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Original article

Associations between eating difficulties, nutritional status and activity of daily living in acute geriatric patients

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SUMMARY

Background & aims: Eating difficulties, having a poor nutritional status, and low activity of daily living are all prevalent issues in the geriatric population. The aim of this study was to explore associations between patients' eating difficulties, their nutritional status and their activity of daily living in patients aged 60 years or older who were admitted to an acute geriatric unit.

Methods: A cross-sectional study was conducted between March and September 2016 at the geriatric department of North Denmark Regional Hospital, Hjørring. The inclusion criteria were: ≥ 60 years old and hospitalized for a minimum of 24 h. The patients' eating difficulties were assessed using the Minimal Eating Observational Form (MEOF-II), including observations related to ingestion, deglutition and energy/appetite. Eating difficulties were determined on the basis of one or more components of the MEOF-II. Poor nutritional status was defined as an age-specific low body mass index (BMI), $<20 \text{ kg/m}^2$ if < 70 years, or $<22 \text{ kg/m}^2$ if ≥ 70 years. Activity of daily living was assessed using the Barthel-100 Index and defined as low (<50) or high (≥ 50).

Results: A total of 297 geriatric patients were included; the mean age was 83.0 (7.7) years and 56.2% of the patients were female. The prevalence of eating difficulties was 55%. Geriatric patients with eating difficulties had a risk increase of 155% of having poor nutritional status ($p = 0.003$). Geriatric patients with eating difficulties had a risk increase of 60% of having low activity of daily living ($p < 0.001$).

Conclusions: Eating difficulties were highly prevalent in geriatric patients and were associated with poor nutritional status and reduced activity of daily living. The identification of eating difficulties may be important for nutritional interventions and maintenance or improvement of activities of daily living in the geriatric population.

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1. Introduction

Changing demographics point to an increase of 56% between 2015 and 2030 in the proportion of people aged 65 years and older. As a consequence, the numbers of geriatric patients needing geriatric health care will increase [1]. Prevalent among those needs in the geriatric population are eating difficulties, poor nutritional status, and decreased activity of daily living [2–4].

Eating difficulties are common among elderly people, with a prevalence of up to 51% [2]. The Minimal Eating Observational Form (MEOF-II) is a screening tool for the structured observation of eating difficulties within the categories ingestion, deglutition, and energy/appetite. Eating difficulties in MEOF-II have previously been investigated in a mixed population of institutionalized and hospitalized elderly people in Sweden. It was found that eating difficulties in MEOF-II were associated with a need for eating assistance, low BMI, and unintentional weight loss [2].

The overall prevalence of malnutrition measured using the Mini Nutritional Assessment was up to 38.7% of the hospitalized elderly population [5]. The cause of malnutrition in the elderly is often multifactorial and complex. A recently published systematic review

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identified 12 risk factors related to malnutrition in individuals 65 years and older. Of those 12, four were related to the eating situation: eating dependencies, poor appetite, basal oral dysphagia, and signs of impaired efficacy of swallowing [3].

Reduced activity of daily living was common in geriatric patients. A Barthel-100 index of less than 50 (low activity of daily living) at admission was found in 54.8% of the patients at an acute geriatric unit [4]. Eating difficulties related to deglutition were associated with a risk of reduced activity of daily living among the elderly [6,7].

To the authors' knowledge, eating difficulties have never been investigated exclusively among geriatric patients admitted with acute illness. It was therefore of interest to investigate the prevalence of eating difficulties in among acute geriatric patients and to explore their association with nutrition status and activity of daily living.

The aim of this study was to explore associations between patients' eating difficulties, their nutritional status, and the activity of daily living in acute geriatric patients.

2. Material and methods

2.1. Design and patient sample

A cross sectional study was performed between March 1, 2016 and September 1, 2016 in the acute geriatric department, North Denmark Regional Hospital. The inclusion criteria were: ≥ 60 years old and hospitalized for a minimum of 24 h. The exclusion criteria were: terminal stage illness, severe dementia, or patients who were in some other way unable to participate.

