

Determination of Dysphagia Using Different Tools in Turkish Nursing Home Residents

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Abstract

Objective: The Eating Assessment Tool-10 (EAT-10) is a self-administered questionnaire for dysphagia screening. Whether EAT-10 is a convenient tool for screening swallowing problems in nursing home residents is debatable. The Yale Swallow Protocol (YSP) is an easily administered, reliable, and validated swallow screening protocol. The aim of this study was to assess dysphagia using EAT-10 and YSP in nursing home residents.

Materials and Methods: Residents without eating or cognitive problems were enrolled in the study. The EAT-10, YSP, Mini-Nutritional Assessment-Short Form, body mass index, hospitalizations for any reason/pneumonia-associated hospitalizations in the last year, comorbidities, and diet type were evaluated.

Results: Ninety-nine residents were enrolled in this study. Dysphagia risk was 31.3% with EAT-10 and 18.2% with YSP. There was a fair agreement between EAT-10 and YSP. Dysphagia defined by YSP was associated with malnutrition risk.

Conclusion: The risk of dysphagia in nursing home residents without documented prior swallowing disorder or complaints was high and variable with different tools, where self-reported dysphagia was higher. Nutritional status was associated with YSP-defined dysphagia risk but not with EAT-10.

Keywords: Aged, nursing home, dysphagia, eating Assessment Tool-10, Yale Swallow Protocol

Introduction

Dysphagia is a frequent health problem in the aging population, and it is becoming more critical as the population ages worldwide (1). Dysphagia's potential consequences include aspiration pneumonia, ranking as the second most prevalent infection among residents of nursing homes (2,3). It may also lead to malnutrition, dehydration, and social-emotional problems (4,5). Swallowing difficulty increases with aging, and the significance of dysphagia in frail older adults is more substantial because it may be life-threatening (6). Dysphagia is a spectrum of disorders experienced during the passage of food from the mouth to the stomach (7). In a review with a comprehensive literature search, in long-term care residents, the occurrence of dysphagia has been documented with varying rates, ranging from 7% to 40% (8). It is not detected routinely and systematically despite severe complications and high prevalence (9). If detected, the

prevalence may be diverse in different settings and populations with different screening and/or assessment methods, depending on the executor. Videofluoroscopic swallowing study (VFSS) and fiberoptic endoscopic evaluation of swallowing (FEES) provide dynamic imaging of swallow function. However, they are invasive and require specialized equipment and qualified personnel (6). Screening methods are necessary to identify people at risk of aspiration or malnutrition and to rapidly identify and refer to patients with dysphagia for further evaluation (9). However, performing further studies in older patients with low functionality might not always be practical. The Eating Assessment Tool-10 (EAT-10) is a self-administered questionnaire designed to screen for dysphagia across diverse clinical settings, accommodating the broad spectrum of underlying causes (9,10). A systematic review suggested the use of bedside clinical assessments involving liquids, such as

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water, alongside oximetry as a recommended approach for identifying individuals with dysphagia (11). The Yale Swallow Protocol (YSP) is a validated bedside screening protocol known for its user-friendly administration, reliability, noninvasive nature, and incorporation of a concise cognitive assessment (12-16). Research evaluating dysphagia in Turkish nursing home residents with any tool is scarce to date. In addition, the suitability of the EAT-10 as a convenient tool for screening swallowing issues among nursing home residents remains a subject of debate. The difference between the two screening tools is that the EAT-10 is a self-administered, symptom-specific screening tool that assesses dysphagia only in a questionnaire style, whereas the YSP is a three-step test used to determine the risk of aspiration by having individuals drink water in addition to the questionnaire. Because YSP is a validated tool and there is no study investigating dysphagia with EAT-10 in comparison with YSP at nursing homes in the literature, we aimed to explore dysphagia with EAT-10 and YSP in Turkish nursing home residents.

Materials and Methods

This was a cross-sectional study. Residents of a nursing home in Izmi, Turkey, were screened in two weeks in September 2018. Residents aged 60 years and older, participants conscious enough to answer the questions, and those who can consume water or receive food orally, such as aqueous food or normal food, were included in the study. Older individuals with pre-existing swallowing difficulty, enteral tube feeding, head position restrictions in bed, and tracheostomy tube were excluded. Besides, the residents who did not want to join the study and residents with a negative "Brief cognitive screen" were also excluded from the study. All of the assessments were performed by two medical doctors who were trained for the protocols (12,13).

