



Nutritional Status and Progression of Dementia

The Cache County Dementia Progression Study



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Abstract

Background. Few studies have examined nutritional status (i.e. well-nourished, risk for malnutrition, or malnourished), and its association with the progression of dementia after its onset. A large multi-center French study reported that malnourished Alzheimer's patients declined more rapidly in a one-year follow-up. Here, we investigate the relationship between nutritional status and dementia progression in a U.S. population-based sample.

Methods. We assessed 264 individuals with dementia (72% AD, 54% female) annually for up to 7.7 years. Mean (SD) ages of participants were 85.44 (5.60). At baseline and annual follow-ups, cognition was assessed with the Mini-Mental State Exam and functional ability with the Clinical Dementia Rating Sum of Boxes (CDR-sb). Nutritional status was assessed using a modified Mini Nutritional Assessment (mMNA), a well-established questionnaire commonly used to screen and assess malnutrition and risk of malnutrition in older adults. In linear mixed models, we examined change in mMNA over time, and its association with cognitive and functional decline in dementia. Covariates tested in all models included gender, education, dementia type, age of dementia onset, and dementia duration at baseline.

Results. mMNA scores declined over time by approximately 0.50 points/year. Worse mMNA scores were associated with female gender, greater dementia onset age and dementia duration, non-AD dementia and worse overall health. Controlling for dementia duration at first visit and presence of 1+ APOE E4 allele, lower mMNA predicted a .10 point/year faster cognitive decline on the MMSE ($p = 0.0277$, $\beta = 0.10$). In the functional domain and controlling for dementia duration and dementia type, mMNA was associated with worse (higher) CDR-sb scores. Every 1-unit increase on the mMNA, corresponded to a .44 point higher score on CDR-sb.

Conclusions. Assessment of risk for malnutrition is useful in predicting rates of decline in cognitive and functional domains in persons with dementia. Future research will examine mMNA components that are most predictive of dementia progression.

Introduction

- Nutrition is one of many lifestyle factors correlated with the development and expression of dementia
- Researchers have examined the relationship between nutritional status (i.e. well-nourished, risk for malnutrition, and malnourished) and progression of dementia, but the findings have been mixed
- While some research suggests that level of malnourishment is significantly associated with cognitive decline in people with dementia^{1,2}, other research suggests these two variables are not related^{3,4}
- Additionally, malnutrition has been correlated with worse functional decline^{2,4}.
- The current study examines the relationship between nutritional status and both cognitive and functional symptoms of dementia.

Methods

Participants:

• Persons enrolled in the Dementia Progression Study⁵ (DPS) who were diagnosed with dementia from the The Cache County Memory Study⁶. DPS is a population-based study of the course of dementia and modifying factors.

Procedures:

• DPS researchers visited participants and caregivers approximately every 6 mos, administering neuropsychological testing and other clinical measures. Nutritional status was assessed annually and data from these visits were used.

Measures:

Nutritional status

• Modified Mini Nutritional Assessment (mMNA): modified from the Mini Nutritional Assessment⁷ (MNA), a well-established assessment of nutritional status in the elderly

• The MNA is a 30-pt assessment of malnutrition using rubrics of anthropometric, dietary, medical, and subjective items. Threshold values: ≤ 17 =malnourished, 17-23.5=risk for malnutrition, ≥ 24 =well-nourished.

• The mMNA excludes items (presence of severe dementia or depression & subjective view of nutritional status) that are associated with severity of dementia. New threshold values (22 pt max): < 12.5 =malnourished, 13-17.5=risk for malnutrition, ≥ 17.5 =well-nourished.

Progression of dementia

• Mini Mental State Exam⁸ (MMSE): 30-point cognitive test used to estimate severity of cognitive impairment

• Clinical Dementia Rating Sum of Boxes⁹ (CDR-sb): numeric rating scale used to estimate functional status and dementia symptom severity

• Subjects completed the MMSE and nurse interviewers completed the CDR-sb and nutritional information at baseline and annual follow-ups

Statistical Modeling:

• Linear mixed models (random intercepts and slopes) examined the change of mMNA over time and its association with cognitive and functional decline in dementia.

