CLINICAL STUDY

CLINICAL AND INSTRUMENTAL ASSESSMENT OF DYSPHAGIA IN SPEECH AND LANGUAGE THERAPY STUDENTS: AWARENESS AND KNOWLEDGE LEVELS

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SUMMARY

Purpose: The aim of this study was to question the awareness and knowledge levels of undergraduate students in the department of speech and language therapy regarding clinical and instrumental swallowing assessment and compare the findings between the 3rd and 4th grades and between those with and without internships.

Methods: The researchers created a questionnaire with five sections and a total of 120 questions.The link to the questionnaire transferred to a Google Form was sent to students via social media platforms.

Results: A total of 327 (289 female and 38 male) SLP students from 12 different schools participated in the survey. It was found that 4th graders were statistically significantly higher than 3rd graders, and internship students were statistically significantly higher than non-internship students in terms of thinking that they could perform clinical swallowing tests on their own and being confident in interpreting test results, as well as awareness and knowledge levels of clinical and instrumental swallowing evaluation ($p<0.05$).Almost half of all participants stated that their clinical courses on instrumental swallowing were insufficient.

Conclusion: In this study, it was observed that the level of education and internship status affected the level of self-confidence, knowledge, and awareness of individuals about swallowing disorders.It was determined that especially instrumental swallowing assessment courses were inadequate. Therefore, it is necessary to increase the content of the swallowing disorders course, especially instrumental swallowing evaluation, and to demonstrate what is taught in the course in practice in the internship. Thus, the awareness, knowledge, and self-confidence of SLPs about swallowing can be increased.

Keywords: Speech and Language Therapy, Awareness, Knowledge, Swallowing, Dysphagia, Assesment

DİL VE KONUŞMA TERAPİSİ ÖĞRENCİLERİNDE DİSFAJİNİN KLİNİK VE ENSTRÜMANTAL DEĞERLENDİRMESİ: FARKINDALIK VE BİLGİ DÜZEYLERİ

ÖZET

Amaç: Bu çalışmanın amacı, dil ve konuşma terapisi bölümü lisans öğrencilerinin klinik ve enstrümantal yutma değerlendirmesine ilişkin farkındalık ve bilgi düzeylerini sorgulamak ve bulguları 3. ve 4. sınıflar arasında ve staj yapan ve yapmayanlar arasında karşılaştırmaktır.

Yöntem: Araştırmacılar tarafından beş bölüm ve toplam 120 sorudan oluşan bir anket oluşturulmuş ve Google Form'a aktarılan anketin linki sosyal medya platformları aracılığıyla öğrencilere gönderilmiştir.

Bulgular: Ankete 12 farklı okuldan toplam 327 (289 kız ve 38 erkek) DKT öğrencisi katılmıştır. Klinik yutma testlerini kendi başlarına yapabileceklerini düşünme ve test sonuçlarını yorumlamada kendilerine güvenme, klinik ve enstrümantal yutma değerlendirmesine ilişkin farkındalık ve bilgi düzeyleri açısından 4. sınıf öğrencilerinin 3. sınıf öğrencilerinden, staj öğrencilerinin ise staj yapmayan öğrencilerden istatistiksel olarak anlamlı düzeyde yüksek olduğu bulunmuştur ($p<0,05$). Tüm katılımcıların neredeyse yarısı enstrümantal yutma konusunda aldıkları klinik derslerin yetersiz olduğunu belirtmiştir.

Sonuç: Bu çalışmada eğitim düzeyi ve staj durumunun bireylerin yutma bozuklukları ile ilgili özgüven, bilgi ve farkındalık düzeyini etkilediği görülmüş, özellikle enstrümantal yutma değerlendirme derslerinin yetersiz olduğu tespit edilmiştir. Bu nedenle yutma bozuklukları dersinin özellikle enstrümantal yutma değerlendirmesinin içeriğinin artırılması ve derste öğretilenlerin stajda uygulamalı olarak gösterilmesi gerekmektedir. Böylece DKT'lerin yutma konusundaki farkındalıkları, bilgileri ve özgüvenleri artırılabilir.

Anahtar Sözcükler: Dil ve Konuşma Terapisi, Farkındalık, Bilgi, Yutma, Disfaji, Değerlendirme

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INTRODUCTION

Swallowing is a neurologically controlled series of rapid and overlapping movements starring the muscles of the oral cavity, pharynx, larynx, esophagus, and stomach[1]. Swallowing consists of oral preparation and transit, pharyngeal, and esophageal phases[2]. Food is held and chewed in the mouth during the oral preparation phase in order to get it ready for swallowing. The bolus is transported to the oropharynx during the oral transit phase by the tongue moving and interacting with the palate, tongue, teeth, and cheeks[1]. The pharyngeal phase

begins when the bolus reaches the level of the valleculae and ends when the upper esophageal sphincter closes[2,3]. The esophageal phase ends with the delivery of the bolus from the esophagus to the stomach[4]. If there is a problem in one or more of these phases, a swallowing disorder (dysphagia) is observed. Various medical conditions that can lead to dysphagia include neurological and neurodegenerative diseases, structural diagnoses, connective tissue disorders, severe respiratory failure, psychogenic causes, and iatrogenic causes[2,5]. Because the prevalence of dysphagia varies between diseases, it is difficult to determine the prevalence of this symptom in the general population[5].

