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Letter to the Editor

Cognitive Deficits Associated With Dysphagia in Patients With Dementia

TO THE EDITOR: Dysphagia is very prevalent but often underestimated among patients with dementia. Dysphagia leads to dehydration, impaired functionality, malnutrition, respiratory infections, reduced quality of life, and increased mortality, which complicates dementia.[1] Dysphagia can occur in different types of dementia and can be shown during the whole course of dementia.[2] Despite this, there are limited studies discussing the role of specific cognition deficits on dysphagia in patients with dementia. Herein, we aim to investigate the cognition associated with dysphagia in patients with dementia.

We recruited patients with dementia in our hospital. Dementia was diagnosed by using the "National Institute of Neurological Disorders and Stroke (NINCDS)-Alzheimer's Disease and Related Disorders Association criteria."[3] We administered demographic data and psychometrics for the subjects, including Mini-mental State Examination (MMSE),[4] Cognitive Abilities Screening Instrument (CASI),[5] Clinical Dementia Rating (CDR)[6] and CDR-sum of boxes (CDR-SB).[6] CASI comprises 10 sub-scales as follows, remote memory, recent memory, attention, mentality, orientation, drawing, abstract, judgement, fluency, and language. We screened the swallowing function for subjects with dementia by using "Eating Assessment Tool-10 (EAT-10)."[7] We recorded the summation of scores to indicate the severity of dysphagia. We presented the demographic data and difference of dysphagia variables between very mild to mild dementia (CDR 0.5 and 1) and moderate to severe dementia groups (CDR 2 and 3). We calculated the correlation between cognitive variables and dysphagia variables by Spearman's correlation test.

After excluding 44 from a total of 89 subjects due to incomplete cognitive and dysphagia assessment, there were 45 subjects (25

Table 1. Demographic Data and Difference of Cognition and Dysphagia Between Very Mild to Mild Dementia and Moderate to Severe Dementia Groups

Demographic data	Total (N = 45)	Very mild to mild dementia (CDR 0.5, 1) (n = 32)	Moderate to severe dementia (CDR 2, 3) (n = 13)	*P*-value
Age (yr)	76.9 ± 9.0	77.8 ± 8.8	74.6 ± 9.2	0.278
Gender (female)	25.0 (55.6)	19.0 (59.4)	6.0 (46.2)	0.419
MMSE	11.3 ± 6.4	13.5 ± 5.6	6.0 ± 5.1	< 0.001
CASI	38.5 ± 22.6	46.3 ± 18.5	19.5 ± 20.7	< 0.001
CDR-SB	6.9 ± 4.3	4.6 ± 2.3	12.4 ± 2.5	< 0.001
EAT-10	4.6 ± 6.5	3.3 ± 4.8	8.1 ± 8.9	0.084
EAT-10 ≥ 3	19.0 (42.2)	11.0 (34.4)	8.0 (61.5)	0.094

CDR, clinical dementia rating; MMSE, mini-mental state examination; CASI, cognitive abilities screening instrument; CDR-SB, clinical dementia rating-sum of boxes; EAT-10, eating assessment tool-10.
Values are presented as mean ± SD or n (%).
$P < 0.05$, statistically significant.

Table 2. Correlation Between Cognition and Eating Assessment Tool-10

Correlation results	EAT-10
Age (yr)	
r	0.069
P	0.652
CDR-SB	
r	0.253
P	0.093
MMSE	
r	−0.064
P	0.675
CASI total score	
r	−0.054
P	0.727
CASI sub-scales	
Remote memory	
r	−0.123
P	0.420
Recent memory	
r	0.040
P	0.794
Attention	
r	−0.302
P	0.044
Mentality	
r	−0.054
P	0.723
Orientation	
r	−0.030
P	0.844
Drawing	
r	−0.060
P	0.694
Abstract	
r	−0.187
P	0.218
Judgement	
r	−0.032
P	0.836
Fluency	
r	−0.111
P	0.468
Language	
r	−0.205
P	0.177

CDR-SB, clinical dementia rating-sum of boxes; MMSE, mini-mental state examination; CASI, cognitive abilities screening instrument; EAT-10, eating assessment tool-10; r, correlation coefficient.
$P < 0.05$, statistically significant.

female, 55.6 %) with dementia recruited in our study. The mean age was 76.9 years old and there were 32 (71.1%) with very mild to mild dementia. There were 19 subjects (42.2%) with high risk of dysphagia (EAT-10 ≥ 3). Table 1 demonstrates the demographic data and showed no difference of age, gender, and dysphagia between the 2 groups. Table 2 demonstrates the correlation of cognition with EAT-10. CDR-SB, MMSE, and CASI showed no correlation with EAT-10. Only attention sub-scale was correlated with EAT-10 ($r = -0.302, P = 0.044$).

We concluded no correlation between dysphagia and severity of dementia. We only observed the attention deficit was associated with dysphagia in patients with dementia. Dysphagia may develop during any course of dementia. Attention deficit is found to be associated with the impaired frontal connectivity in patients with subcortical ischemic vascular dementia and Alzheimer's disease.[8] Saito et al[9] speculated a neural circuit responsible for swallowing indicating that the middle frontal gyrus serves as an association area between the insula (as a sensory center) and the primary motor cortex (as a motor center). The lesion in the primary motor cortex may cause buccofacial apraxia (BFA) and limb kinetic apraxia, which presented frequently in patients with dementia. Although BFA is related with severity of dementia, Michel et al[10] concluded no significant association between BFA and dysphagia. Researches indicated the prefrontal cortex, containing the large part of middle frontal gyrus, involved in swallowing function in the higher cognition level. The prefrontal cortex integrates perceived sensory signals with motor commands. Dorsolateral prefrontal cortex, locating in anterior half of the middle frontal gyrus, performs not only self-awareness and attentional control but also executive control of working memory.

Overall, we conclude that the attention deficit was associated with dysphagia in patients with dementia. Further studies focusing on evaluation of attention profiles and functional connectivity between frontal lobe and swallowing may aid in optimizing therapeutic approaches in dementia.

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