



## Original Article

# Association Between Eating Disorders and the Survival in Older Patients with Dementia: Palliative Care Unit-Based Cohort Study

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## ABSTRACT

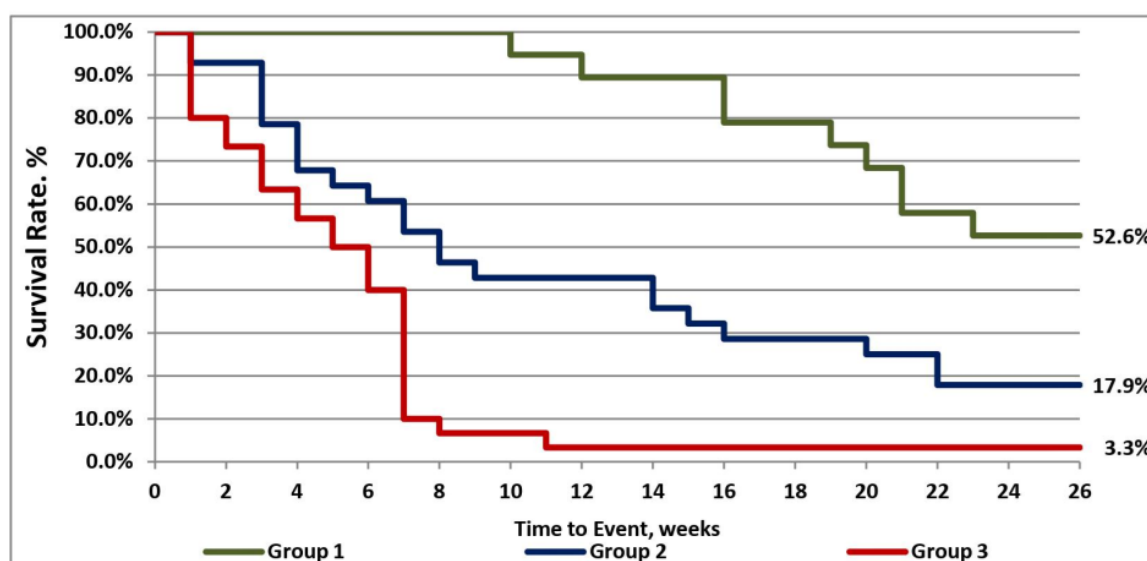
The aim of our study was to identify the peculiarities of eating disorders on the survival rates of patients with dementia. The present, prospective cohort study conducted in palliative care unit and performed with 77 patients admitted to our clinic in 2022-2023. The degree of dementia was assessed by standard valid MMSE, CDR and FAST scales. The presence of eating disorders was diagnosed by EdFED-Q and MNA-SF questionnaires. Eating disorders were presented in 58 patients (76.3%), and dysphagia in 30 (39.0%). Patients with dementia and without eating disorders were included in study group D (n=19); patients with dementia and eating disorders (except dysphagia) were included in study group DE (n=28); patients with dementia, eating disorders and dysphagia were included in study group DED (n=30). Eating disorders (according to the MNA-SF scale) were more significantly manifested in group DED than in groups D and DE (p<0.001, in both cases), and in group DE vs. group D (p=0.003). Survival analysis showed that survival rate in group D was 52.6%, in group DE – 17.9%, and in group DED – 3.3%. Hazard ratio (HR) of bad outcome in group DED compared to group D was significant - HR=7.32 (p<0.001); HR between groups DED and DE was also significant - HR=2.67 (p<0.001); HR of bad outcome between groups DE and D was also significant - HR=3.14 (p=0.001). It was concluded that mortality rate was significantly increased if eating disorders were manifested; they became significantly higher if dysphagia was presented.