A multidisciplinary team that consist of speech-language pathologists, physicians, nurses, physiotherapists, and dietitians deals with disease-related dysphagia[6]. Symptoms of dysphagia include oral residue, drooling, coughing, and/or change in voice during meals; prolonged meal duration; weight loss; malnutrition; nasal regurgitation; and odynophagia[7]. Dysphagia causes morbidity and mortality by leading to malnutrition, dehydration, weight loss, and aspiration pneumonia[8,9]. Dysphagia not only has a negative physical impact but can also have psychological effects such as increased anxiety and low self-esteem[8,10]. From a social perspective, mealtimes can be very stressful for individuals with dysphagia; going to a restaurant may no longer be enjoyable for them, and they may seek social isolation[11]. Finally, dysphagia is both financially burdensome and a physical, social, and psychological burden for caregivers. The reasons for increases in healthcare costs due to dysphagia may be related to a variety of factors, including longer hospital stays, more frequent emergency department admissions, infectious complications, discharges to rehabilitation settings and nursing homes, treatment, and medical equipment[6,12,13].

Dysphagia needs to be handled carefully as it affects both the individual and the caregiver psychologically, physically, socially, and financially, and also places a financial burden on the supporting health services. Therefore, a large number of patients in need should be evaluated with clinical and instrumental methods[2]. Clinical assessment is also defined as bedside swallowing assessment. Clinical assessment roughly includes screening procedures, medical history, physical assessment of structures involved in swallowing, swallowing tests, and tests used to detect aspiration[2,14]. An instrumental assessment of swallowing is often necessary to confirm the impressions of the clinical assessment and provide direct guidance on the safety of oral feding[1,14]. The most commonly used instrumental assessment tools are the Videofluoroscopic Swallow Study/Modified Barium Swallow Study (VFSS/MBSS) and Fiberoptic Endoscopic Evaluation of Swallowing (FEES), which are considered the gold standard of swallowing[2]. Other instrumental methods include manometry, the Iowa Oral Performance Instrument (IOPI), which measures tongue pressure and strength, ultrasound, eletromyography (EMG), and scintigraphy[1].

It is important for speech and language therapy/pathology (SLP) students to provide better service to individuals with dysphagia upon graduation in order to provide adequate quality and duration of training and clinical practices for the implementation of clinical and instrumental swallowing assessments. Therefore, it is important to question the knowledge of SLP undergraduate students about clinical and instrumental assessment of dysphagia and to determine in which areas they should be supported more. In addition, if there is content that is not included in the training program, guiding studies are needed for educators. In a study conducted in the literature, the knowledge of SLP undergraduate students about bedside swallowing assessment was examined[15]. As a result of the study, they thought that most of the SLP undergraduate students had sufficient theoretical knowledge about bedside swallowing assessment, but the reason why they felt inadequate in terms of education might be the lack of sufficient practical application; however, they did not make a comparison according to practical application status[15]. Gölaç, İncebay, and Esen-Aydınlı (2022) examined the training received by SLPs working actively in the field and the opportunities to practice in clinical practice. However, there is no study examining the awareness and knowledge levels of SLP candidates about general dysphagia, including bedside and instrumental assessments[5]. When the international literature is examined, it is seen that

there are awareness and self-efficacy studies on swallowing disorders for SLP graduate students[16,17] or SLPs working in the field[18,19].

To the best of our knowledge, there is no study that examines the general dysphagia awareness and knowledge levels of SLP students and compares the findings between the 3rd and 4th grades and between those with and without internships. Knowing the symptoms associated with dysphagia and complications of dysphagia before evaluation is a guide for clinical and instrumental evaluation. Unlike the study in the literature, the awareness and knowledge levels of students regarding dysphagia-related symptoms and complications will be examined through cynical and instrumental assessment. As a result, it is predicted that the educators will be able to determine the information that the student needs to complete. It will allow for reviewing the opportunities to be offered for both theoretical and practical applications. Based on this information, the aim of this study was to question the awareness and knowledge levels of undergraduate students in the department of speech and language therapy regarding clinical and instrumental swallowing assessment and compare the findings between the 3rd and 4th grades and between those with and without internships.

MATERIAL and METHODS

This study was conducted with the approval of the ethics committee of Üsküdar University, with the number 61351342. It was conducted in accordance with the principles of the Declaration of Helsinki by obtaining consent from the participants in the first question.

Survey questions

First of all, the questionnaire on awareness and knowledge levels of SLPs was created by the researchers in Word format after reviewing the literature and discussing the questions[20-22]. The questionnaire was designed to consist of five multiple-choice sections, excluding the age and patient observation questions. The agreed-upon questions were transferred to Google Forms. The form was sent to three expert speech and language therapists who were not familiar with the questionnaire and were asked about the comprehensibility of the questions. After the expert feedback, 3 more question items were added, and 2 questions were changed for clarity. The final version of the questionnaire, which has five sections, has a total of 120 questions.

The first part of the questionnaire included demographic information such as grade level, gender, school name, and age. The second part aims to obtain information about the status of taking courses on clinical and instrumental evaluation of swallowing disorders and the adequacy level of the courses, internship status, internship hours, patient observation opportunities, and theoretical and practical courses on swallowing disorders. The third part includes awareness questions about dysphagia risks, complications, and clinical and instrumental evaluation. The fourth section aims to measure the level of knowledge about diseases affecting swallowing function and the clinical and instrumental evaluation of dysphagia. In the awareness section, there are "yes" and "no,", and in the knowledge section, there are 3-choice elective questions as "yes,", "no," and "I don't know". In the fifth section, questions were asked to obtain the opinions of the students about performing the clinical and instrumental evaluation themselves and their self-confidence.

