Journal of Associated Medical Sciences 2025; 58(2): 170-178

JAMS
Journal of Associated Medical Sciences

Scopus Indexed & Thai-Journal Citation Index Centre (TCI)

Journal of Associated Medical Sciences

Journal homepage: https://www.tci-thaijo.org/index.php/bulletinAMS/index



Development of dysphagia screening questionnaire for Thai older adults

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ARTICLE INFO

Article history:
Received 4 September 2024
Accepted as revised 17 February 2025
Available online 19 February 2025

Keywords:
Screening tool, oropharyngeal dysphagia, aging, clinimetric properties.

ABSTRACT

Background: Oropharyngeal dysphagia is a common condition in the older person and can lead to serious complications. In Thailand, there is currently no standardized dysphagia screening tool for gathering preliminary information about clients for early evaluation and intervention.

Objective: This study aimed to develop a dysphagia risk screening tool for older persons and investigate its psychometric properties. This study examined the content validity, criterion validity, and test-retest of the Geriatric Dysphagia Risk Screening Tool (GDRST).

Materials and methods: 26 questions were developed from literature review and expert opinion. Five expert occupational therapists examined content validity. The Index of Congruence (IOC) was calculated from five experts, and the items that showed IOC scores of over 0.5 were incorporated into the target screening tool. Thirty older adults who had a risk of dysphagia (Mean±SD, 66.13±4.66 years) participated in the study. The internal consistency was assessed using Cronbach's alpha. An intraclass correlation coefficient (ICC) was used to examine the test-retest reliability of the screening tool. The criterion validity of the GDRST was evaluated by investigating the relationships between a score of the Functional Oral Intake Scale (FOIS) and the Swallowing Quality Assessment Form for Occupational Therapists (SQAOT) using Spearman's correlation coefficients.

Results: Based on the literature review and occupational therapy expert opinions, the screening tool covers three domains, including the cognition domain, oral phase swallowing ability domain, and pharyngeal phase swallowing ability domain. Content validity IOC scores were between 0.6 and 1.0 for all items. The internal consistency of the GDRST was high, with 0.971 Cronbach's alpha for the test. The screening tool had excellent test-retest reliability on all items (p<0.05). The score of the GDRST was significantly correlated with the score of FOIS (r=-0.468, p=0.009), and SQAOT (r=-0.705, p=0.000).

Conclusion: The GDRST demonstrated excellent reliability and validity against the clinical assessment. It was simple to administer and could be beneficial for screening older people in the community for dysphagia.

Introduction

Thailand has entered an aging society, with the elderly population in 2023 accounting for 20.92% of the total population.[1] Dysphagia occurs mainly in elderly people due to multiple age-related changes in the neural and physiological mechanisms controlling swallowing. As individuals age, there is a decline in body structure and function, including decreased sensory perception of taste, temperature, and food texture, reduced saliva production, tooth loss, impaired coordination of lip and tongue muscles, decreased muscle strength for chewing and swallowing, and reduced strength

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doi: 10.12982/JAMS.2025.050
E-ISSN: 2539-6056

of pharyngeal muscle contractions. Additionally, delayed opening of the upper esophageal sphincter affects the ability to swallow food.[2]

Oropharyngeal dysphagia is difficulty forming or safely moving a food bolus from the oropharynx to the cervical esophagus due to dysfunction in the oropharyngeal phase of swallowing.[3] The prevalence of oropharyngeal dysphagia is between 11.4%-13.7% among older people living independently and 36.5%-50.2% among older people living in care facilities.[4,5] The occurrence of dysphagia in the elderly can lead to a decreased appetite, fear or anxiety about swallowing, and reduced food intake, resulting in various complications such as malnutrition, weight loss, dehydration, suffocation, and aspiration pneumonia.[2,6] These complications significantly impact the quality of life of the elderly.

Dysphagia in older individuals often goes undetected until severe symptoms or complications like undernutrition or pneumonia arise. Screening for swallowing difficulties in communities or elderly care facilities is not widely practiced, as these individuals often perceive difficulties in eating due to abnormalities in both the oral and pharyngeal phases as a natural part of aging. Consequently, older adults may choose to endure dysphagia or employ compensatory strategies such as selecting specific foods or reducing food intake, which can lead to malnutrition and increase the risk of complications.[2,6] Early identification of dysphagia risk allows for early clinical assessment and intervention, which can delay the progression of dysphagia and reduce morbidities.