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## GRAPHICAL ABSTRACT



## Introduction

Dementia is considered as a leading cause of disability in the elderly. About 50 million people worldwide have symptoms of dementia [1]. Among these are nutritional imbalances, which are reported in the majority of elderly people with dementia [2]. Malnutrition is commonly observed in individuals who have been in long-term care facilities for 8 or more years [3]. Eating disorders are prevalently manifested in patients with Alzheimer's disease (AD) and vascular dementia (VD) [4, 5]. A number of physiological and psychological factors lead to the changes in eating behaviour and significantly correlated with age increase. According to a number of studies, different types of eating disorders appear with the disease progression: changes in the taste associated with food in the initial stage of the disease (increasing the proportion of sweets), changes in appetite (hyper- or hypoanorexia), changes in eating habits (extending eating time), and dysphagia [6]. Appropriate practice and protocol for the care of such patients in the final years of life should include routine assessment and follow-up of the patient's feeding and swallowing functions. According to many researchers, it is desirable to carry out diagnostic tests to detect eating and swallowing disorders,

which are often associated with certain difficulties in older people [7].

Dysphagia and the disorders of swallowing function are considered along with the main risk factors (age, gender, and history of cerebrovascular disease) associated with mortality in patients with dementia [8, 9]. Eating disorders and dysphagia have a crucial role in the last days of the life of patients with AD and vascular dementia. Some studies focus not only on malnutrition, but also on dysmetabolic processes (abnormal levels of plasma glucose, insulin, lipids, leptin, and resistin), which are significantly worsened in patients with eating disorders and dysphagia [10, 11].

Accordingly, the aim of our study was to identify the peculiarities of eating disorders and dysphagia on the survival rates of patients with dementia.

## Results and Discussion

The values of age, comorbidities, anthropometric parameters, dementia, and eating disorders scales are presented in Table 1. It is obvious that eating disorders (according to the MNA-SF scale) were more significantly manifested in group DED than in groups D and DE ( $p < 0.001$ , in both cases), and in group DE vs. group D ( $p = 0.003$ ).

**Table 1:** Characterization of study groups

Study Parameters	n (%), Mean $\pm$ SD		
	Group D (n=19)	Group DE (n=28)	Group DED (n=30)
Age (years)	76.9 $\pm$ 10.8	77.2 $\pm$ 9.0	79.5 $\pm$ 17.2
Gender			
Male	5 (26.3%)	7 (25.0%)	6 (20.0%)
Female	14(73.7%)	21(75.0%)	24(80.0%)
Comorbidities			
Hypertension	10(52.6%)	20(71.4%)	17(56.7%)
Heart ischemic disease (HID) or atherosclerosis or heart failure	11(57.9%)	17(60.7%)	17(56.7%)
Brain stroke or infarction	3 (15.8%)	6 (21.4%)	10(33.3%)
Diabetes mellitus type 2	3 (15.8%)	6 (21.4%)	5 (16.7%)
Parkinson's disease	0 (0.0%)	0 (0.0%)	3 (10.0%)
Epilepsy	1 (5.3%)	1 (3.6%)	0 (0.0%)
Neurosyphilis	1 (5.3%)	0 (0.0%)	0 (0.0%)
Diseases of the muscle-skeletal system	2 (10.5%)	2 (7.1%)	1 (3.3%)
Condition after COVID-19 infection	0 (0.0%)	1 (3.6%)	5 (16.7%)
Lying injury	2 (10.5%)	1 (3.6%)	4 (13.3%)
Psoriasis	0 (0.0%)	0 (0.0%)	1 (3.3%)
Diseases of the thyroid gland	0 (0.0%)	1 (3.6%)	1 (3.3%)
Gastrointestinal and liver diseases	2 (10.5%)	1 (3.6%)	1 (3.3%)
Anemia	0 (0.0%)	1 (3.6%)	1 (3.3%)
Anthropometry			
Body mass, kg	71.4 $\pm$ 12.7	60.4 $\pm$ 11.1	56.5 $\pm$ 5.4
Body height, m	1.7 $\pm$ 5.0	1.7 $\pm$ 5.3	1.7 $\pm$ 5.6
Body Mass Index, kg/m <sup>2</sup>	24.9 $\pm$ 4.6	21.0 $\pm$ 4.1	19.8 $\pm$ 1.7
Waist circumference, cm	95.9 $\pm$ 13.1	87.5 $\pm$ 12.3	84.5 $\pm$ 9.3
Waist circumference (male), cm	95.4 $\pm$ 13.9	88.3 $\pm$ 5.3	82.7 $\pm$ 7.8
Waist circumference (female), cm	96.1 $\pm$ 13.3	87.2 $\pm$ 12.0	78.7 $\pm$ 18.9
Dementia assessment scales			
Mini Mental State Examination (MMSE), score	16.1 $\pm$ 4.1	13.5 $\pm$ 3.5	7.3 $\pm$ 3.6
Clinical Dementia Rating (CDR), score	2.6 $\pm$ 0.2	2.7 $\pm$ 0.2	3.0 $\pm$ 0.1
Functional Assessment Staging (FAST) score=6	13(68.4%)	11(39.3%)	2 (6.7%)
Functional Assessment Staging (FAST) score=7	6 (31.6%)	17(60.7%)	28(93.3%)
Eating Disorder assessment Scales			
The Edinburgh Feeding Evaluation in Dementia (EdFED), score	7.4 $\pm$ 1.8	10.8 $\pm$ 3.1	12.0 $\pm$ 2.6
Mini Nutritional Assessment Short-Form (MNA-SF), score	17.2 $\pm$ 2.3	14.4 $\pm$ 3.3	10.6 $\pm$ 2.7