Participants and procedure

The inclusion criteria were to be a 3rd or 4th year SLP undergraduate student and to have taken or be taking a course on swallowing therapy. The reason for selecting only 3rd and 4th grades was that the swallowing disorders course was taught and completed in these grades. Because the questionnaire was sent to the students at a time when the school semester was about to end. The link to the questionnaire was sent to students via social media platforms such as Facebook, WhatsApp, and Instagram. The open period for completing the questionnaire was set at one week, and the data were collected between May 26 and June 2, 2023.

Statistical analysis

The analyses were performed after the data were transferred to the IBM SPSS (Statistical Package for the Social Sciences) 23.0 program and edited. For descriptive analyses, categorical variables were evaluated as number and percentage, normally distributed numerical variables as mean and standard deviation, and non-normally distributed numerical variables as median (minimum-maximum). The Chi-squared

test was used for two-group comparisons according to the normality distribution of the data obtained. $p<0.05$ was accepted as a significant difference.

RESULTS

A total of 327 (289 female and 38 male) SLP students from 12 different schools participated in the survey. The mean age of the participants was 22.388±2.47 years; 44.04% (n = 144) were in the fourth year, and 55.96% (n = 183) were in the third year (Table 1).

In terms of swallowing, 11.90% of those who did not do an internship and 1.71% of those who did an internship stated that they did not take lessons on instrumental swallowing assessment, and the result showed a statistically significant difference between the two groups ($p = 0.001$). Of all participants, 58.72% of clinical and 48.93% of instrumental swallowing evaluations were thought to be adequate. The adequacy of training in clinical swallowing assessment differed statistically significantly between those who did not do swallowing internships and those who did, and between 3rd graders and 4th graders ($p<0.05$) (Table 2).

For the clinical swallowing test, it was found that a statistically significant higher number of 4th graders than 3rd graders and with internships than without internships thought that they could perform the tests on their own and were confident in interpreting the test results. Only 4th grade students (52.08%) were statistically significantly more confident in performing instrumental swallowing assessments and interpreting the findings than 3rd grade students (32.24%)(Table 2).

It was found that the awareness of the tests and scales used in clinical swallowing assessment in the international literature was statistically significantly higher in the 4th grade compared to the 3rd grade in 8 different tests and in the internship students compared to the non-internship students in 7 different tests (Table 3).

In instrumental evaluation, it was found that the awareness of the 4th graders was statistically different from that of the 3rd graders, and those who had an internship were statistically different from those who did not have an internship in three different evaluation methods (Table 4).

In the dysphagia symptoms section, statistically significant differences were found in 2 findings between those who did not have an internship and those who did and in 5 findings between 4th graders and 3rd graders. Among all SLP students, the most common symptom of dysphagia was a feeling of getting stuck in the throat (99.08%), and the least common symptom was bulbar symptoms (68.20%)(Table 5).

In the knowledge question, the most correct answer was the item "Head and body position of the person is important in clinical swallowing evaluation" with 92.97%, while the least correct answer was the item "Pharyngeal residue can be determined in ultrasound evaluation" with 15.92%.

There were statistically significant differences between the 3rd and 4th grades on 5 of the 21 questions about the level of knowledge for clinic and internship assessment items, and between students with and without internships on 11 of the questions.In addition, SLP students most frequently responded to the following items: "MBSS provides the best kinematic analysis of swallowing" (45.57%) and "a score of 3 or more on the EAT-10 scale indicates a risk of dysphagia" (39.45%). 39.45% of SLP students stated that they did not know the items "Yale Pharyngeal Residue Severity Rating Scale or Visual Analysis of Swallowing Efficiency and Safety (VASES) scales can be used to rate residual status in instrumental swallowing assessment."

Among the knowledge questions about clinical diseases affecting swallowing function, the most correct answers were "Parkinson's disease" (98.17%) and "head and neck cancers" (97.25%), while the least correct answers were "poliomyositis" (8.56%) and "upper respiratory tract infection" (18.04%), respectively. In addition, 57.49% of SLP students stated that they did not know whether poliomyositis, 23.24% of Wilson's disease, 22.02% of myotonic muscular dystrophy, and spinal muscular atrophy cause dysphagia. Among the 25 disease, disorder, or syndrome items, statistically significant differences were found in 6 items between 3rd and 4th grades and in 4 items between those with and without internships.