Measures

Diet (regular diet, use of a thickener, oral nutritional supplement, soft diet), number of hospitalizations in the last 12 months, hospitalizations with pneumonia diagnosis in the last 12 months, and comorbidities were noted. The EAT-10 screening test was applied to all participants (9,10). Afterwards, YSP was performed for the residents.

The EAT-10 questionnaire comprises 10 items, with each item scored on a scale of 0 to 4. A score of 0 denotes "no problem", while a score of 4 signifies a "severe problem". An EAT-10 score of ≥ 3 indicates the existence of swallowing challenges (9,10). The has been validated in adult Turkish patients (4).

The YSP is a dependable and validated bedside screening tool for assessing the risk of aspiration. It encompasses a concise cognitive assessment, an examination of the oral mechanism,

and a 3-ounce water swallow challenge. This challenge involves drinking water from a cup or straw, with observed reactions such as coughing, choking, and voice alterations serving as endpoints (14-18). Successful completion of the YSP necessitates sufficient cognitive capacity and proper oral function to engage in uninterrupted water consumption without experiencing coughing either during the act or immediately after finishing the 3-ounce intake (17). Failure criteria for YSP include interrupted drinking, an inability to consume the entire quantity, or the occurrence of coughing during or shortly after drinking (17). The concise cognitive evaluation consists of inquiries like "What is your name?," "Where are you currently?," and "What year is it?" (15,17). Participants with one or more omitted or incorrect responses were not included in the study.

Body mass index was equal to weight divided by the square of height (kg/m^2).

Nutritional status was evaluated using the Mini Nutritional Assessment-Short Form (MNA-SF) (19). The MNA-SF comprises 6 questions, with the cumulative score ranging from 12 to 14 indicating a normal nutritional status, 8 to 11 suggesting a risk of malnutrition, and 0 to 7 indicating malnourishment. The Turkish validity of the scale was proved by Sarkaya (20).

The study received approval from the Ethics Committee of the relevant university (dated: 25/04/2018; number: 18-4.1/25) and was conducted in alignment with the ethical guidelines outlined in the Declaration of Helsinki.

Statistics

Statistical analyzes were conducted using IBM SPSS Statistics 25.0 software. Numeric data are reported as mean \pm standard deviations, and as medians and minimum-maximum values where available. Data normality was assessed using the Shapiro-Wilk test. Categorical variables are presented as frequencies and percentages. To assess the distinctions between the two groups divided by EAT-10 scores (0-2 and 3-4) and YSP scores (successful and unsuccessful), the chi-square test and Mann-Whitney U test were employed. The agreement between EAT-10 and YSP was evaluated by the Kappa coefficient. Binary logistic regression analysis was used to identify potential risk factors associated with dysphagia. Statistical significance was established at a p value of <0.05 .

Results

Out of 181 residents, those who did not want to join the study ($n=15$), those with preexisting swallowing difficulty ($n=5$), and those with a negative "Brief cognitive screen" ($n=62$) were excluded. Finally, 99 residents were enrolled in the study (Figure 1). More than half of the residents were female (63.6%) and over 75 years of age (60.6%). As there were no residents with thickener use or oral nutritional supplement intake in our

study group, the diet of the participants was classified into two groups: a regular and soft diet. Only 40% of the residents were evaluated as having normal nutritional status. The risk of dysphagia was observed in 31.3% of the residents with EAT-10 and 18.2% of the residents with YSP. The characteristics of the participants are shown in Table 1.

The median MNA-SF score was lower, and the number of residents at risk of malnutrition was higher among residents at risk for dysphagia with YSP ($p=0.009$, and $p=0.023$, respectively) than among residents not at risk for dysphagia with YSP. A higher number of residents at dysphagia risk with EAT-10 were on a soft diet than residents without dysphagia risk ($p=0.032$).

