Published in final edited form as:

Laryngoscope. 2024 May ; 134(5): 2115–2120. doi:10.1002/lary.31164.

Correlations Between Anxiety and/or Depression Diagnoses and Dysphagia Severity

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Abstract

Objective: An increased prevalence of mood and anxiety disorders in patients with dysphagia has been noted previously, but whether dysphagia severity may be exacerbated by anxiety and depression has never been studied before. The purpose of this study is to identify the effect of pre-existing diagnosis of anxiety and/or depression (anxiety/depression) on the Eating Assessment Tool (EAT-10), a validated patient reported outcome measure for dysphagia. We hypothesized that patients with dysphagia and normal instrumental evaluation have higher EAT-10 score in the presence of pre-existing anxiety and depression.

Methods: A retrospective chart review was conducted of patients seen at the multi-disciplinary dysphagia clinic of an urban academic institution. EAT-10 scores and pre-existing diagnoses of anxiety/depression were collected at the first visit with laryngologists. The two-sample t-test was used to compare mean EAT-10 scores between the anxiety/depression and no anxiety/depression groups, stratified by swallowing dysfunction etiology.

Results: The study included 290 consecutive patients seen starting in January 2018. In this cohort, 60 (21%) had pre-existing anxiety, 49 (17%) depression and 36 (12%) both. Overall, 59 patients had normal swallowing based on instrumental swallowing testing (flexible endoscopic evaluation of swallowing, videofluoroscopic swallow study, esophagram, or esophagoscopy). Among those, mean EAT-10 score was significantly higher in patients with anxiety and/or depression (n=30) (14.63, SD=11.42) compared to those with no anxiety and/or depression (n=29) (8.93, SD=6.59) (P=0.023).

Conclusion: While anxiety/depression may aggravate dysphagia in patients with normal swallowing function, this correlation may not hold in those with objective swallowing dysfunction.

Short Summary:

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Financial Disclosures/Conflicts of Interest

Anaïs Rameau owns equity of Perceptron Health, Inc. Anaïs Rameau is a medical advisor for Savorease, Inc.

Meeting: This study was presented as a poster at the Annual Meeting of the American Bronchoesophagological Association, Boston, MA, in May 2023.

Level of Evidence: 4

Anxiety/depression may increase dysphagia in people with normal swallowing function.

Keywords

Dysphagia; Deglutition; Anxiety; Depression

Introduction

Depression and anxiety are common mental health disorders, and they often co-occur with other chronic health conditions[1]. In 2019, the U.S. Department of Health and Human Service, National Center for Health Statistics estimated 10.8% of adults 18 or over had symptoms of anxiety disorder or depressive disorder.[2] Importantly, in the case of depression, the relationship with physical diseases has been demonstrated to be temporarily bidirectional, meaning that a history of disease increases risk of subsequent depression and vice-versa[3].

A growing body of literature has examined the presence of depression and anxiety in conjunction with voice disorders. Studies have shown there is a correlation between anxiety and depression and higher Voice Handicap Index-10 (VHI-10) scores[4]. Depression has been associated with a nearly 2-fold increased chance of patients reporting voice problems[5]. Additionally, patients with a history of depression and anxiety are susceptible to developing functional voice disorders[6–8].

People with dysphagia often report associated anxiety and affective symptoms, as dysphagia impacts health and quality of life, notably through the disruption of the social aspect of sharing meals[9]. However, the effects of pre-existing anxiety and/or depression on swallowing function surveys have not been investigated.

The Eating Assessment Tool – 10 (EAT-10) is a widely used validated patient reported outcome measure for dysphagia that can be utilized to document initial symptom severity and to monitor treatment response[10]. The purpose of this study was to evaluate the effects of pre-existing diagnosis of depression and/or anxiety on EAT-10 in subjects with normal and abnormal swallowing function on instrumental swallow evaluation (fluoroscopy, flexible endoscopic evaluation of swallowing, or esophagoscopy). We hypothesized that subjects with a diagnosis of anxiety and/or depression with normal instrumental swallow evaluation may present with higher EAT-10 scores that those without those co-occurring mental disorders.

Methods

This was a retrospective data analysis completed via a REDCap[11] database. All procedures performed were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Approval was obtained from the Weill Cornell Medical College Institutional Review Board (# 22-02024665).

Study participants

All new patients evaluated for dysphagia (ICD code R13.10–19) in an urban laryngology clinic by three laryngologists over a period of 4 years (January 1, 2018 to October 2022) were investigated. Patients' Epic charts were reviewed for pre-existing medical history of anxiety or depression. The diagnosis needed to precede laryngology evaluation and be listed in the medical history. Patients may have had other diagnosis codes associated with the encounter, including dysphonia, gastro-esophageal reflux disease, cough or shortness of breath.