Instrumental and clinical assessments conducted by professionals specializing in swallowing rehabilitation and using standardized methods can evaluate functional impairments in swallowing-related components and overall swallowing ability.[7,8] However, due to time and budget constraints, clinical assessments have limitations in community settings, making self-report questionnaires a valuable tool for screening dysphagia in older adults.[7,9,10] The Eating Assessment Tool-10 (EAT-10) is the dysphagia screening tool widely used in many countries.[11,12] The EAT-10 has been translated into the Thai version and used as a screening tool for dysphagia. Although the Thai version of EAT-10 has high reliability and validity for screening dysphagia in adult populations who have pathological conditions, its psychometric properties have not been tested for use with the aging population.[13,14] Specifically, the EAT-10 is designed to evaluate the severity of dysphagia in symptomatic individuals and does not address the factors reportedly contributing to swallowing limitations in this population (e.g., cognitive and physical decline).[15] Therefore, the dysphagia screening tool for older individuals is still limited.

Swallowing problems in the geriatric population coexist and can be undetectable with a variety of degenerative issues in the elderly. The Geriatric Dysphagia Risk Screening Tool (GDRST) in this study is a self-report questionnaire that screens for the elderly's cognitive and oropharyngeal aspects of swallowing performance through questions related to eating behaviors in daily life. The frequency of abnormal behavior in each item is given as a score, with a higher score showing poor performance. Therefore, the advantage of GDRST is that it is a rapid screening tool that can be done at home or in the community. Each item's score reports the clients' clinical symptoms that provide information to therapists in selecting client-specific clinical assessments, prevention, and intervention in clinical settings. Early recognition of oropharyngeal dysphagia symptoms is highly beneficial in screening for swallowing difficulties in community-dwelling older adults before they become severe. Therefore, this study aims to develop a screening tool for the early identification of dysphagia risk in older persons and test its psychometric properties. It is expected that this tool could be part of an early screening process in the community or even in elderly care facilities to facilitate early assessment and intervention for older adults at risk of oropharyngeal dysphagia.

Materials and methods

This study was divided into two stages. The first stage was the development of the questionnaire based on literature reviews and testing the content validity of the screening tool. The second stage was the study of the internal consistency, test-retest reliability, and criterion validity of the GDRST.

Participants

In the first stage, the research team consisted of three occupational therapists with at least five years of experience working in swallowing rehabilitation, conducting the items of the GDRST questionnaire version-1 based on dysphagia symptoms in older persons. Afterward, five registered occupational therapists with at least five years of experience working in swallowing rehabilitation were invited to participate in testing the questionnaire's content validity. The GDRST was revised and used to examine its psychometric properties in the second stage.

In the second stage, participants were recruited from the community in Bangkok and its surrounding areas through a web-based platform and promotional posters between April 2023 and April 2024. Once interested elderly persons applied to participate in this study, they were screened based on the inclusion and exclusion criteria. Thirty participants who met the criteria participated in the pilot study. Participants were asked to provide informed consent before data collection.[16] The inclusion criteria were an older person aged 60-75 years, at risk of dysphagia as screened by an EAT-10 score >3 and able to understand and respond to the screening tool independently.[11] The exclusion criteria were participants having a diagnosed medical condition that acutely affects swallowing ability, such as a stroke or head and neck cancer.

Procedure

First stage: Development of the Geriatric Dysphagia Risk Screening Tool

A literature review was conducted to identify relevant theoretical frameworks related to oropharyngeal dysphagia in older adults. In this population, swallowing undergoes various changes, influenced by cognitive impairments

affecting eating, oral phase swallowing disorders, and pharyngeal phase swallowing disorders. All these factors were considered during item development. The research team developed items based on these factors. The initial version of the screening tool (version 1) consisted of 22 items representing three domains derived from the conceptual framework: 1) cognition (5 items), 2) oral phase swallowing ability (7 items), and 3) pharyngeal phase swallowing ability (10 items). The scoring criteria were based on the frequency of behavior occurrence. Each item had four response options: never=0, rarely=1, sometimes=2, and often=3. Five occupational therapists with over five years of experience in swallowing rehabilitation were asked to assess content validity. The congruence index (IOC) was analyzed, and items with an IOC of 0.5 or higher were accepted. At the same time, those with an IOC below 0.5 were revised based on expert feedback, leading to the refinement of the screening tool.