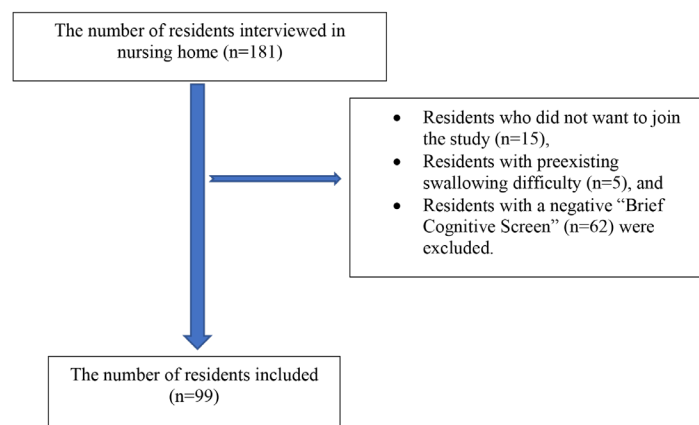


Figure 1. Flow chart for the participants included in the study

Variables		Total population (n=99)
Age, years (range) ^a		76.2±7.7 (62-98)
Age groups, n (%)	<75 years	39 (39.4)
	≥75 years	60 (60.6)
Female, n (%)		63 (63.6)
BMI, kg/m ^{2a}		27.1±4.9
Number of comorbidities		1.2±0.9
Diabetes mellitus, n (%)		13 (13.1)
Hypertension, n (%)		44 (44.4)
Coronary artery disease, n (%)		15 (15.2)
Cerebrovascular disease, n (%)		13 (13.1)
Other diseases, n (%) ^b		28 (28.3)
EAT-10 score ^a		2.5±3.8
MNA-SF score ^a		10.9±2.0
Hospitalization for any reason in the last year, n (%)		27 (27.3)
Pneumonia-associated hospitalization in the last year, n (%)		5 (5.1)
EAT-10 categories, n (%)	Score ≥3	31 (31.3)
	Score <3	68 (68.7)
Yale Swallow Protocol, n (%)	Unsuccessful	18 (18.2)
	Successful	81 (81.8)
Nutritional status, n (%) ^c	Normal nutritional status	40 (40.4)
	At-risk	53 (53.5)
	Malnourished	6 (6.1)
Diet, n (%)	Soft diet	5 (5.1)
	Regular diet	94 (94.9)

BMI: Body mass index, EAT-10: Eating Assessment Tool-10, MNA-SF: Mini Nutritional Assessment-Short Form

^aValues are given as means (± standard deviations), ^bOther diseases: Fracture, thyroid disease, depression, renal failure, gastroesophageal reflux disease, chronic obstructive pulmonary disease, ^cMNA-SF scores from 0 to 7 points indicate malnutrition, scores >7 to 11 indicate the risk of malnutrition

No other significant relationship was observed among YSP, EAT-10, and other variables (Table 2).

A moderate level of concurrence was observed between EAT-10 and YSP ($\kappa=0.231$, $p=0.014$). In the binary logistic regression analysis, dysphagia defined by YSP was associated with nutritional status, and residents at risk of malnutrition had four times more swallowing problems diagnosed with YSP (odds ratio, 4.205, 95% confidence interval 1.129-15.652, $p=0.032$). The risk of dysphagia with EAT-10 was not associated with any of these factors. The number of "hospitalizations for any reason" and "pneumonia-associated hospitalizations" in the last year

were similar among older patients with and without dysphagia risk by both instruments (Table 2).

Discussion

We report that dysphagia risk in Turkish nursing home residents was variable with EAT-10 and YSP, and the agreement among the tools was fair. Poor nutritional status was associated with dysphagia risk with YSP alone.

In our study, dysphagia risk was found in 31.3% of residents with EAT-10. Similar to our study, in a systematic review, the combined prevalence of three studies screening for dysphagia with EAT-10 in nursing homes was reported as 36.11% (21).

Table 2. Characteristics of nursing home residents in relation to dysphagia risk by EAT-10 and YSP

