	0.289	0.717
COPD	0.462	2.480
Coronary artery diseases	0.041	2.601
Stroke	0.039	9.300
Hypothyroidism	0.702	0.858
Depression	0.473	0.595
Obesity	0.432	1.289
CKD	0.059	7.859
Smoking	0.865	0.908

The adjusted cutoff points for MCI were less than 14 for illiterate individuals, less than 20 for individuals with 1–6 years of education, and less than 25 for individuals with 7 or more years of education. The adjusted cutoff scores for dementia were less than 9 for illiterate individuals, less than 13 for individuals with 1–6 years of education, and less than 16 for individuals with 7 or more years of education. Based on the level of education-adjusted score, the prevalence of MCI and dementia was 38.6 and 6.4%, respectively, and the overall prevalence of cognitive impairment was 45%.

Discussion

The prevalence of dementia and MCI differs worldwide because of multiple factors including the variation of educational levels, and the prevalence of other important risk factors of dementia [14, 15]. The estimated global prevalence of dementia in elderly above the age of 60 is 5–7% [16]. On the other hand, the prevalence of MCI ranges between 10 and 20% [17]. Regionally, the prevalence of cognitive impairment for both dementia and MCI among Arabic speaking populations are substantially varied and ranges between 4.4 and 32% [18–20]. This is the first study evaluating the prevalence of cognitive impairment in a community-based setting in Saudi Arabia and the region using MoCA.

Age, low level of education, smoking, obesity, diabetes mellitus, hypertension, and high cholesterol are all considered risk factors for dementia [21]. Data from Saudi Arabia shows high prevalence of these risk factors [12]. Among the general adult population, the prevalence of hypertension and hypercholesterolemia is estimated to be 26 and 50%, respectively [22, 23]. In addition, obesity is a major health issue in Saudi Arabia with very high prevalence reaching up to 35% [24]. Furthermore, diabetes mellitus prevalence is 23% [25]. The prevalence of hypertension and diabetes in our study is consistent with the morbidity profile among the elderly population in Saudi Arabia as reported in other studies [26]. In the Arabic validation study, the prevalence of cognitive impairment was 34 and 44% for male and female subjects, respectively [9].

It has been consistently suggested that one cutoff point is not ideal, especially for educationally diverse population. Even more, level of education is considered one of the strongest factors affecting MoCA score [13]. In our study, the level of illiteracy is significantly higher than in the original study validating MoCA and the Arabic MoCA validation study. The illiteracy rate among the included sample is matching the illiteracy rate among the general elderly population in Saudi Arabia [2].

The mean age in our study is lower than the mean age of other studies evaluating the prevalence of cognitive impairment in other countries. The worldwide prevalence of dementia among the general population for the same age group as in our study is 4%, while it is 6.4% in our study.

Finally, MCI and dementia prevalence in our study were higher than the worldwide figures. This high prevalence of cognitive impairment despite the included relatively young elderly population is related to the high level of illiteracy and the high prevalence of risk factors of dementia. There is a need to control risk factors of cognitive impairment in Saudi Arabia such as diabetes, hypercholesterolemia, and hypertension; otherwise the prevalence of dementia could increase significantly in the country as the aging population increases.

Acknowledgments

We would like to thank Ms. Suad Alsoghayer and Mr. Abdelmoneim Eldali for their great support and help.

Disclosure Statement

The authors declare no conflict of interest.

