JAMDA xxx (2016) 1–5

JAMDA

journal homepage: www.jamda.com

Original Study

Cognitive Impairment Is Very Common in Elderly Patients With Syncope and Unexplained Falls

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Keywords:
Syncope
fall
cognitive disorder
mini-mental state examination
montreal cognitive assessment

A B S T R A C T

Objectives: To evaluate the prevalence of cognitive impairment (CI), including mild CI and dementia, in elderly patients with syncope and unexplained falls. In this population, we compared the use of the Mini-Mental State Examination (MMSE) with a cognitive screening test that assesses executive dysfunction typical of subcortical (vascular) CI, that is, the Montreal Cognitive Assessment (MoCA).
Design: Observational cohort study.
Setting: Outpatient fall and syncope clinic.
Participants: Consecutive patients aged ≥65 years with syncope and unexplained falls without loss of consciousness.
Measurements: Baseline characteristics, functional status, MMSE, MoCA, and magnetic resonance imaging scans of the brain. Main outcome: prevalence of CI, comparing the MMSE with the MoCA. CI was defined as an MMSE/MoCA score <26. Secondary outcomes: MMSE/MoCA overall and subdomain scores, Fazekas and medial temporal lobe atrophy scores.
Results: We included 200 patients, mean age 79.5 (standard deviation 6.6) years (Syncope Group: n = 101; Fall Group: n = 99). Prevalence of CI was 16.8% (MMSE) versus 60.4% (MoCA) in the Syncope Group ($P < .001$) and 16.8% (MMSE) versus 56.6% (MoCA) in the Fall Group ($P < .001$). Prevalence of CI did not differ between the Syncope Group and Fall Group with either method. Executive dysfunction was present in both groups.
Conclusion: CI is as common in elderly patients with syncope as it is in patients with unexplained falls, with an overall prevalence of 58%. The MMSE fails as a screening instrument for CI in these patients, because it does not assess executive function. Therefore, we recommend the MoCA for cognitive screening in older patients with syncope and unexplained falls.

Syncope is defined as a transient loss of consciousness (T-LOC) due to transient global cerebral hypoperfusion characterized by rapid onset, short duration, and spontaneous complete recovery.[1] From the age of 70, its incidence increases rapidly, up to 81.2 per 1000 patient-years ≥80 years of age.[2] Falls are even more common, with 32% to 42% of persons aged >70 years falling each year.[3]

Cognitive impairment (CI), including mild CI and dementia, is present in 19% of the general population aged ≥75 years.[4] CI is a known risk factor for falling,[5–10] and some studies suggest vice versa that recurrent falling may result in cognitive decline.[11,12] Whether a similar relationship exists between CI and syncope remains unclear. To our knowledge, only 1 study reported poor cognitive performance in patients with a history of falls and/or syncope, but this study did not make a distinction between patients with and without T-LOC.[13]

It is not unlikely that a relationship between syncope and CI exists, since there is a large overlap between syncope and falls.[14] Syncope often presents as a fall, especially if not witnessed, because of loss of muscle tone and retrograde amnesia following T-LOC. On the other hand, moderate hemodynamic changes in elderly patients with gait and balance disturbances may result in falls but not full syncope.[14–17] A common cause may therefore be to

The authors declare no conflicts of interest.

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http://dx.doi.org/10.1016/j.jamda.2016.11.012
1525-8610/

blame for both these conditions, and this common cause might also be the cause of CI.

The object of our study was to investigate the prevalence of CI in elderly syncope patients, compared with patients presenting with unexplained falls without T-LOC. Because CI interferes with the diagnostic process and interventions to prevent recurrence in fall and syncope patients, it is important that clinicians screen for its presence. There are several screening instruments for CI available. The widely used Mini-Mental State Examination (MMSE) is composed of 11 items, testing 5 subdomains (memory, orientation, attention, language, and visual construction).[18] Because it does not include executive functions, the MMSE may not identify subcortical CI, typical of vascular disorders. The Montreal Cognitive Assessment (MoCA) evaluates 6 subdomains (memory, orientation, attention, language, visuospatial, and executive function), using 12 items.[19] It has a higher sensitivity to identify CI in vascular disease than the MMSE.[20,21] Because cardiovascular causes of syncope are common in the elderly,[17,22] the MoCA might be more useful than the MMSE to screen for CI in this population. The second objective of our study was therefore to compare the use of the MMSE with the MoCA in a population with unexplained falls and syncope.

Methods

We conducted an observational cohort study at the Fall and Syncope Day Clinic (FSC) of the Northwest Clinics, Alkmaar, the Netherlands, including consecutive fall and syncope patients aged ≥65 years from November 2011 until the end of May 2014. Specific patient consent and ethical board approval were not requested, because this study used archival data of standard geriatric evaluations and had no implications on therapeutic decisions. No sensitive patient data were used.