Second stage: Study the psychometric properties

Thirty older persons participated in the evaluation of internal consistency, test–retest reliability, and criterion validity. The internal consistency reliability was examined to determine the contribution of each item to the overall questionnaire. To evaluate test-retest reliability, the GDRST was completed by the same participants on two occasions, separated by one week. The one-week period was selected because no change in the swallowing process was expected to take place within this period. The intraclass correlation coefficient (ICC) value was calculated for test-retest reliability.

The validity of an outcome measure is the ability of an instrument to predict the participants' swallowing performance. The criterion validity of the GDRST was determined by assessing the correlation between it and clinical assessments, including the Functional Oral Intake Scale (FOIS) and the Swallowing Quality Assessment Form for Occupational Therapists (SQAOT).

The FOIS assesses swallowing ability based on the type or category of food that can be swallowed. It is divided into 7 levels, with a score of 1 indicating no oral intake and a score of 7 indicating total oral intake without restriction. The FOIS is a reliable and valid tool compared with the Videofluoroscopic Swallowing Study and Fiberoptic Endoscopic Evaluation of Swallowing.[17]

The SQAOT is a clinical assessment tool occupational therapists use to evaluate swallowing quality.[18] The SQAOT has a maximum total score of 29 points, consisting of assessments in 6 areas: 1) diet/liquid intake (2 points), 2) progression of food intake (5 points), 3) progression of liquid intake (5 points), 4) quantity of oral feeding (2 points), 5) improvement of oro-motor function (9 points), and 6) oral reflex (6 points). A lower score indicates that the patient has less ability in that area.

Statistical analysis

Descriptive statistics were presented to describe demographic data. The Kolmogorov-Smirnov test was used to test the participants' normality of age and score of EAT-10. The internal consistency of each item was measured using Cronbach's alpha. The intraclass correlation coefficient (ICC) model 3,1 was used to examine the test-retest reliability. The Spearman coefficient was used to assess the correlation between the GDRST, FOIS, and the SQAOT to determine criterion validity. The significant level was set as 0.05. All statistical analyses were conducted using SPSS statistical package version 18.

Results

First stage: Development of screening tools

The GDRST version 1 had an IOC score between 0.2 and 1.0. Six items had an IOC score less than 0.5: 4 items in the Cognition domain, 1 item in the Oral phase swallowing ability domain, and 1 item in the Pharyngeal phase swallowing ability domain. Additionally, the experts suggested adding 2 more items to the Cognition domain and 2 more to the Oral phase swallowing ability domain. As a result, the GDRST version-2 comprised 26 items: 7 items in the Cognition domain, 9 in the Oral phase swallowing ability domain, and 10 in the Pharyngeal phase swallowing ability domain. The total score was 78 points. Subsequently, the GDRST version-2 was sent to experts for another round of IOC score review, with scores for all 26 items ranging from 0.6 to 1.0. After a trial with ten older participants, no issues were reported, and all participants could follow the screening instructions. This is the final version of the GDRST, as shown in Table 1.

Table 1. Domain and items of the Geriatric Dysphagia Risk Screening Tool final version and IOC scores.