Table 1: Demographic information and internship status, internship hours, patient observation opportunities

Age (mean±SD) years	22.388 ± 2.47
Gender n (%)	
Female	289 (88.38)
Male	38 (11.629
Education n (%)	
4th Grade	144 (44.04)
3rd Grade	183 (55.96)
School n (%)	
Ankara Yıldırım Beyazıt University	59 (18.04)
Hacettepe University	54 (16.51)
Kapadokya University	24 (7.34)
Kutahya Health Sciences University	13 (3.98)
İzmir Bakırçay University	38 (11.62)
University of Health Sciences	63 (19.27)
Samsun Ondokuz Mayıs University	44 (13.46)
Üsküdar University	18 (5.50)
Biruni University	8 (2.45)
Others (3 school)	6 (1.83)
Does your swallowing disorders course have a practical internship? n (%)	
There is	117 (35.78)
None	132 (40.37)
Will be	78 (23.85)
If you have a practice internship, how many hours per week do you do your internship? (if not, you can write 0)	2.043 ± 5.493
How many patients did you observe during your practice internship? (you can write 0 if you did not observe)	8.459 ± 25.484

Table 2: Theoretical and practical courses on swallowing disorders the students about performing the clinical and instrumental evaluation themselves and their self-confidence

		All participants N (%)	3rd Grade	4th Grade	X^2;p	Internship	Non-internship	X^2;p
Did you have a course on clinical/instrumental swallowing assessment during your undergraduate period?								
Clinical swallowing assessment	**Yes**	326 (99.69)	183 (100)	143 (99.31)	-	117 (100)	209 (99.52)	-
	No	1 (0.31)	0 (0.00)	1 (0.69)		0 (0.00)	1 (0.48)	
Instrumental swallowing assessment	**Yes**	300 (91.74)	170 (92.90)	130 (90.28)	0.729; p=0.393	115 (98.29)	185 (88.10)	10.310; **p=0.001**
	No	27 (8.26)	13 (7.10)	14 (9.72)		2 (1.71)	25 (11.90)	
Do you think the information about clinical/instrumental swallowing assessment you received during your undergraduate education was sufficient?								
Clinical swallowing assessment	**Yes**	192 (58.72)	96 (52.46)	96 (66.67)	6.711; **p=0.009**	86 (73.50)	106 (50.48)	16.437; **p=0.001**
	No	135 (41.28)	87 (47.54)	48 (33.33)		31 (26.50)	104 (49.52)	
Instrumental swallowing assessment	**Yes**	160 (48.93)	81 (44.26)	79 (54.86)	3.623; p=0.057	74 (63.25)	86 (40.95)	2.138; p=0.144
	No	167 (51.07)	102 (55.74)	65 (45.14)		43 (36.75)	124 (59.05)	
I can perform the clinical swallowing assessment on my own.								
	Yes	130 (39.76)	48 (26.23)	82 (56.94))	31.743 ; **p<0.001**	67 (57.26)	63 (30.00)	23.3213; **p<0.001**
	No	197 (60.24)	135 (73.77)	62 (43.06)		50 (42.74)	147 (70.00)	
I am not confident in performing and interpreting clinical swallowing assessment.								
	Yes	195 (59.63)	121 (66.12)	74 (51.39)	7.265; **p=0.008**	61 (52.14)	134 (63.81)	4.253; **p=0.039**
	No	132 (40.37)	62 (33.88)	70 (48.62)		56 (47.86)	76 (36.19)	
I can perform some of the instrumental swallowing assessments myself.								
	Yes	179 (54.74)	96 (52.46)	83 (57.64)	0.873; p=0.350.	71 (60.68)	108 (51.43)	2.598; p=0.107
	No	148 (45.26)	87 (47.54)	61 (42.36)		46 (39.32)	102 (48.57)	
I am not confident in performing instrumental swallowing assessment and interpreting the findings.								
	Yes	193 (59.02)	124 (67.76)	69 (47.92)	13.119; **p=0.001**	62 (52.99)	131 (62.38)	2.739; p=0.098
	No	134 (40.98)	59 (32.24)	75 (52.08)		55 (47.01)	79 (37.62)	