The FSC is a multidisciplinary diagnostic pathway for elderly patients with unexplained falls and/or syncope, involving geriatricians, cardiologists, and neurologists. Details of this 2-day program have been published earlier.[14] In short, patients underwent a comprehensive geriatric assessment, including medical history, eyewitness account if available, medication review, and physical examination. A nurse practitioner and physiotherapist investigated mental, nutritional, and functional state. We assessed cognitive function with the MMSE and MoCA. Additionally, laboratory tests, blood pressure measurements for orthostatic and postprandial hypotension, and cardiac evaluation, including a 12-lead electrocardiogram, were performed. On indication, patients were seen by the cardiologist, neurologist, dietician, and/or old age psychiatrist.

A magnetic resonance imaging (MRI) scan of the brain was performed in all patients unless contraindicated, and evaluated by a radiologist who was unaware of the patient's cognitive function. Hippocampal atrophy (a biomarker for Alzheimer disease) was measured by the medial temporal lobe atrophy (MTA) score.[23] White matter abnormalities (a sign of intracerebral vascular disease) were visually rated using the Fazekas score.[24]

After the full evaluation, the final diagnosis and advice for treatment were devised in the multidisciplinary team, based on all available information. Based on their final diagnosis, patients were divided in the syncope group (SG) and the fall group (FG). The first group contained all patients with T-LOC according to the definition of the European Society of Cardiology.[1] The latter was composed of patients with unexplained falls without T-LOC. Patients without a fall or syncope were excluded.

Baseline characteristics (age, comorbidities, medication use, and functional status) of the SG and FG were compared. Primary study outcome was the prevalence of CI in both groups. This included both dementia and mild CI. We compared the prevalence of CI using the MMSE with the prevalence of CI using the MoCA. A MoCA score <26 has previously been defined as mild CI.[19] The MMSE cut-off score for mild CI is less clear, with cut-offs between <24 and <29 being used.[25] However, a cut-off score of <24 has also been used for screening for dementia. For the purpose of this study, we therefore used a cut-off score of <26 to screen for any form of CI.

Secondary outcomes included MMSE and MoCA overall and subdomain scores. To assess whether CI resulted from dysfunction on certain subdomains, we calculated equivalent scores for each item on the MMSE and MoCA by converting scores into percentages of the maximum possible score on each item.

Finally, we compared Fazekas and MTA scores between the different subgroups.

Statistical Analysis

Statistical analyses were performed using SPSS for Windows, version 20 (SPSS, Inc, Chicago, IL). Characteristics of patients were compared using Student *t* test (continuous variables), Mann–Whitney *U* test (ordinal variables), and Pearson χ^2 test or Fisher exact test when indicated (nominal variables). The difference between MMSE and MoCA in diagnosing CI was analysed with the McNemar test. Two-tailed *P* values <.01 were considered statistically significant, to control for the effect of multiple comparisons.

Results

Out of 262 consecutive patients, 34 patients were excluded because they experienced no fall or syncope. Six patients did not complete the MMSE, and 22 did not complete the MoCA; these patients were also excluded from further analysis. Therefore, 200 patients were included in the current study: 101 syncope patients (SG) and 99 fall patients without T-LOC (FG), as shown in Figure 1.

Baseline characteristics of both groups are shown in Table 1. We included a very elderly population (mean age 79.5, standard deviation [SD] 6.6 years), which mainly consisted of females (71%), with multiple comorbidities (mean 10.8, SD 4.9), as would be expected in a geriatric outpatient community. No significant differences were found between the SG and FG, except for dependence in instrumental activities of daily living (IADL), which was more common in the SG than the FG (41.6% vs 25.3%, $P = .01$). Table 2 shows medication use in our patients. The FG used more vitamin supplements than the SG (46.5% vs 27.7%, $P = .006$). It is of note that 98% (99 patients) of the SG also experienced a fall.

Cognitive Impairment

Prevalence of CI in the SG was 16.8% (MMSE) versus 60.4% (MoCA) ($P < .001$), and 16.8% (MMSE) versus 56.6% (MoCA) in the FG ($P < .001$). Prevalence of CI did not differ between the SG and FG with the MMSE ($P = .34$) or the MoCA ($P = .58$). Prior to the FSC visit, CI had been diagnosed in 7.9% (SG) versus 7.1% (FG) ($P = .82$). Figure 2 shows the results of cognitive screening with the MMSE versus the MoCA in the SG and FG.

Patients with and those without CI did not significantly differ in baseline characteristics. CI patients were more often IADL dependent compared with cognitively intact patients, but this was not statistically significant (39.3% vs 25.3%, $P = .04$). Likewise, there was a trend toward lower Tinetti scores for balance and gait[26] ($P = .04$) and higher timed get up and go scores[27] ($P = .02$) in CI patients. We found a (nonsignificantly) higher use of psychoactive medication in cognitively intact patients compared with CI patients (37.4 % vs 23.9 %, $P = .04$), which was explained by a significant difference in benzodiazepine use: 32.5% (cognitively intact patients) versus 15.4% (CI patients) ($P < .001$).