Domains	Items	Question	Index of congruence
Cognition (7 items)	1	You experience low alertness or drowsiness while eating.	0.6
	2	You lack focus, are easily distracted, or have difficulty paying attention while eating.	0.6
	3	You take bites of food that are too large to swallow completely.	1
	13	You hold food in your mouth and need to be reminded to chew or swallow.	1
	24	You eat less due to difficulties with chewing and swallowing.	1
	25	You need to be reminded when it's mealtime or forget that you've already eaten a meal.	1
	26	You are afraid to swallow food or liquids due to choking or aspiration.	1
Oral phase performance (9 items)	5	Chewed food particles fall out of your mouth while eating.	1
	6	You feel like you cannot chew your food thoroughly.	1
	7	You experience dry mouth and have difficulty chewing and swallowing due to insufficient saliva.	1
	8	You feel like food is stuck in your cheeks, under your tongue, or on the roof of your mouth after swallowing.	1
	9	You have difficulty swallowing food, feel like it's getting stuck, have to exert a lot of effort to swallow, or need to swallow multiple times.	0.6
	10	You have difficulty swallowing solid foods or pills.	1
	11	Liquid comes out of your nose when you drink.	1
	12	You often bite your cheek or tongue while chewing.	1
	14	You have difficulty eating foods with a liquid consistency, such as porridge.	1
Pharyngeal phase performance (10 items)	4	You need to use a neck support device while eating	0.8
	15	You feel like food is stuck in your throat or want to cough after swallowing.	1
	16	You are unable to clear your throat or cough when you need to.	1
	17	You experience difficulty breathing after swallowing.	0.8
	18	You cough or choke while swallowing saliva.	1
	19	You cough or choke while swallowing liquids.	1
	20	You cough or choke while swallowing food.	1
	21	Your voice changes, becomes hoarse, or raspy immediately after swallowing food or liquids.	1
	22	You experience pain in your throat while swallowing.	1
	23	You feel a burning sensation in your chest or upper abdomen during or after eating.	1

Second stage: Study the psychometric properties

The participants consisted of 30 older persons who were at risk of dysphagia (EAT-10 scores >3). The mean age was 66.13±4.66 years, and the EAT-10 scores were 9.76±7.17. GDRST score was 14.67±10.01. The sample group's normality test results show a normal distribution. Table 2 presents the participants' demographic data.

The internal consistency of the GDRST was excellent consistency with a Cronbach's alpha value of 0.971. The ICC value of all items ranged between 0.828 and 1.00 indicated that the instrument is excellent test-retest reliability, as shown in Table 3.

Table 2. Demographic information of participants.

Variables	Participant (N=30)
Sex [N (%)]	
Male	8 (26.67)
Female	22 (73.33)
Age (years) [Mean (SD)]	66.13 (4.66)
Education level [n (%)]	
Elementary Level	20 (66.67)
Secondary Level	4 (13.33)
Bachelor Level	4 (13.33)
Higher than bachelor Level	2 (6.67)
Dental orthosis [n (%)]	
Yes	14 (46.67)
No	16 (53.33)
EAT-10 score [Mean (SD)]	9.76 (7.17)
GDRST score [Mean (SD)]	14.67 (10.01)
FOIS score [Mean (SD)]	6.27 (0.91)
SQAOT score [Mean (SD)]	22.07 (3.94)

***Note**: N: number, SD=standard deviation, EAT-10: Eating Assessment Tool-10, GDRST: Geriatric Dysphagia Risk Screening Tool, FOIS: Functional Oral Intake Scale, SQAOT: Swallowing Quality Assessment Form for Occupational Therapist.*

Table 3. The test-retest reliability of the Geriatric Dysphagia Risk Screening Tool.

Items	Time 1 Mean (SD)	Time 2 Mean (SD)	ICC	95%CI
1	0.20 (0.40)	0.17 (0.38)	0.892	0.786-0.947
2	0.20 (0.48)	0.13 (0.43)	0.848	0.705-0.925
3	0.33 (0.76)	0.30 (0.70)	0.969	0.936-0.985
4	0.00 (0.00)	0.00 (0.00)	1.000	1.000-1.000
5	0.43 (0.72)	0.43 (0.72)	1.000	1.000-1.000
6	1.53 (0.82)	1.77 (0.82)	0.862	0.730-0.932
7	0.73 (0.91)	0.8 (0.99)	0.927	0.852-0.964
8	0.80 (1.06)	0.86 (1.00)	0.938	0.874-0.970
9	0.90 (1.09)	0.90 (1.06)	0.970	0.939-0.986
10	1.20 (1.09)	1.02 (1.06)	0.970	0.939-0.986
11	0.20 (0.48)	0.27 (0.64)	0.900	0.801-0.951
12	0.73 (0.82)	0.83 (0.91)	0.939	0.875-0.970
13	0.10 (0.40)	0.10 (0.40)	1.000	1.000-1.000
14	0.06 (0.25)	0.06 (0.25)	1.000	1.000-1.000
15	0.80 (0.92)	0.80 (0.92)	0.960	0.917-0.981
16	0.17 (0.46)	0.10 (0.40)	0.828	0.670-0.914
17	0.07 (0.25)	0.07 (0.25)	1.000	1.000-1.000
18	0.97 (0.80)	1.03 (0.85)	0.953	0.9.4-0.977
19	1.00 (1.02)	1.03 (0.96)	0.913	0.825-0.958
20	0.70 (0.79)	0.83 (0.87)	0.914	0.828-0.958
21	0.43 (0.81)	0.40 (0.86)	0.927	0.852-0.965
22	0.27 (0.69)	0.23 (0.68)	0.965	0.927-0.983
23	0.73 (0.91)	0.73 (0.94)	0.960	0.917-0.981
24	0.70 (0.87)	0.70 (0.87)	1.000	1.000-1.000
25	0.20 (0.48)	0.20 (0.48)	1.000	1.000-1.000
26	0.33 (0.61)	0.37 (0.67)	0.959	0.916-0.980
Total	13.80 (9.67)	14.33 (9.40)	0.985	0.969-0.993