Variables	EAT-10 score <3 (n=68)	EAT-10 score ≥3 (n=31)	P	YSP (successful) (n=81)	YSP (unsuccessful) (n=18)	P
Age, years ^a	76.25 (62-98)	75.97 (62-95)	0.907	75.95 (62-95)	77.11 (65-98)	0.696
Age groups, n (%)						
<75 years of age	29 (42.6)	10 (32.3)	0.380	33 (40.7)	6 (33.3)	0.606
≥75 years of age	39 (57.4)	21 (67.7)		48 (59.3)	12 (66.7)	
Gender, n (%)						
Female	42 (61.8)	21 (67.7)	0.655	51 (63.0)	12 (66.7)	1.000
Male	26 (38.2)	10 (32.3)		30 (37.0)	6 (33.3)	
BMI, kg/m ^{2a}	26.7 (17.8-42.0)	27.9 (17.8-38.3)	0.182	27.0 (17.8-42.0)	24.9 (19.6-31.7)	0.081
MNA-SF score ^a	11 (2-14)	11 (5-14)	0.546	11 (2-14)	10.5 (5-12)	0.009
Diabetes mellitus, n (%)	10 (14.7)	3 (9.7)	0.749	13 (16.0)	0 (0)	0.118
Hypertension, n (%)	17 (54.8)	27	0.193	37 (45.7)	7 (38.9)	0.794
CAD, n (%)	12 (17.6)	(39.7)	0.378	13 (16)	2 (11.1)	0.732
CVD, n (%)	10 (14.7)	3 (9.7)	0.749	11 (13.6)	2 (11.1)	1.000
Other diseases, n (%) ^c	17 (25)	11 (35.5)	0.338	25 (30.9)	3 (16.7)	0.264
Number of comorbidities ^a	1 (0-3)	1 (0-3)	0.900	1 (0-3)	1 (0-3)	0.098
Nutritional status, n (%) ^d						
Normal nutritional status	28 (41.2)	12 (38.7)		37 (45.7)	3 (16.7)	
At risk of malnutrition	40 (58.8)	19 (61.3)	0.588	44 (54.3)	15 (83.3)	0.023
Diet, n (%)						
Soft diet	1 (1.5)	4 (12.9)	0.032	3 (3.7)	2 (11.1)	0.223
Regular diet	67 (98.5)	27 (87.1)		78 (96.3)	16 (88.9)	
Hospitalization for any reason in the last year, n (%)						
No hospitalization	48 (70.6)	24 (77.4)	0.628	61 (75.3)	11 (61.1)	0.249
≥1 hospitalization	20 (29.4)	7 (22.6)		20 (24.7)	7 (38.9)	
Pneumonia-associated hospitalization in the last year, n (%)	4 (5.9)	1 (3.2)	1.000	5 (6.1)	0 (0)	0.581

BMI, Body mass index; CAD, Coronary artery disease; CVD, Cerebrovascular disease; EAT-10, Eating Assessment Tool-10; MNA-SF Mini Nutritional Assessment-Short Form

^aValues are given as medians (minimum-maximum), ^bValues are given as means (± standard deviations), ^cOther diseases: Fracture, thyroid disease, depression, renal failure, gastroesophageal reflux disease, chronic obstructive pulmonary disease, ^dMNA-SF scores from 0 to 7 points indicate "malnutrition", scores >7 to 11 indicate "the risk of malnutrition".

Although there has been no validation study of the EAT-10 in the identification of dysphagia in older adults, this questionnaire has been the most frequently used in the included studies.

The risk of dysphagia did not differ according to the older age group (≥ 75 years) in our study with both instruments, although the effect of aging on swallowing function has been described in previous studies, with a higher impact in the oldest age group (22,23). Dysphagia is defined higher in patients with functional declines and comorbidities, although there are studies that are not able to show the association of dysphagia and comorbidities in accordance with our results (24,25). The insignificance of age and other variables may have occurred because of the sample size of this study. Dysphagia is a highly prevalent clinical finding in older patients with pneumonia, and nearly half of nursing home residents with dysphagia have been reported to develop aspiration pneumonia in the last year (26–28). EAT-10 may also provide useful information on aspiration risk (29). However, the number of hospitalizations for any reason and pneumonia-associated hospitalizations in the last year were similar among older patients with and without dysphagia risk by both instruments in our study. This may be due to the retrospective design of the study. An evident connection emerged between dysphagia and malnutrition, both among nursing home residents and individuals residing in assisted-living facilities (30). In a systematic review (31), impaired functioning and swallowing challenges were the factors consistently linked to inadequate nutrition among nursing home residents. In a review by Zhang et al. (32), it was reported that dehydration, malnutrition, and aspiration pneumonia were among the common complications of dysphagia. Furthermore, in a recent study, EAT-10 was found to correlate with the nutritional status of older individuals in need of long-term care (33). Tagliaferri et al. (34) noted that 37.8% of individuals at risk of dysphagia experienced malnutrition, and their study demonstrated a significant and negative correlation between EAT-10 and MNA-SF scores. In our study, most residents exhibited vulnerability to malnutrition. Nonetheless, although an association between dysphagia risk and poor nutritional status was observed solely with YSP, not EAT-10, our knowledge base lacks any prior studies delving into the connection between YSP and the risk of malnutrition.

