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Letter to the Editor

Handgrip Strength in Elderly People with Alzheimer's Disease

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Dear Editor-in-Chief

Despite the evidence of the relationship between cognitive and motor functions in Alzheimer's disease (AD), there are gaps in the literature about the association of this disease with handgrip strength (HGS) decline, and the factors associated with HGS in elderly people with AD have not been widely assessed.

We evaluated HGS in individuals with AD and its relationship with the Clinical Dementia Rating (CDR) and the Mini Nutritional Assessment (MNA), in 2016, in Campinas-SP-Brazil. This study included 43 elderly patients aged 65 years and over, 65.1% (n=28) being female, with AD. A control group (CG) was formed with 51 patients (78.3±7.8 years) and similar socio-cultural conditions, without cognitive complaints and without neurological or psychiatric diseases. The study was approved by the institution's Ethics Research Committee (nº 1.234.677).

The CDR score (1) was used to classify the degree of severity of dementia and the MNA (2) form to assess nutritional status. In the statistical analysis, an exploratory factor analysis was used to summarize the cognitive assessment, determined by several tests in a single component (3). A multiple linear regression was applied with the purpose of identifying the variables related to HGS and not with the objective of HGS prediction, by the actual cause-effect assumption itself. Due to the applied transformation, the parameters estimated served only to direct the existing relationship and not for calculating predicted HGS values.

Using the principal component extraction method, the 1-factor model explained 64.5% of the total variance (Table 1).

Table 1: Exploratory factor analysis

Variable	*MSA*	*Standardized factorial load*	*Final communality*
Mini-Mental State Examination	0.5723	0.3666	0.8937
Verbal fluency test	0.7281	0.2965	0.5847
Simple memory drawing	0.5896	0.3099	0.6387
Clock-drawing test	0.6785	0.2635	0.4619

MSA: Measure of sampling adequacy. KMO: Kaiser-Meyar-Olkin test. Global=0.6205.
Model suggested by the eigenvalue criterion >1.
Explained variance = 64.5%

In the analysis of simple and multiple linear regressions, for the study of mean HGS between the right and left arms, gender, age and the assessment of nutritional status by MAN, were the variables associated with HGS- mean between the right arm and the left arm. The highest scores found for mean HGS (in both arms) were associated with male gender, younger age, and patients without nutritional risk (Table 2).

Table 2: Simple and multiple linear regression analysis, for the study of HGS- mean between right and left arm

Univariate analysis			
Variables	Reference	*P*-value	R2
Gender	Male vs. female	<0.0001	0.4265
Age		0.0013	0.2254
Factor 1		0.6506	0.0051
MNA	Eutrophy vs. MR + M	0.0800	0.0729
CDR	Mild vs. moderate	0.6417	0.0368
	Mild vs. serious	0.6114	
	Multiple analysis *		
Variables	Reference	Estimated parameter	*P*-value
Gender	Male vs. female	14.97424	<.0001
Age		-0.65307	0.0009
MNA	Eutrophy vs. MR + M	6.15246	0.0176

* Stepwise process, R2 of the model = 0.6154.

R2 model = proportion of explanation of the dependent variable by the variation of the independent variables that remained in the model.

CDR: Clinical Dementia Rating; MNA: Mini Nutritional Assessment; MR: malnutrition risk; M: malnutrition

Our data showed significant differences regarding HGS among patients with AD and patients in the CG and HGS was weaker in patients with AD. The strong point of this investigation was the performance of exploratory factor analysis; this kind of analysis was used here to summarize in a single component, all the tests of cognitive assessment.

In the linear regression analysis, which in this study was not used for the purpose of prediction, but only to show the variables that were related to HGS; males, patients without nutritional risk and younger age were associated with the highest HGS scores in the right arm. In contrast, left arm HGS scores were only associated to males and younger age. When the mean HGS between the right and left arm was assessed, a relationship was observed between the highest HGS scores and patients without nutritional risk, male gender, and younger age.

The findings in our study support the use of HGS to monitor cognitive changes and show that declining HGS over time, can serve as a predictor of cognitive loss with advancing age. In a prospective study (4) with 5104 elderly people, no association was found between HGS and the risk of dementia and in another investigation (5), HGS was not associated with the risk of dementia. Another study (6), grip strength was related to an improvement of the cognitive function and to reduced cognitive rate decline; the authors pointed out that grip strength was an independent predictor of a better cognitive condition in middle-aged and elderly (6). Emerenziani et al (7) described a practical prediction equation to estimate cognitive function using physical fitness parameters in older adults and concluded that this equation could be used to predict cognitive functions.

Finally, there was no relationship between HGS and physical activity, daily living activities, cognitive function, and severity of the disease. Further investigations should be conducted to elucidate these aspects in patients with AD.

Conflict of Interest

The authors declare that there is no conflict of interests.

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