Results

Sample Characteristics:

• 264 persons with dementia (72% AD, 54% female) were participants with mean (sd) age of 85.44 (5.6), education of 13.28 yrs (2.985), and disease duration of 3.439 (1.88) years. Baseline mean (sd) global Clinical Dementia Rating was 1.21 (0.764) and Mini-Mental State Exam was 20.608 (6.687), both designating mild dementia.

• Median follow-up was approximately 14-16 months

Trajectory of mMNA Score:

• mMNA scores declined by approximately 0.5 points/year

• Worse mMNA scores were associated with female gender, greater dementia onset age and dementia duration, non-AD or VaD dementia and worse overall health

Trajectory of MMSE Total Score:

• lower mMNA predicted a .10 point/year faster decrease on the MMSE ($p = 0.0277$)

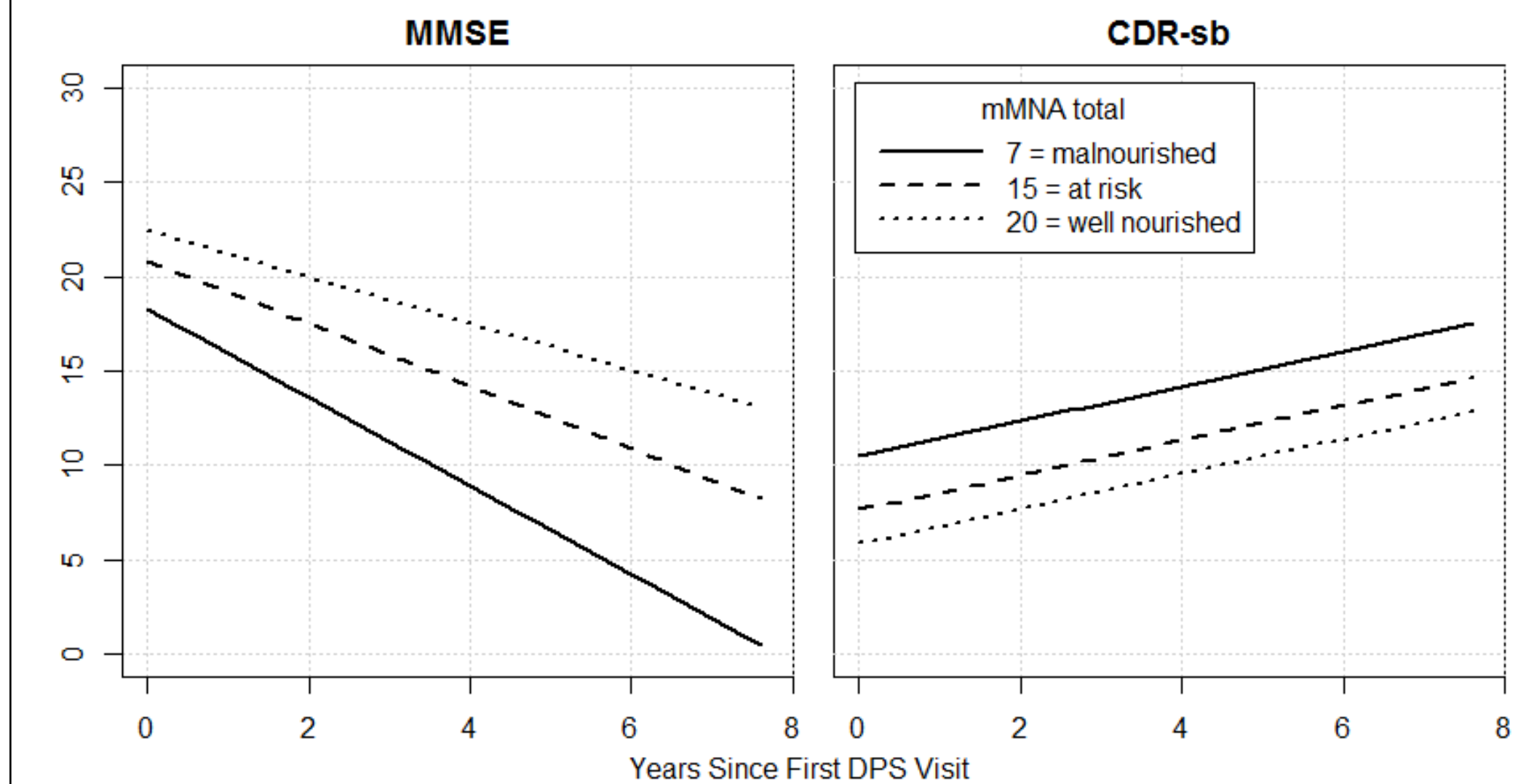
• Covariates included dementia duration at first visit and presence of 1+ APOE E4 allele