Distinguishing patients with dysphagia involves a range of methods, including assessments, interviews, observation of indicative cues, and trials involving swallowing (6,11). The prevalence of dysphagia in older persons may particularly vary according to the instrument used, depending on whether it is a screening questionnaire or a clinical examination such as volume viscosity swallowing test (VST), and depending on the settings, comorbidities present, and the sample chosen. The prevalence ranges from 27% to 91% in different settings with varying characteristics in older people (24). It has been shown that most older persons who live in elderly care centers

do not benefit from the correct diagnosis and/or treatment of dysphagia (35). To be practical for use by nurses within nursing homes, the tool should exhibit simplicity by comprising fewer items, minimizing the need for extensive training. EAT-10 determines self-perceived dysphagia symptoms of patients (4,11,36). Research investigating dysphagia in nursing homes and long-term care facilities with YSP is scarce (37), although there are various studies with the same or different amounts of water (12,14,38). In a recent study, Greek-EAT-10 and FEES scores were significantly correlated (39). On the other hand, a recent study has highlighted potential shortcomings in the construct validity of EAT-10, prompting a consideration for enhancing the instrument to enhance its suitability for regular application in both clinical settings and research endeavors (40). In a study from a nursing home in Turkey, dysphagia was investigated with EAT-10 and 100 cc water drinking test (41). There was no patient identified to be at risk for dysphagia in the aforementioned study, and there are many methodological issues such as defining dysphagia with scores ≥ 2 for EAT-10 (41). In the present study, dysphagia risk was higher with EAT-10 (31.3%) than with YSP (18.2%) among Turkish nursing home residents, and a moderate level of concurrence was observed between EAT-10 and YSP. Likewise, the prevalence of dysphagia varies by screening questionnaires (11.4% to 33.7%) and by clinical explorations such as VVST (23%) in community-living older adults (42). However, we could not locate other studies comparing EAT-10 and YSP in the literature in relation to dysphagia in nursing home residents. Nevertheless, in a recent study using VFSS as a reference standard, both EAT-10 and VVST as clinical bedside assessments were shown to discriminate dysphagia (9). In addition, in a very recent study from Turkey, the Gugging Swallowing Screen was shown to correlate negatively with EAT-10 in healthy older people (43). In a cohort study, YSP was established as a valid and dependable tool within post-acute care settings, encompassing long-term care facilities (37). Furthermore, in a recent assessment of dysphagia screening methods in residential care contexts, YSP emerged as one of the instruments characterized by exceptional diagnostic accuracy values (44).

Among the limitations of this study are the relatively modest participant count and the absence of validation for dysphagia diagnosis via assessment techniques such as VFSS and FEES. The strength of this study is that it is the first study to investigate dysphagia with EAT-10 and YSP comparatively at nursing homes in the literature.

Conclusion

The risk of dysphagia exhibited variations depending on the assessment tools employed, with EAT-10 and YSP demonstrating a moderate level of agreement. Although there is no consensus on how to identify dysphagia in nursing homes, poor nutritional

status was associated with only dysphagia screened by YSP in our study. There were no swallowing disorder complaints in the older residents enrolled in our study, and the presence of dysphagia risk reveals the importance of evaluating swallowing disorders with simple screening tools such as EAT-10 and YSP. The predictive values of the YSP and self-reported EAT-10 questionnaire need to be studied with prospective studies.

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Ethics

Ethics Committee Approval: The study received approval from the Ethics Committee of the relevant university (dated: 25/04/2018; number: 18-4.1/25) and was conducted in alignment with the ethical guidelines outlined in the Declaration of Helsinki.

Informed Consent: Informed consent was obtained from all participants.

Peer-review: Externally and internally peer reviewed.

Authorship Contributions

Concept: S.S., N.D., A.K., F.S., Design: S.S., N.D., A.K., F.S., Data Collection or Processing: S.S., A.K., Analysis or Interpretation: S.S., A.K., Literature Search: S.S., N.D., A.K., F.S., Writing: S.S., N.D., A.K., F.S.

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