Subjects were included if they had completed the EAT-10 questionnaire, were evaluated by a laryngologist with laryngoscopy and/or stroboscopy, and had instrumental swallow evaluation including videofluoroscopic swallow study (VFSS), flexible endoscopic evaluation of swallowing (FEES), esophagram, or esophagoscopy. Patients were excluded if they had not completed the EAT-10 questionnaire, were coming for a follow-up visit, had no etiology of dysphagia in the laryngologist's evaluation in the medical records, or no instrumental swallow evaluation.

Data Collected

The EAT-10 is a ten-question patient reported survey to assess dysphagia severity and quality of life impact[10]. The EAT-10 includes questions regarding possible swallowing and swallowing-related issues such as weight loss, stress related to swallowing, coughing during meals. Each question is rated on a five-point scale (0 = no problem, 4 = severe problem), with a total possible score of 40. A total score of three or higher is considered abnormal based on normative data. The EAT-10 has high internal consistency, test-retest reproducibility, and criterion-based validity. In addition, demographic information include age and sex were collected. We relied on the laryngologists' notes in the medical record, as well as reports from VFSS, FEES, esophagram, and esophagoscopy for the etiology of dysphagia.

Swallowing fluoroscopy, including VFSS and esophagram, provides dynamic visualization of bolus flow for assessment of swallowing physiology of multiple anatomic regions. It is considered the gold standard for a comprehensive investigation of deglutition, with VFSS completed by the trained speech-language pathologist (SLP) and the radiology team (radiologist, radiology assistant and/or radiology technologist) and esophagram completed by the radiology team. VFSS evaluates swallowing safety and efficiency via swallowing kinematics (physiology) from the lips to the pharyngoesophageal segment, and the esophagram evaluates structural and functional abnormalities from the pharyngoesophageal segment to the gastroesophageal junction[12].

FEES is an instrumental exam used in clinical practice by trained speech-language pathologists and otolaryngologists for assessment of oropharyngeal swallow function, and involves passing a flexible laryngoscope transnasally to view the pharynx, larynx, and subglottis before, during, and after a swallow of various liquid and food textures[13 14]. Esophagoscopy allows for endoscopic visualization of the aerodigestive tract and is indicated in patients with dysphagia, reflux, and globus to assess for an underlying etiology,

exclude malignant and premalignant conditions[15]. Whereas esophagogastroduodenoscopy (EGD) is typically performed with sedation, transnasal esophagoscopy (TNE), allows for safe in-office examination of the esophagus from nasal vestibule to the gastric cardia without sedation[16].

The VFSS were scored with Modified Barium Swallow Impairment Profile (MBSImP). However, the researchers used the evaluating SLP's overall impressions of the swallowing dysfunction diagnosis (e.g., oropharyngeal swallowing dysfunction, pharyngoesophageal swallowing dysfunction or normal oropharyngeal swallow), as this diagnosis was present in every SLP's dysphagia evaluation reports, whether VFSS or FEES, and specified in the relevant physician note. Data was extracted by an SLP with 10 years of clinical experience in dysphagia (VM) and a research assistant (HR). The latter was trained for the specific data extraction by VM. Reliability checks for HR were completed by VM after the initial data extraction. Both data extractors were supervised by a laryngologist (AR).

Study Design

Subjects were classified into 2 major groups according to presence of anxiety or depression: Group 1 (anxiety and/or depression present) and Group 2 (control, no anxiety or depression). Group 1 was further divided into 3 sub-groups; 1a: anxiety, 1b: depression and 1c: anxiety and depression.

Subjects were also categorized into 3 groups according to the etiology of dysphagia based on instrumental swallow evaluation: normal, oropharyngeal swallowing dysfunction for oral and/or pharyngeal dysfunction, esophageal swallowing dysfunction, oropharyngeal and esophageal swallowing dysfunction based on physician or speech-language pathologist's documentation in the electronic medical record. EAT-10 scores that were collected during the initial visit were used for statistical analysis. Instrumental studies were coded based on the diagnosis made in the MD assessment and/or the SLP assessment, depending on the study type and the information available in the chart. For the subset of patients who had more than one instrumental test, all abnormal identified swallowing dysfunctions were included. For example, for a subject with normal oropharyngeal swallowing on VFSS or FEES and esophageal dysfunction esophagram, the entry was coded as esophageal swallowing dysfunction. If patients presented with multilevel swallowing dysfunction based on MD and SLP notes, all phases of the described swallowing dysfunction were included.

Statistical Analysis

Statistical analysis was performed with SPSS version 26.0 (IBM Corp. Released 2021. IBMSPSS Statistics for Windows, Version 28.0. Armonk, NY: IBM Corp). Descriptive statistics were used for baseline characteristics in the total sample and in each group as defined by history of anxiety/depression: age, sex, and dysphagia etiology. Frequency and relative frequency were used to describe categorical variables. Summary statistics were used to characterize all data with mean values and standard deviations for all continuous data.