Kaplan-Meier curves have been used to assess 6-months survival rates for these study groups, as displayed in [Figure 1](#). Survival analysis showed that survival rate in group D was 52.6%, in group DE – 17.9%, and in group DED – 3.3%. Hazard ratio (HR) of bad outcome in group DED compared to group D was significant - HR=7.32 (95% CI 3.65-14.70;  $p<0.001$ ); HR of bad outcome in group DED compared to group DE

was also significant - HR=2.67 (95% CI 1.49-4.78;  $p<0.001$ ); HR of bad outcome in group DE compared to group D was also significant - HR=3.14 (95% CI 1.58-6.27;  $p=0.001$ ). We can conclude that mortality rate was significantly increased if eating disorders were manifested; they became higher if among eating disorders dysphagia was presented.

Results of the multiple linear regression indicated that there was a moderate collective significant effect between the age, BMI, MMSE, MNA-SF, dysphagia, comorbidities, and outcome expressed by the time to event during 26 weeks [F-test(2, 74) = 20.61,  $p < 0.001$ ,  $R^2 = 0.36$ ,  $R^2$ -adjusted = 0.34]. The individual predictors were examined further and indicated that Age ( $t = 2.447$ ,  $p = 0.017$ ) and BMI ( $t = 5.045$ ,  $p < .001$ ) were significant predictors in the model, and other predictors were non-significant in the model. Weight loss is common in older people and is associated with decline in vital functions and mortality. A sustained loss of body weight by 10% over 10 years was significantly associated with the mortality and functional decline [12]. However, there are very few studies providing the information about the relationship between survival rates and eating disorders in elderly patients with dementia. A simple assessment of eating and swallowing function was studied by Hoshino D *et al.* to predict the mortality of residents with advanced dementia in Japanese nursing homes [7]. They performed a simple assessment of eating and swallowing by routine evaluations of palpation of masseter muscle tension and modified water swallowing tests (tests to identify dysphagia) in residents of long-term facilities with advanced dementia. Furthermore, they have studied the association of these functions with 1-year mortality. Authors concluded that eating and swallowing functions significantly correlated with 1-year mortality rate and can predict bad prognosis. Dysphagia in advanced dementia leads to dehydration, decreased immune function, and decreased nutritional status; it also may be considered as a significant factor affecting prognosis of choking, aspiration, infections, and other abnormalities [13-14]. The study authors believe that the MNA-SF score may be an accurate predictor of 1-year mortality in nursing home residents. Thus, this nutritional screening tool can be considered as a tool to identify most at risk persons in the population [15]. The results of our study are in agreement with the findings and conclusions of these studies. There were several limitations in our study and its design. The participants were initially recruited in spring and summer. Seasonal