Table 3: Awareness questions about dysphagia: clinical evaluation

		All participants Yes N; No N	3rd Grade Yes N; No N	4th Grade Yes N; No N	X^2;p	Internship Yes N; No N	Non-internship Yes N; No N	X^2;p
1.	**Bedside Swallowing Assessment**	315 ;12	174;9	141;3	1.832;p= 0.176	114;3	201;9	0.630;p=0.428
2.	**Burke Dysphagia Screening Test**	138;189	73;110	65;79	0.91;p=0.340	45;72	93;117	1.0449;p=0.307
3.	**Gugging Swallowing Screen Test (GUSS)**	223;104	120;63	113;31	6.546 **p=0.011**	86;31	137;73	2.367;p=0.124
4.	**Water Swallow Test**	178;149	98;85	80;64	0.130;p=0.718	62;55	116;94	0.153;p=0.696
5.	**Massey Bedside Swallowing Screen**	186;141	99;84	87;57	1.312;p=0.252	71;46	115;95	1.074;p=0.300
6.	**Modified Mann Assessment of Swallowing Ability(MMASA)**	200;127	109;74	91;53	0.447;p=0.504	31;86	124;86	**31.933;p< 0.001**
7.	**10 ml bedside water swallowing test**	281;46	153;30	128;16	1.860;p=0.173	108;9	173;37	**6.125;p=0.013**
8.	**Barnes Jewish Hospital Stroke Dysphagia Screen**	55;272	33;150	22;122	0.437;p=0.508	13;104	42;168	**4.243;p=0.039**
9.	**Timed Water Swallow Test (TWST)**	77;250	50;133	27;117	**3.289;p=0.070**	25;92	52;158	0.481;p=0.488
10.	**3-Ounce Water Swallow Test**	273;54	141;42	132;12	**12.489;p=0.001**	112;5	161;49	**19.799;p< 0.001**
11.	**Scottish Intercollegiate Guideline Network**	21;306	13;170	8;136	0.3215;p=0.571	5;112	16;194	1.399;p=0.239
12.	**Northwestern Dysphagia Patient Check List**	32;295	18;165	11;133	0.481;p=0.488	10;107	22;188	0.3168;p=0.574
13.	**Toronto Bedside Swallowing Screening Test (TOR-BSST)**	203;124	97;86	106;38	**14.535;p=0.001**	93;24	110;100	**23.452;p< 0.001**
14.	**Modified Evans Blue Dye Test (MEBDT)**	258;69	138;45	120;24	3.039;p=0.081	95,22	163;47	0.578;p=0.448
15.	**Swallowing Impairment Index (SIS-6)**	120;207	60;123	60;84	2.735;p=0.098	45;72	75;135	0.244;p=0.621
16.	**Eating Assessment Tool (EAT-10)**	294;33	161;22	133;11	1.706;p=0.191	108;9	186;24	1.156;p=0.282
17.	**Volume-Viscosity Swallowing Test (V-VST)**	133;194	80;103	53;91	1.595;p=0.207	41;76	92;118	2.393;p=0.122
18.	**Sydney Swallowing Questionnare**	175;152	125;58	77;67	**7.509;p=0.006**	68;49	107;103	1.552;p=0.21
19.	**Swallowing Disturbance Questionnare**	148;179	76;107	72;72	2.334;p=0.127	65;52	83;127	**7.79;p=0.005**
20.	**Screening Tool for Acute Neurological Dysphagia (STAND)**	78;249	47;136	31;113	0.766; p=0.381	26;91	52;158	0.267;p=0.605
21.	**Standardized Bedside Swallow Assessment**	160;167	86;97	74;70	0.623;p=0.430	58;59	102;108	0.030;p=0.862
22.	**Yale Swallow Protocol**	226;101	138;45	88;56	**7.718; p=0.005**	92;25	134;76	**7.734;p=0.005**
23.	**M. D. Anderson Dysphagia Inventory**	63;264	35;148	28;116	0.005;p=0.942	23;94	40;170	0.018;p=0.893
24.	**Swallow Quality of Life Questionnaire. (SWAL-QOL)***	235;92	125;58	110;34	2.604;p=0.107	90;27	145;65	2.305;p=0.129
25.	**Dysphagia Assessment Scale in Multiple Sclerosis (DYMUS)**	124;203	68;115	56;88	0.103;p=0.749	45;72	79;131	0.023;p=0.880
26.	**Dysphagia Handicap Index (DHI)**	247;80	128;55	119;25	**7.0265;p=0.008**	94;23	153;57	2.278;p=0.131
27.	**Schedule for Oral Motor Assessment (SOMA)***	200;127	103;80	97;47	**4.163;p=0.041**	78;39	122;88	2.324;p=0.127
28.	**Pedi EAT-10**	187;140	96;87	91;53	3.793;p=0.051	74;43	113;97	2.734;p=0.098
29.	**Neo EAT-10**	101;226	56;127	45;99	0.016;p=0.899	39;78	62;148	0.511;p=0.475

Table 4: Awareness questions about dysphagia: instrumental evaluation

	All participants Yes N; No N	3rd Grade Yes N; No N	4th Grade Yes N; No N	X^2;p	Internship Yes N; No N	Non-internship Yes N; No N	X^2;p
1. Fiberoptic Endoscopic Evaluation of Swallowing (FEES)	305;22	166;17	139;5	4.346; **p=0.037**	115;2	190;20	7.312; p=0.007
2. Modified Barium Swallow Study (MBSS)	307;20	166;17	141;3	7.288; **p=0.007**	112;5	195;15	1.077; p=0.299
3. High-Resolution Manometry (HRM)	150;177	87;96	63;81	0.466; p=0.495	45;72	105;105	4.029; p=0.045
4. Ultrasonography	269;58	151;32	118;26	0.018; p=0.894	100;17	169;41	1.284; p=0.257
5. Electromyography (EMG)	307;20	166;17	141;3	7.288; **p=0.007**	112;5	195;15	1.077; p=0.299
6. Iowa Oral Performance Instrument (IOPI)	100;227	45;138	55;89	7.026; **p=0.008**	41;76	59;151	1.708; p=0.191
7. Cervical Auscultation	84;243	40;143	44;100	3.194; p=0.074	31;86	53;157	0.062; p=0.803
8. Scintigraphy	96; 231	49;134	47;97	1.336; p=0.248	52;65	44; 166	19.995; p < 0.001