The results found a significant negative moderate correlation between the GDRST and FOIS scores (r=-0.468, *p*=0.009). The scatter plot between the GDRST and the FOIS scores is shown in Figure 1. Additionally, the GDRST score strongly correlated with the SQAOT score (r=-0.705, *p*=0.000), as depicted in the scatter plot in Figure 2.

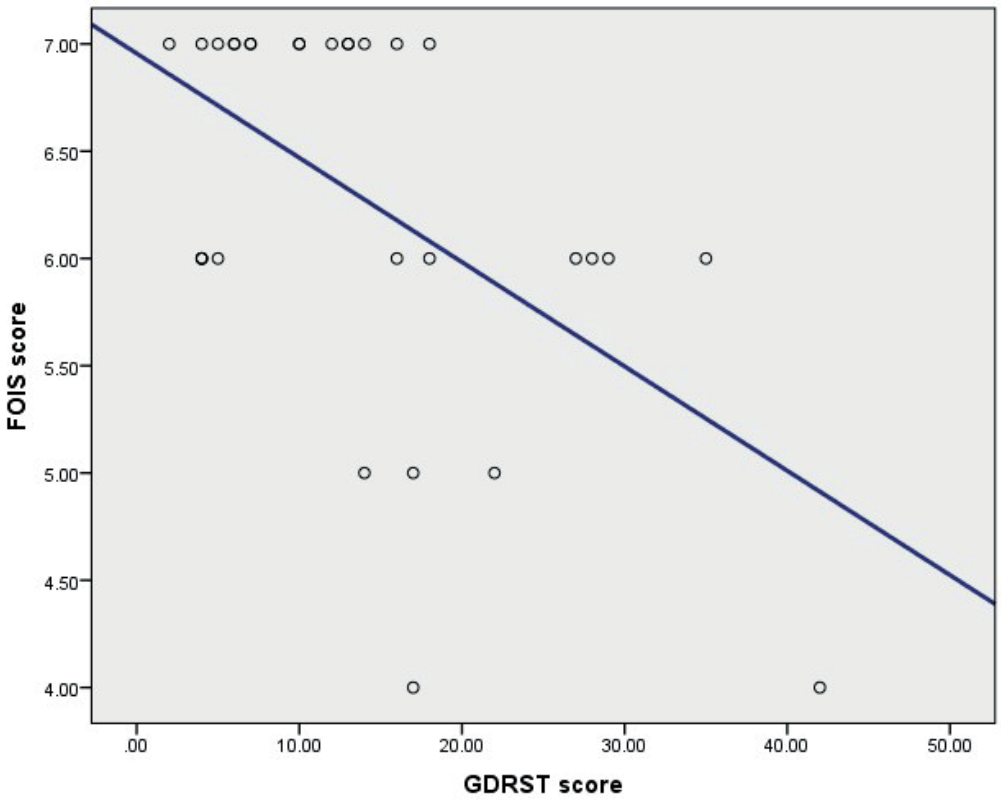


Figure 1. *Correlations between GDRST and FOIS score.*

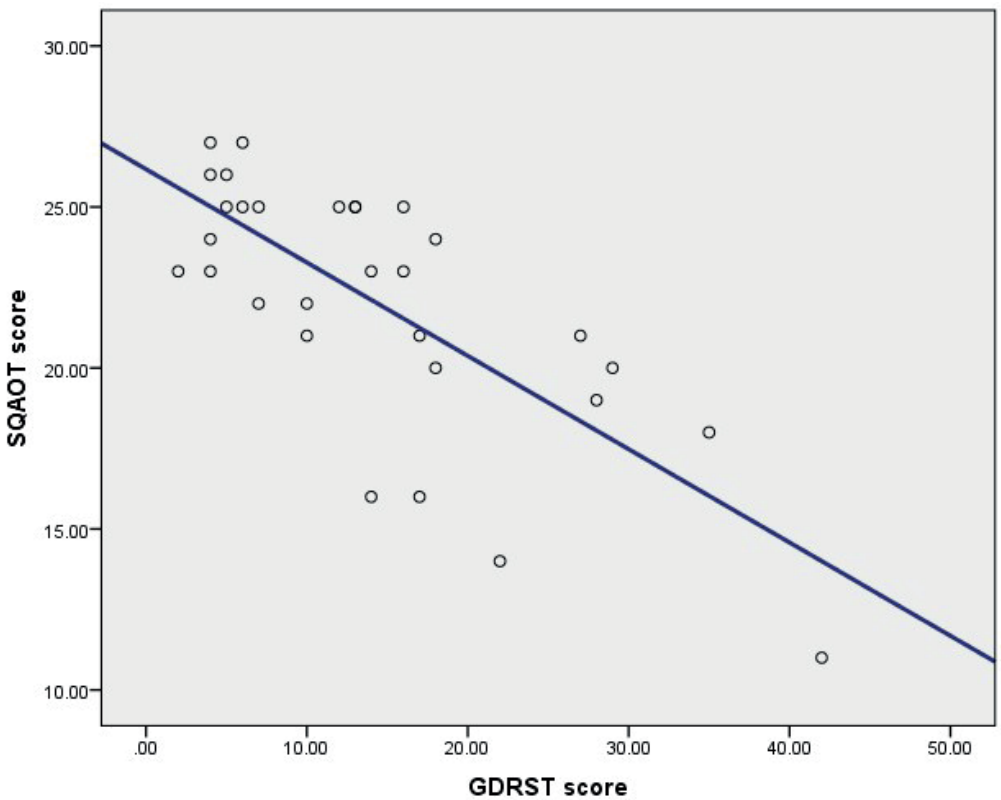


Figure 2. *Correlations between GDRST and SQAOT score.*

Discussion

The main finding of this study is that the GDRST questionnaire proved to be a helpful screening tool for detecting dysphagia in older adults. Preliminary data and psychometric analyses demonstrated excellent internal consistency and test-retest reproducibility. Furthermore, the GDRST scores correlated with clinical performance as assessed by the FOIS and the SQAOT.

The presence of swallowing dysfunction in older individuals tends to progressively worsen with age and the natural process of physical decline. Unfortunately, these symptoms often go unreported by older adults or remain undetected by therapists until severe symptoms or complications, such as malnutrition and aspiration pneumonia, manifest.[2,19] Early detection of oropharyngeal dysphagia in older persons is crucial for prevention and reducing the risk of complications. However, standard instrumental approaches and clinical testing require high assessment costs or specialized expertise for definitive diagnosis, making them unsuitable for widespread community screening. Therefore, having a reliable screening tool for identifying older individuals at risk of dysphagia would facilitate appropriate referrals for further specific investigations. The GDRST is a self-report, symptom-specific instrument for oropharyngeal dysphagia. It can be administered quickly and is suitable for older people. The questionnaire addresses factors related to the swallow functional decline of older individuals, including decline in oral function abilities, pharyngeal function abilities, and cognitive ability.[20-22] The items reflect the pre-clinical symptoms of dysphagia that manifest in both daily life and frequency in the elderly population.