Two samples t-test was used to compare the mean EAT-10 scores of Groups 1 and 2. Furthermore, comparison between mean EAT-10 scores of Groups 1a, 1b, 1c and 2 was completed with ANOVA and Kruskal-Wallis test. Comparison between the mean EAT-10

scores of Groups 1 and 2 with further categorization according to dysphagia was done with two sample t-test and Wilcoxon rank-sum test. Statistical significance was set as $p<0.05$.

Results

Overall, 290 patients met inclusion criteria. The average age of the overall cohort, Group 1 and Group 2 were 66.0 ± 18.4, 63.1 ± 19.2 and 68.8 ± 18.3 respectively. While 55% of the overall cohort was female, 63% of Group 1 and 47% of Group 2 were female. Among included patients, 60 (21%) had a diagnosis of anxiety, 49 (17%) had a diagnosis of depression and 36 (12%) had a diagnosis of both. Overall, 50% of the subject population had anxiety and/or depression, with 21% of subjects with anxiety, 17% with depression and 12% with anxiety and depression. Detailed distribution of patients according to presence of anxiety and/or depression and type dysphagia is given in Table 1.

Figure 1 displays the distribution of EAT-10 according to presence or absence of diagnosis of anxiety and/or depression. Median and mean EAT-10 scores were as follows: 15 (range, 0–40) and 16.0 (sd 11.0), no anxiety or depression; 12 (range, 1–36) and 15.7 (sd 11.5), anxiety; 14 (range, 0–40) and 16.9 (sd 11.2), depression; 15 (range, 1–40) and 17.4 (sd 11.4), anxiety and depression. No significant difference was found in comparing mean EAT-10 score across mental health status as displayed in Table 2 ($p=0.85$ by ANOVA test and $p=0.84$ by Kruskal-Wallis test). Comparison of mean EAT-10 score per absence or presence of anxiety and/or depression showed a slightly higher mean EAT-10 score in patients with anxiety and/or depression (mean 16.5 vs. 16.0), but the difference was not significant ($p=0.69$ by two-sample t-test) (Table 3). Of note, EAT-10 score distribution was relatively parametric and the results were near identical for both the parametric and nonparametric analyses. Kruskal-Wallis and Wilcoxon rank-sum test results were confirmatory with the t-tests and ANOVA results.

In analyzing the distribution of EAT-10 according to the mental health diagnosis and the etiology of dysphagia, we found that, in patients with normal swallowing function based on the laryngology note and instrumental swallow evaluation, the mean EAT-10 score was statistically higher in patients with anxiety and/or depression diagnosis ($P=0.023$). No significant difference in EAT-10 was found between each group in patients with abnormal swallow based on the laryngology note or the instrumental swallow evaluation (Table 4).

Discussion

Anxiety and depression are prevalent mental health diagnoses that affect quality of life[2]. Although the frequent co-occurrence of anxiety and affective symptoms and dysphagia has been noted before[9], investigation of the severity of dysphagia in relation to anxiety and/or depression diagnosis has not been reported. Our study has revealed three important findings: 1) in our patients with normal swallowing function on instrumental examination, dysphagia symptoms were amplified in the presence of anxiety and/or depression; 2) anxiety/depression did not aggravate dysphagia in patients with objective findings of swallowing dysfunction in our clinic population; 3) consistent with other studies, we found high prevalence of anxiety and/or depression in patients presenting with dysphagia.

Our group has previously highlighted the importance of accurate terminology in distinguishing dysphagia and swallowing dysfunction. Dysphagia refers to the patient's sensation of obstruction to food passage, while swallowing disorder refers to objective findings of abnormal deglutitive function observed by clinicians[17]. This distinction is important, as the extent of swallowing dysfunction is not necessarily commensurate with the patient's discomfort, and patients may have dysphagia with no objective findings, or conversely, severe swallowing impairments requiring non-oral findings and minimal symptoms. Dysphagia and swallowing disorders, as distinct concepts, are measured with different tools. Dysphagia assessed with patient reported outcomes measures (PROMs), while swallowing dysfunction is assessed by instrumental examination - such as bedside swallow evaluation, flexible evaluation of swallowing, videofluoroscopy, esophagoscopy or high-resolution manometry. The importance of precise semantics is highlighted by the findings of our present study, with worsened dysphagia symptoms in the presence of anxiety/depression despite a normal instrumental exam.

Dysphagia may devastate one's quality of life, and has been previously associated with anxiety and affective symptoms[9]. Two recent systematic reviews demonstrated that anxiety and depression are common in patients presenting with oropharyngeal dysphagia[18]. A preliminary study of 96 outpatient adults with dysphagia presenting to a university medical center in the Netherlands for dysphagia evaluation revealed 47% of participants demonstrated affective symptoms. Screening for affective symptoms can be particularly clinically relevant in patients with head and neck cancer and concurrent dysphagia[19].