differentiation of the nature of the eating disorders may have influenced the results of the surveys determined by study protocol. Unfortunately, blood biochemical tests associated with mortality were not performed. However, we believe that it was not proper option to carry out blood analysis that are often performed in patients with AD and vascular dementia.

## Materials and Methods

### Study design

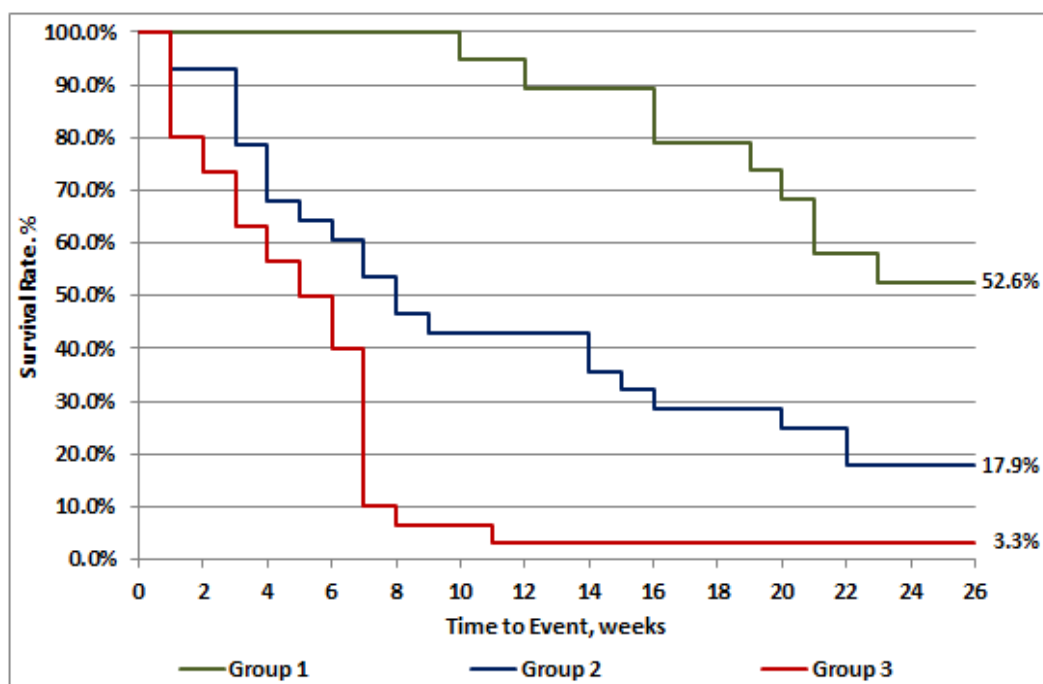
The present study is a prospective cohort study performed in palliative care clinic. Baseline data collection began in May 2022 and ended in April 2023. All patients newly admitted to the palliative care unit with the symptoms of dementia and aged more than 60 years were considered for inclusion in the study. Principal exclusion criteria were acute cardiovascular and neurological diseases. After obtaining the signed consent agreement the patients included in the study. The study was performed in accordance to the principles of the Declaration of Helsinki and the protocol was approved by the Ethics Committee of the Institution Review Board. Written informed consent was obtained for every patient.

### Mental and Nutritional assessment

The degree of dementia was assessed by MMSE [16], CDR [17], and FAST [18] scales. The presence of eating disorders was diagnosed with EdFED-Q [19] and MNA-SF [20] questionnaires. Eating disorders were present in 58 patients (76.3%), and dysphagia - in 30 (39.0%).