There is limited research on the reliability of screening tools used to identify dysphagia in the elderly population in Thailand. This is because commonly used screening tools from other countries are often in English, which can be challenging for Thai elderly individuals due to language barriers. The EAT-10, although translated into Thai and widely used for dysphagia screening in Thailand, has its limitations. The Thai version of EAT-10 has not been tested for reliability and validity in the elderly population. Additionally, the EAT-10 focuses on the severity of the impact of dysphagia, not specifically on the symptoms of oropharyngeal dysphagia, making it challenging to identify progressive swallowing function changes in older persons.[13] The 26 questions of the GDRST, which address both oropharyngeal and cognitive functions related to clients' symptoms, differentiate this tool from the EAT-10. This study included older adults at risk of dysphagia, all of whom completed the GDRST independently. The results showed high internal consistency and test-retest reliability, indicating the tool's strong repeatability over time in this population.

Regarding criterion validity, the results showed a correlation between the GDRST and clinical testing using the FOIS and the SQAOT. The FOIS reflects functional oral intake and is associated with dysphagia severity, while the SQAOT reflects oral and swallowing function as assessed by therapists. The correlation suggests that self-reported symptom information and clinical evaluation based on the clinician's judgment provide complementary information on oropharyngeal dysphagia. The moderate correlation between the GDRST and FOIS might be attributed to the FOIS primarily focusing on oral intake status, while the GDRST focuses on swallowing symptoms of dysphagia. This could also be explained by the distribution of GDRST and FOIS scores (Figure 1), which shows that many participants had the GDRST scores but still had an FOIS score of 7, indicating a ceiling effect. Investigating the relationship between the GDRST and standardized diagnostic tools for swallowing, such as fiber-optic endoscopic evaluation of swallowing (FEES) or videofluoroscopic swallowing study (VFSS), could further enhance the validation of the screening tool.[23]

There is a high correlation between the GDRST and the SQAOT. It shows that the screening tool is consistent with the swallowing ability and related components. In addition, the self-report from screening tools can provide complementary information about the dysphagic symptoms that help the therapist select a clinical assessment that is specific to the symptoms that the client experienced. Another interesting aspect is that the participants in this study mostly did not have cognitive problems, which may be present in community-dwelling older adults. As a result, items related to cognitive domains were not selected in this population, potentially affecting the overall assessment scores. Therefore, the results of this study may not be generalizable to older adults with swallowing problems stemming from cognitive impairments.

Limitation

A limitation of this study is that our sample size was relatively small, and most of the sample was older people in the 60-75 age range. It may impact generalizability to the older person in the community, as older age has increased difficulties and functional decline of swallowing function.[19] This study has a small sample size because it tested the swallowing ability of the elderly with the risk of dysphagia outside of a hospital setting without the supervision of a doctor. The Ethics Committee recommends conducting a pilot study to assess whether the testing poses no harm to the participants. This study did not have any adverse events that occurred to the participants. Further research should increase the sample size and examine the validity of this screening tool for late older adults (more than 75 years). Participants in this study are research-interested volunteers who can perform questionnaires by themselves. Some elderly persons in the community may be unable to answer the questionnaire due to cognitive or communication problems. Therefore, receiving information from caregivers or family members can be an alternative method for using this questionnaire. Additionally, the ability of the screening tool to predict outcomes will need to be assessed. Future steps in this research will recommend for inter-rater reliability, concurrent validity, sensitivity, and specificity studies of the screening tool.

Conclusions

The questionnaire created to evaluate the risk of dysphagia for the community older person reflects the complex symptomology and frequency of swallowing difficulties. The questionnaire demonstrates strong content validity, high internal consistency, and test-retest reliability. Furthermore, the questionnaire provides preliminary insight into understanding oropharyngeal dysphagia symptoms before clinical evaluation. There is a correlation between the screening tool and the clinical tests evaluated by the therapist. This study indicates that this questionnaire may be a useful screening tool for early identification and prevention of oropharyngeal dysphagia in aging populations.

Conflict of interest

The authors have no actual or potential conflict of interest to declare that it is relevant to the content of this article.

Ethical approval

Ethical approval for the study was obtained from Mahidol University Central Institutional Review Board for Human Research (MU-CIRB 2023-068.2002). Prior to data collection, all participants provided written informed consent for study participation and for the publication of this study.

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