References

- Abusaaq H: Population Aging in Saudi Arabia [Internet]. 1st ed. Economic Research Department, Saudi Arabian Monetary Agency; 2015 (cited July 12, 2017). Available from: <http://www.sama.gov.sa/en-US/EconomicResearch/WorkingPapers/population%20aging%20in%20saudi%20arabia.pdf>.
- Demographic Survey 2016 (Internet). The General Authority for Statistics. 2016 (cited July 12, 2017). Available from: https://www.stats.gov.sa/sites/default/files/en-demographic-research-2016_2.pdf.
- Batum K, Çınar N, Şahin Ş, Çakmak M, Karşıdağ S: The connection between MCI and Alzheimer disease: neurocognitive clues. *Turk J Med Sci* 2015;45:1137–1140.
- Norton S, Matthews F, Barnes D, Yaffe K, Brayne C: Potential for primary prevention of Alzheimer's disease: an analysis of population-based data. *Lancet Neurol* 2014;13:788–794.
- Lin J, O'Connor E, Rossom R, Perdue L, Eckstrom E: Screening for cognitive impairment in older adults: a systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med* 2013;159:601–612.
- Etgen T, Sander D, Bickel H, Förstl H: Mild cognitive impairment and dementia: the importance of modifiable risk factors. *Dtsch Arztebl Int* 2011;108:743–750.
- Mukadam N, Cooper C, Kherani N, Livingston G: A systematic review of interventions to detect dementia or cognitive impairment. *Int J Geriatr Psychiatry* 2014;30:32–45.
- Nasreddine Z, Phillips N, Bédirian V, Charbonneau S, Whitehead V, Collin I, et al: The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *J Am Geriatr Soc* 2005;53:695–699.
- Rahman T, El Gaafary M: Montreal Cognitive Assessment Arabic version: reliability and validity prevalence of mild cognitive impairment among elderly attending geriatric clubs in Cairo. *Geriatr Gerontol Int* 2009;9:54–61.
- Horton D, Hynan L, Lacritz L, Rossetti H, Weiner M, Cullum C: An Abbreviated Montreal Cognitive Assessment (MoCA) for Dementia Screening. *Clin Neuropsychol* 2015;29:413–425.
- Trzepacz P, Hochstetler H, Wang S, Walker B, Saykin A: Relationship between the Montreal Cognitive Assessment and Mini-Mental State Examination for assessment of mild cognitive impairment in older adults. *BMC Geriatr* 2015;15:107.
- Memish Z, Jaber S, Mokdad A, AlMazroa M, Murray C, Al Rabeeah A: Burden of disease, injuries, and risk factors in the Kingdom of Saudi Arabia, 1990–2010. *Prev Chronic Dis* 2014;11:E169.
- Lu J, Li D, Li F, Zhou A, Wang F, Zuo X, et al: Montreal Cognitive Assessment in detecting cognitive impairment in Chinese elderly individuals: a population-based study. *J Geriatr Psychiatry Neurol* 2011;24:184–190.
- Rizzi L, Rosset I, Roriz-Cruz M: Global epidemiology of dementia: Alzheimer's and vascular types. *Biomed Res Int* 2014;2014:908915.
- Sachs-Ericsson N, Blazer D: The new DSM-5 diagnosis of mild neurocognitive disorder and its relation to research in mild cognitive impairment. *Aging Ment Health* 2015;19:2–12.
- Prince M, Bryce R, Albanese E, Wimo A, Ribeiro W, Ferri C: The global prevalence of dementia: a systematic review and metaanalysis. *Alzheimers Dement* 2013;9:63–75.e2.
- Langa K, Levine D: The diagnosis and management of mild cognitive impairment. *JAMA* 2014;312:2551.
- Sweed H, Elawam A: Cognitive impairment among residents of elderly homes in Cairo, Egypt. *Middle East J Psychiatry Alzheimers* 2010;1:15–20.
- Afgin A, Massarwa M, Schechtman E, Israeli-Korn S, Strugatsky R, Abufel F, et al: High prevalence of mild cognitive impairment and Alzheimer's disease in Arabic villages in northern Israel: impact of gender and education. *J Alzheimers Dis* 2012;29:431–439.
- Zaitoun A, Al Ma'moun A, Sarhan M, Selim A, Mousa G: Epidemiological study of dementia after retirement. *Egypt J Neurol Psychiat Neurosurg* 2008;45:65–74.
- Alzheimer's Association: 2015 Alzheimer's disease facts and figures. *Alzheimers Dement* 2015;11:332–384.
- Al-Nozha MM, Arafah MR, Al-Maatouq MA, Khalil MZ, Khan NB, Al-Marzouki K, Al-Mazrou YY, Abdullah M, Al-Khadra A, Al-Harhi SS, Al-Shahid MS, Al-Mobeireek A, Noh MS: Hyperlipidemia in Saudi Arabia. *Saudi Med J* 2008;29:282–287.
- Al-Nozha MM, Abdullah M, Arafah MR, Khalil MZ, Khan NB, Al-Mazrou YY, Al-Maatouq MA, Al-Marzouki K, Al-Khadra A, Noh MS, Al-Harhi SS, Al-Shahid MS, Al-Mobeireek A: Hypertension in Saudi Arabia. *Saudi Med J* 2007;28:77–84.
- Al-Nozha MM, Al-Mazrou YY, Al-Maatouq MA, Arafah MR, Khalil MZ, Khan NB, Al-Marzouki K, Abdullah MA, Al-Khadra AH, Al-Harhi SS, Al-Shahid MS: Obesity in Saudi Arabia. *Saudi Med J* 2005;26:824–829.
- Al-Nozha MM, Al-Maatouq MA, Al-Mazrou YY, Al-Harhi SS, Arafah MR, Khalil MZ, Khan NB, Al-Khadra A, Al-Marzouki K, Noh MS, Abdullah M, Attas O, Al-Shahid MS, Al-Mobeireek A: Diabetes mellitus in Saudi Arabia. *Saudi Med J* 2004;25:1603–1610.
- Al-Modeer M, Hassanien N, Jabloun C: Profile of morbidity among elderly at home health care service in Southern Saudi Arabia. *J Family Community Med* 2013;20:53–57.