Table 5: Awareness questions about dysphagia: risks, complications

	All participants Yes N; No N	3rd Grade Yes N; No N	4th Grade Yes N; No N	X^2;p	Internship Yes N; No N	Non-internship Yes N; No N	X^2;p
1. Weight Loss	306;21	165;18	141;3	**8.060;p=0.005**	114;3	192;18	**19.995;p < 0.001**
2. Being in the geriatric period	270;57	147;36	123;21	1.45;p=0.229	95;22	175;35	0.238;p=0.625
3. Gastrointestinal symptoms	276;51	154;29	122;22	0.019;p=0.888	98;19	178;32	0.057;p=0.811
4. Pulmonary infections	271;56	144;39	127;17	**5.131;p=0.024**	99;18	172;38	0.389;p=0.533
5. Difficult swallowing	322;5	181;2	141;3	0.525;p=0.469	114;3	208;2	1.296;p=0.255
6. Bulbar symptoms	223;104	115;68	108;36	**5.493;p=0.019**	89;28	134;76	**5.206;p=0.023**
7. Gastroesophageal reflux (GERD)	291;36	165;18	126;18	0.584;p=0.445	107;10	184;26	1.127;p=0.288
8. Symptoms of dehydration/malnutrition	307;20	169;14	138;6	1.703;p=0.192	113;4	194;16	2.309;p=0.129
9. Change of voice	283;44	151;32	132;12	**5.798;p=0.016**	105;12	178;32	0.668;p=0.414
10. Drooling	311;16	174;9	137;7	0.001;p=0.981	111;6	200;10	0.022;p=0.883
11. Sticking sensation in the throat	324;3	180;3	144;0	-	116;1	208;2	0.008;p=0.929
12. Cough after eating	323;4	180;3	143;1	0.596;p=0.440	115;2	208;2	0.356;p=0.551
13. Medical diagnosis of the client	305;22	165;18	140;4	**6.398;p=0.011**	112;5	193;17	1.749;p=0.186
14. Swallowing several times	294;33	161;22	133;11	1.706;p=0.191	110;7	184;26	3.389;p=0.065
1. Increased mortality rate	249;78	134;49	115;29	1.954;p=0.162	94;23	155;55	1.765;p=0.184
2. Pneumonia	310;17	170;13	140;4	3.060;p=0.080	113;4	197;13	1.171; p=0.279
3. General weakness	230;97	132;51	98;46	0.642;p=0.423	82;35	148;62	0.005; p=0.941
4. Problems with digestion	235;92	135;48	100;44	0.746;p=0.388	84;33	151;59	0.001; p=0.983
5. Aspiration	326;1	182;1	144;0	-	117;0	209;1	-
6. Dehydration	299;28	171;12	128;16	2.134;p=0.144	109;8	190;20	0.693; p=0.405
7. Chest pain	223;104	112;71	111;33	**9.371;p=0.002**	84;33	139;71	1.088; p=0.297
8. Malnutrition	270;57	146;37	124;20	2.243;p=0.134	104;13	166;44	**5.909; p=0.015**

DISCUSSION

While the number of dysphagia centers where evidence-based practices are performed for patients with swallowing disorders is rapidly increasing all over the world, the SLP profession is still in its infancy in many developing countries such as Turkey[5]. In countries where the SLP profession is still in its infancy, subjective evaluation of the competence of undergraduate and graduate education programs and the adequacy of the clinical practices offered is important in terms of updating and improving the education curriculum. When the studies investigating the knowledge, attitudes, awareness, and self-efficacy perceptions of SLP candidates in the national literature were examined, it was found that studies on phonological awareness[23], effective communication self-efficacy[24], traumatic brain injury[25], genetics[26], family-centered service[27] and bedside swallowing assessment[15]. In the graduate SLP population, there were studies on selective mutism[28], and bedside swallowing assessment[29]. To the best of our knowledge, this is the first study to examine the general dysphagia awareness and knowledge levels of SLP students, to compare the findings between the 3rd and 4th grades, and to compare those with and without an internship in swallowing disorders.

In our study, based on a survey of 327 speech-language pathology students from 12 different schools, the level of knowledge and educational experiences of students regarding clinical and instrumental swallowing assessment were analyzed. The majority of the respondents (99.6%) indicated that they had taken clinical swallowing courses, and 91.74% had taken instrumental swallowing courses. However, an important point that draws attention in the survey results is that 11.90% of the participants stated that they did not have an internship in clinical swallowing or a course in instrumental swallowing. This finding reveals the concern that students who cannot receive education in this field may graduate with insufficient knowledge and experience. Hatlevik (2012) states that there is a strong relationship between theoretical knowledge and clinical practice and that therapists are more successful in areas where practice opportunities are offered[30]. This may also affect the number of therapists working in the field of dysphagia.

Almost half of all participants (48.93%) thought that the information they received during their undergraduate years about instrumental swallowing assessment was sufficient, while 58.72% thought that the information about clinical swallowing assessment was sufficient. These results suggest that students are generally better prepared for clinical swallowing assessment but need more training for instrumental swallowing assessment. This finding supports the conclusion of Gölaç, İncebay, and Esen-Aydınlı (2022) that instrumental swallowing assessment is used less frequently than clinical swallowing assessment. In fact, in general, both clinical and instrumental assessment results are lower than expected[5]. This situation shows that the content of the courses for both clinical and instrumental swallowing assessment should be organized and its adequacy should be increased. Therapists tend to turn to the assessment tool for which they think they have received more adequate training in the clinic, but it should not be forgotten that clinical and instrumental evaluation are inseparable and complementary steps of swallowing evaluation as a whole. In addition, it is seen that those who did not do swallowing internships thought that clinical swallowing assessment training was insufficient significantly more than those who did internships, and 3rd graders than 4th graders. Considering that clinical internship is included in the 4th grade program in some university curricula, it is thought that the determining variable here is internship. As emphasized by Koçak, Altun, and Bengisu (2022) in their study, it is thought to reflect the importance of presenting information about clinical swallowing assessment not only theoretically but also as a clinical internship during the undergraduate period[15].