Trajectory of CDR-sb Score:

• mMNA was associated with worse (higher) CDR-sb scores (every 1-unit decrease on the mMNA to a .44 higher score on the CDR-sb)

• Covariates included dementia duration at first visit & dementia type

Figure 1: mMNA predicts cognitive and functional impairment



Linear mixed effects models controls for dementia duration (both), presence of APOE e4 (MMSE), and dementia type (CDR-sb). P value for interaction between mMNA and time in modeling the MMSE was 0.0277, $\beta = 0.10$.

Conclusions

- Our findings suggest that worse nutritional status is correlated with faster progression of dementia symptoms in cognitive and functional domains.
- Therefore, screening for malnutrition is useful in predicting cognitive and functional decline in people with dementia.
- Future research will investigate which components of the mMNA predict cognitive and functional outcomes of dementia.

Citations

1. Vellas, B., Lauque, S., Gillette-Guyonnet, S., Andrieu, S., Cortes, F., Nourhashemi, F., ... Grandjean H. (2005). Impact of nutritional status on the evolution of Alzheimer's disease and on response to acetylcholinesterase inhibitor treatment. *J Nutr Health Aging*, 9(2), 75-80.
2. Guerin, O., Soto, M.E., Brocker, P., Robert, P.H., Benoit, M., & Vellas, B. Nutritional status assessment during Alzheimer's disease: results after one year (the REAL French Study Group). (2005). *J Nutr Health Aging*, 9(2), 81-4.
3. Saragat, B., Buffa, R., Mereu, E., Succa, V., Cabras, S., Mereu, R.M., ... Marini, E. (2012). Nutritional and psycho-functional status in elderly patients with Alzheimer's disease. *J Nutr Health Aging*, 16(3), 231-6.
4. Spaccavento, S., Del Prete, M., Craca, A., & Fiore, P. (2008). Influence of nutritional status on cognitive, functional and neuropsychiatric deficits in Alzheimer's disease. *Arch Gerontol Geriatr*, 48(3), 356-60. doi:10.1016/j.archger.2008.03.002.
5. Tschanz, J.T., Corcoran, C., Schwartz, S., et al. Progression in Cognition, Function and Neuropsychiatric Symptoms in a Population Cohort with Alzheimer's Dementia. The Cache County Dementia Progression Study. *Am J Geriatr Psychiatry*, 2011;19:532-42.
6. Breitner, J.C., Wyse, B.W., Anthony, J.C., et al. APOE-epsilon4 count predicts age when prevalence of AD increases, then declines: the Cache County Study. *Neurology*, 1999; 53: 321-331.
7. Guigoz, Y., Vellas, B., & Garry, P.J. (1994). Mini Nutritional Assessment: A Practical Assessment Tool for Grading the Nutritional State of Elderly Patients. In B. J. Vellas, Y. Guigoz, P. J. Garry & J. L. Albarede (Eds.), *Facts and Research in Gerontology* (15-59). U.S.A.: Springer Publishing Company.
8. Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. *Journal Of Psychiatric Research*, 12(3), 189-198. doi:10.1016/0022-3956(75)90026-6
9. Hughes CP, Berg L, Danziger WL, Coben L, Martin R. (1982). A new clinical scale for the staging of dementia. *The British journal of psychiatry*. 1982;140:566-572.

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