### Study groups

The study was performed with 77 patients admitted to our palliative clinic in 2022-2023. Diagnoses were coded according to the International Classification of Diseases, 10<sup>th</sup> Revision (ICD-10). 4 (5.2%) out of all patients had AD (ICD-10 F00), 15 (19.5%) - vascular dementia (ICD-10 F01), 3 (3.9%) - Dementia in other diseases classified elsewhere (ICD-10 F02) and 55 (71.4%) - dementia unspecified (ICD-10 F03).



**Figure 1:** The results of 6-months survival rates for study groups

**Table 2:** Characterization of study groups

Study Parameters	Study Group, n (%) or Mean $\pm$ SD
Number of patients	77 (100%)
With VD	4 (5.2%)
With VD	15 (19.5%)
With Dementia in other diseases	3 (3.9%)
With Dementia unspecified	55 (71.4%)
Age, years	78.0 $\pm$ 11.1
Gender Males	18 (23.4%)
Females	59 (76.6%)
Comorbidities	
Hypertension	47 (61.0%)
Heart ischaemic disease (HID) or atherosclerosis or heart failure	45 (58.4%)
Brain stroke or infarction	19 (24.7%)
Diabetes mellitus type 2	14 (18.2%)
Parkinson's disease	3 (3.9%)
Epilepsy	2 (2.6%)
Neurosyphilis	1 (1.3%)
Diseases of the muscle-skeletal system	5 (6.5%)
Condition after COVID-19 infection	6 (7.8%)
Lying injury	7 (9.1%)
Psoriasis	1 (1.3%)
Diseases of the thyroid gland	2 (2.6%)
Gastrointestinal and liver diseases	4 (5.2%)
Anemia	2 (2.6%)
Presence of eating disorders	
Without eating disorders	19 (24.7%)
Eating disorders without dysphagia	28 (36.4%)
Eating disorders with dysphagia	30 (39.0%)

Anthropometry	
Body mass, kg	78.0 ± 11.1
Body height, cm	169.5 ± 5.3
Body Mass Index, kg/m <sup>2</sup>	21.5 ± 4.1
Waist circumference, cm	88.4 ± 12.1
Waist circumference (male), cm	88.4 ± 10.1
Waist circumference (female), cm	88.4 ± 12.8
Dementia assessment scales	
Mini Mental State Examination (MMSE), score	11.8 ± 5.2
Clinical Dementia Rating (CDR), score	2.8 ± 0.2
Functional Assessment Staging (FAST)	score=6 (n=26,33.8%), score=7 (n=51,66.2%)
Eating Disorder assessment Scales	
The Edinburgh Feeding Evaluation in Dementia (EdFED), score	9.9 ± 3.2
Mini Nutritional Assessment Short-Form (MNA-SF), score	13.7 ± 3.9

The average age of the study group was 78.0 ± 11.1 years (see Table 2). Patients with dementia and without eating disorders were included in study group D (n=19); patients with dementia and eating disorders (except dysphagia) were included in study group DE (n=28); patients with dementia and eating disorders (including dysphagia) were included in study group DED (n=30).

#### Statistical treatment

The obtained results were statistically treated by the software SPSSv.23.0 (IBM SPSS, Chicago, IL, USA). Continuous variables are presented as Mean±SD. Their comparison between groups was carried out by analysis of variance. Categorical variables are presented as percentages. Their comparison between groups was performed by Chi<sup>2</sup>- and Fisher's exact tests. Survival rates during 6-month period were assessed by Kaplan-Meier curves and Hazard Ratio (HR). To study the joint influence of various factors on the outcome (death), the Cox proportional model was used.

#### Conclusion

Based on the study results, it is concluded that mortality rates are significantly increased if eating disorders were manifested; they became higher if dysphagia was presented along with eating disorders. Our results suggest that BMI, MMSE, MNA-SF, dysphagia, and comorbidities

have a moderate collective significant effect on the 6-months mortality rates.

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