2.2. Instruments

Eating difficulties were determined on the basis of components of the MEOF-II screening. MEOF-II is an instrument for structured observations of the eating situation. MEOF-II is psychometrically robust and to be used for screening for dysphagia [8]. It includes observations related to the categories ingestion, deglutition and energy/appetite. Each category contains three sub-questions (Fig. 1). A rate of zero indicates normal eating, whereas a rate of one indicates an eating difficulty. MEOF-II screening does not allow for a total score or rating of the eating situation [2]. In this study, eating difficulties were categorized into no eating difficulties, or eating difficulties. The MEOF-II screening was performed by occupational therapists, who were trained in MEOF-II screening. Poor nutritional status was, in this study, defined from a reduced age-specific BMI from the criteria BMI < 20 kg/m² if < 70 years, or < 22 kg/m² if ≥ 70 years [9]. The Barthel-100 index was used to assess the activity of daily living. The Barthel-100 index includes the evaluation of 10 items related to activities of daily living, and is rated with a given number of points between 0 and 100. A score of 100 points indicates functional independence [10]. The Barthel-100 index does not contain a predetermined cut-off score for evaluating the activity of daily living. In this study, Barthel-100 was categorized into two groups and defined as low activity of daily living with a score of < 50 , or high, with a score between 50 and 100 points. Barthel-100 has previously been categorized in this way in investigations into the association between nutritional status and activity of daily living [11]. Comorbidity was measured using the Charlson Comorbidity Index (CCI) [12]. CCI was recorded from hospital charts and CCI is calculated based on hospital diagnoses within the last 5 years prior to admission. In addition to the above data, sex and age was included in the study. Nutritional status, Barthel-100 index and additional patient-related outcomes were collected by a multidisciplinary group, primarily by nurses.

2.3. Analysis

Categorical data were analyzed using chi-squared test and reported by number (n) and percent (%). Continuous data, with the assumption of normal distribution, were analyzed with Student's *t*-test and reported with mean and standard deviation (sd). Continuous data that do not meet the assumption of normal distribution were analyzed with Mann–Whitney's *U* test and reported by median and interquartile range (IQR). The association between eating difficulties and nutritional status and activity of daily living, respectively, were estimated from two separate relative risks. Similarly, the association between the individual categories in MEOF-II and nutritional status and activity of daily living were estimated. All statistical analyses were performed with STATA 14.0 software. A *p*-value < 0.05 was considered statistically significant.

2.4. Ethics

The study protocol was approved by The National Committee on Health Research Ethics (N-20160007) and The Danish Data Protection Agency (2015-200).

3. Results

A total of 418 acute geriatric patients were admitted from March 1, 2016 to September 1, 2016. The inclusion of patients is presented in the flowchart (Fig. 2)

The admitted patients had a mean age of 83.2 ± 7.9 years with a median CCI score of 2 (IQR 1; 3) and 54% of them were women. Of the 418 patients, 23% had a reduced age-specific low BMI and 63% had a low activity of daily living level, with a Barthel-100 score < 50 . A total of 297 (71%) patients met the inclusion criteria. The demographic characteristics of the included patients are presented in Table 1.

A dropout analysis found a significantly lower median Barthel-100 score and activity of daily living, in the analysis group compared to the dropout group. There were no significant differences in any other demographic characteristics between the groups.

3.1. Prevalence of eating difficulties

The MEOF-II screening showed that 163 of the 297 patients (55%) had eating difficulties. Table 2 shows the prevalence of difficulties in each of the sub-categories of MEOF-II of the 163 patients with eating difficulties. Eating difficulties were common in all of the categories of MEOF-II; the category energy/appetite was the most prevalent category of eating difficulties in this study.

3.2. Characteristics according to the presence of eating difficulties

When comparing characteristics between groups with and without eating difficulties (Table 3), the groups were comparable in terms of sex, age and comorbidity. By contrast, there was a significant difference between the groups in terms of the average BMI and nutritional status. Equally, the scores related to activity of daily living were significantly different in the groups depending on their eating difficulties. The difference related to activity of daily living was found in the median of Barthel-100, and divided into groups of low and high activity of daily living levels.

3.3. Association between eating difficulties and nutritional status

The patients with eating difficulties had a significant higher risk of poor nutritional status, corresponding to a risk increase of 155%

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