In the literature, it is stated that decreased exposure and practice related to dysphagia intervention in SLP students may result in lower self-perception and self-confidence[16,19]. In this study, it was determined that SLP students' self-

confidence in clinical and instrumental swallow assessment was different. In general, half or more than half of the students stated that they were not confident in interpreting clinical or instrumental assessments. Koçak, Altun, and Bengisu (2022) examined the knowledge of SLP students about bedside swallowing assessment and reported that the majority of students did not feel competent in practice[15]. Hazelwood et al. (2022) found that SLP graduate students reported lower self-efficacy in all areas of dysphagia intervention[16]; Knollhoff (2023) found that SLP graduate students did not feel clinically prepared at all despite taking courses in pediatric dysphagia management[17]; and O'Donoghue and Dean-Claytor (2008), who conducted research in the SLP population working in schools, found that therapists reported a low level of self-confidence in dysphagia intervention[31]. Our study's findings support the literature. When the findings are considered as a whole, it can be said that the lack of clinical practice opportunities during the training process of therapists affects their readiness and self-confidence levels in dysphagia intervention[30-33]. In addition, in our study, it was found that for clinical swallowing assessment, 4th grade students and those with internships believed that they could perform the tests alone and interpret the results at a higher rate than 3rd grade students and those without internships. However, for instrumental swallowing assessment, only 4th-year students were more confident in interpreting the tests and findings than 3rd-year students. This finding showed the effect of internship and case experience on clinical swallowing assessment and self-confidence. In addition, the fact that all students found their level of knowledge about instrumental swallowing assessment insufficient may have also contributed to this result.

In our study, the awareness levels of SLP students about the tests and scales used for clinical swallowing assessment, instrumental swallowing assessment methods, dysphagia symptoms, and complications of dysphagia were higher in 4th grade than in 3rd grade, and in those with internships than in those without internships. These results show that the awareness levels of SLP students about the tests and scales used in clinical swallowing assessment, instrumental swallowing assessment methods, dysphagia symptoms, and dysphagia complications may differ depending on their level of education and internship experience. One reason for this may be that educational programs and internship opportunities help students gain more in-depth knowledge and experience in their specialty areas. Another reason may be that 4th year students hear more about tests, scales, and instrumental swallowing assessment methods; these tests are taught in more detail later in the training programs, and they are exposed to more practice in their internship experiences. It may also have been influenced by the fact that SLP students who had an internship saw more different tests, scales, and instrumental swallowing assessment methods during the internship and gained more knowledge about dysphagia symptoms and complications through practical experiences. In the study conducted by Jelvani (2013), it was stated that transforming the theoretical knowledge of SLP undergraduate students on swallowing into practice and having the chance to observe an SLP working in a hospital environment contributed significantly to the professional development of the students[36].

In our study, the most well-known tests for clinical swallowing assessment were the Bedside Swallowing Assessment (EATS), Eating Assessment Tool (EAT-10), 10 ml bedside water swallowing test, 3 oz water swallowing test, modified Evans blue dye test, dysphagia handicap index, Turkish Swallow Quality of Life Questionnaire (T-SWAL-QOL), Yale Swallowing Test, and the Gugging Swallowing Screen (GUSS). On the other hand, the least known tests include the Scottish University Cross-Guideline Network, the Northwestern Dysphagia Patient Check List, the Barnes-Jewish Hospital Stroke Dysphagia Screening (BJHITT), the M.D. Anderson Dysphagia Inventory, the Timing Test, the Screening Tool for Acute Neurologic Dysphagia (STAND), the Neo EAT-10, the Nutrition/Swallowing Impact Questionnaire, and the Swallowing Impairment Score (SIS-6). These findings, which list the tests used for clinical swallowing assessment in terms of SLP students' knowledge and awareness, are very important. These results

show that students have more knowledge about the tests that are standardized and widely used, especially in our country, and that they have deficiencies in lesser-known tests. Therefore, these scales should be included in the course content in order to increase awareness of the scales that are used in the literature but are less known and to increase the command of the literature in general.

We determined that the 4th grade was more aware of FEES, one of the instrumental swallowing assessment methods, compared to the 3rd grade and those who had an internship compared to those who did not. This situation suggests that FEES is affected by education and internship status, that only 3rd grade courses are not sufficient to increase its awareness, and that at least seeing the application with accumulation and practical experience may be effective. In addition, it was determined that the MBSS method was the most commonly heard instrumental method and cervical auscultation (instant sound analysis) was the least heard instrumental method. These results show that in our country, students are most knowledgeable about the MBSS method and that this method is more widely used. The gold standard for evaluating and diagnosing dysphagia is accepted as MBSS[37,38]. MBSS, also known as video fluoroscopic swallowing study (VFSS), is a fluoroscopic assessment tool that examines the swallowing mechanisms of the oropharynx and esophagus in real time[35]. Studies in the literature also report that the most frequently recommended instrumental assessment is the MBSS[20,39]. Pettigrew and O'Toole (2007), who examined the dysphagia assessment practices, clinical evaluation, and instrumental examination decision-making criteria of SLPs working in Ireland, pointed out that videofluoroscopic evaluation is the most preferred method, which is an expected result, pointing out the compatibility between its application and limitations[37]. Cervical auscultation is a clinical assessment method used to evaluate the pharyngeal phase of swallowing by listening to swallowing and swallow-related breath sounds[40]. Lagarde, Kamalski, and Van Den Engel-Hoek (2016) reported in their systematic review study that there is conflicting evidence for the validity of cervical auscultation and that the reliability would be insufficient when used as a stand-alone tool for the diagnosis of dysphagia[41]. Considering the fact that it is not widely used in dysphagia evaluation in our country, it is not surprising that cervical auscultation is the least commonly used method.

According to the results of the study, the majority of SLP students think that the most common symptoms of dysphagia are feeling stuck in the throat (99.08%), coughing after eating (98.78%), and difficult swallowing (98.47%). The majority of SLPs were generally aware of dysphagia symptoms. However, the least awareness was of bulbar symptoms (68.20%). This may have been due to their unfamiliarity with the term bulbar in general. In addition, a significant difference was found in 5 dysphagia symptom questions between 3rd and 4th grade students and in 2 dysphagia symptom questions between those with and without internships. These results indicate that awareness of dysphagia symptoms may vary according to the level of education rather than the internship. In our study, almost all of the participants accepted the risk of aspiration as a complication in the question on awareness of dysphagia complications, while the least selected complication was chest pain. In this case, it is important that training on complications of dysphagia be provided effectively for all student groups. The statistically significant difference in malnutrition complications between students with and without internships is another remarkable result. It can be interpreted as the effect of internships on increasing awareness of dysphagia complications or that malnutrition is observed more in cases taken during internships.

When the answers given to the knowledge question of the study were analyzed, it was seen that the items that the participants gave the most correct answers to were the items that questioned their knowledge about clinical swallowing assessment. These results show that the participants have basic knowledge about clinical swallowing assessment and a general awareness of this subject. The items with the least number of correct answers were mostly items involving instrumental swallowing assessment and dietary modification. It is noted

that it will be difficult to gain experience and competence, especially in the field of swallowing and eating disorders, when the number of students and programs far exceeds the number of clinical opportunities available[17]. In developing countries such as Turkey, where the number of SLP undergraduate programs is gradually increasing, insufficient opportunities, especially in areas where the need for practical training such as instrumental assessment is felt, may have affected the level of knowledge about instrumental swallowing assessment.

In the part of the study measuring the level of knowledge, significant differences were observed in the items questioning clinical and instrumental evaluation between the 3rd and 4th grades and between those with and without internships. In addition, significant differences were found in 5 items between the 3rd and 4th grades and in 11 items between those with and without internships among the 21 question items related to the level of knowledge. These results suggest that clinical practice is effective in increasing knowledge. In the study, when the questions related to the level of knowledge of SLP students about clinical diseases affecting swallowing function were examined, it was seen that the participants gave the most correct answers about Parkinson's disease and head and neck cancers, while the least correct answers were about poliomyositis and upper respiratory tract infections. It is seen that approximately more than half of the participants do not have sufficient knowledge about how rare diseases such as Wilson's disease and myotonic muscular dystrophy can affect swallowing function. Considering that dysphagia is caused by many different etiological factors, knowing the etiological factors that may cause dysphagia plays an important role in determining therapeutic strategies[42]. In line with these findings, it is seen that etiological factors related to dysphagia should be emphasized in more detail in educational curricula. In addition, among the information questions about 25 diseases, disorders, or syndromes that may cause dysphagia, significant differences were found in 6 items between 3rd and 4th grades and in 4 items between those with and without internships. These findings emphasize the importance of the theoretical and practical components of dysphagia education. It is understood that it is important to provide students with comprehensive and up-to-date information about dysphagia-related diseases and conditions as well as internship and clinical experiences in educational programs[15,16,19].

One of the strengths of our research is that it was realized with the participation of a large number of students from 12 different schools. Because almost all schools with 3rd and 4th grade students participated with at least one person. Another strength is that all items of knowledge and awareness were compared between groups one by one. Thus, it was ensured that awareness and knowledge were seen as item-specific rather than a general judgment. Another strength of the study was the inclusion of various questions to examine in detail the awareness and knowledge levels of students regarding clinical and instrumental evaluation of dysphagia and the examination of comprehensibility by blinded evaluators. In addition, it is thought that our findings will guide instructors in their educational programs in terms of providing comprehensive and up-to-date information to students about dysphagia-related diseases and conditions. Our study has some weaknesses as well as strengths. One of these is that there were 327 participants in total. Not all students from each school participated. This may make it difficult to generalize the results. Another weakness is that the question items in the sections are long. The length may have caused distraction and misleading answers to some questions.

CONCLUSION

In this study, for the first time, the knowledge and awareness of SLP students regarding clinical and instrumental swallowing assessments were compared between 3rd and 4th grades and between those with and without internships. In general, it was observed that 4th graders were better than 3rd graders, and internship students were better than non-internship students in both awareness and knowledge questions. Almost half of all participants stated that their clinical courses on instrumental swallowing were insufficient. In

addition, half or more than half of the SLPs stated that they were not confident in interpreting clinical or instrumental assessments. This suggests that internships and training may affect not only knowledge and awareness but also confidence in swallowing assessment. For this reason, more patients can be reached by increasing the content of instrumental swallowing assessment, increasing the awareness, knowledge, and self-confidence of people about swallowing, especially by increasing the content of instrumental swallowing assessment, and demonstrating what is taught by practicing with internship. By identifying the deficiencies of students before graduation, their knowledge and awareness deficiencies can be eliminated before graduation, and they can graduate with a good command of swallowing assessment.

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