The incidence of dysphagia is expected to increase worldwide with aging populations. Gaining additional insight into mood and anxiety comorbidities in people with dysphagia will be important to further refine patient-centered multidisciplinary evaluation and treatment. Improved understanding of the relationship could contribute to a targeted multidisciplinary approach to treatment of both swallowing and mental health symptoms. Furthermore, anxiety and depression are prevalent in patients with dementia, and so is swallowing dysfunction[20,21]. Unravelling the relationship between affective disorders and deglutition may bring new insights in this complex population, with currently limited options for swallowing improvement.

Our findings resonate with prior evidence of an impact of mood and anxiety disorders on pharyngeal and pharyngoesophageal sensations. For instance, the severity of globus pharyngeus has been associated with distress caused by anxiety, low mood or depression, and somatic concern[22]. A possible pathophysiologic explanation to these findings is the known negative effect of anxiety on esophageal motility and esophageal hyperalgesia[23,24]. Thus, anxiety may play a role in higher EAT-10 scores by either heightening globus symptoms through increased hyperalgesia,[25,26] or inducing esophageal dysmotility[10]. Prospective studies with the inclusion of high resolution manometry may be helpful in elucidating an explanation for such findings.

Significance of anxiety and affective comorbidities in the field of laryngology have been mostly investigated in relation to dysphonia[4–8]. Investigations in gastroenterology, however, have suggested that psychological factors, such as anxiety or hypervigilance, may exacerbate

patients' symptoms beyond any objective physiologic abnormalities. For instance, in patients undergoing manometry, a higher score on the Esophageal Hypervigilance and Anxiety Scale questionnaire predicted severe dysphagia better than identification of a true major motility disorder[27]. Similarly, in patients with dysphagia due to eosinophilic esophagitis, a higher esophageal symptom-specific anxiety predicted severity of dysphagia better than objective findings on endoscopy or histology[28]. Supportive treatments targeting the brain-gut axis such as cognitive-behavioral therapy, swallow therapy, and neuromodulators may be effective in addressing deglutitive functional disorders[29].

The contemporary pain literature may shed new insights on the experience of somatic discomfort in relation to affective disorders in laryngology. More specifically, the concept of nociplastic pain offers a useful framework to address chronic symptoms with no obvious organic basis, which may be exacerbated by anxiety and depression. Nociplastic pain arises from the abnormal processing of pain signals without any objective findings of tissue damage or pathology involving the somatosensory system, such as in fibromyalgia or irritable bowel syndrome[30–32]. This pain category is thought to be associated with augmented sensory processing and has a high co-prevalence with psychiatric conditions. Nociplastic conditions management prioritizes non-pharmacological interventions, such as cognitive behavioral therapies, acceptance-based interventions, biofeedback and hypnotherapy, and avoidance of medication and procedural interventions which provide modest benefits[30]. Collaboration with pain medicine specialists may shed new lights on functional disorders affecting swallowing.

Our study has several limitations. As a retrospective chart review, it was limited by the data found in the electronic medical record. For instance, the presence of globus sensation in included subjects could not be investigated. Furthermore, the battery of test for dysphagia work-up was variable across included patients. We also did not include measures of severity of anxiety and depression or history of pharmaceutical intervention and cognitive behavioral therapy, as many subjects had their psychological care at other institutions, with limited documentation available in the electronic medical record. Future studies should be prospective, include patient reported outcome measures for anxiety and depression, as well as current psychological/psychiatric management regimen, in addition to a comprehensive dysphagia work-up with esophagoscopy, high resolution manometry, and FEES or VFSS. Future studies may also consider item analysis between EAT-10 and swallowing dysfunction type. Post-surgical or post-radiation head and neck cancer treatment was not specifically investigated in the subgroup analysis, and this would be investigated in the future. Of note, there were patients in both groups (no anxiety/depression & anxiety/depression) with a history of head and neck cancer. Despite these limitations, our study highlights an area of investigative deficiency in otolaryngology and suggests for the first time that anxiety and/or depression may have an impact on patients' experience of swallowing difficulty.

Conclusion:

Our retrospective study suggests that pre-existing anxiety/depression may aggravate dysphagia in patients with normal swallowing function on instrumental evaluation. A similar relationship was not demonstrated in patients with objective findings of swallowing

dysfunction. Prospective studies are needed to further delineate the relationship between patients' perception of difficulty swallowing and anxiety and affective disorders.

Funding:

Anaïs Rameau was supported by a Paul B. Beeson Emerging Leaders Career Development Award in Aging (K76 AG079040) from the National Institute on Aging and by the Bridge2AI award (OT2 OD032720) from the NIH Common Fund.

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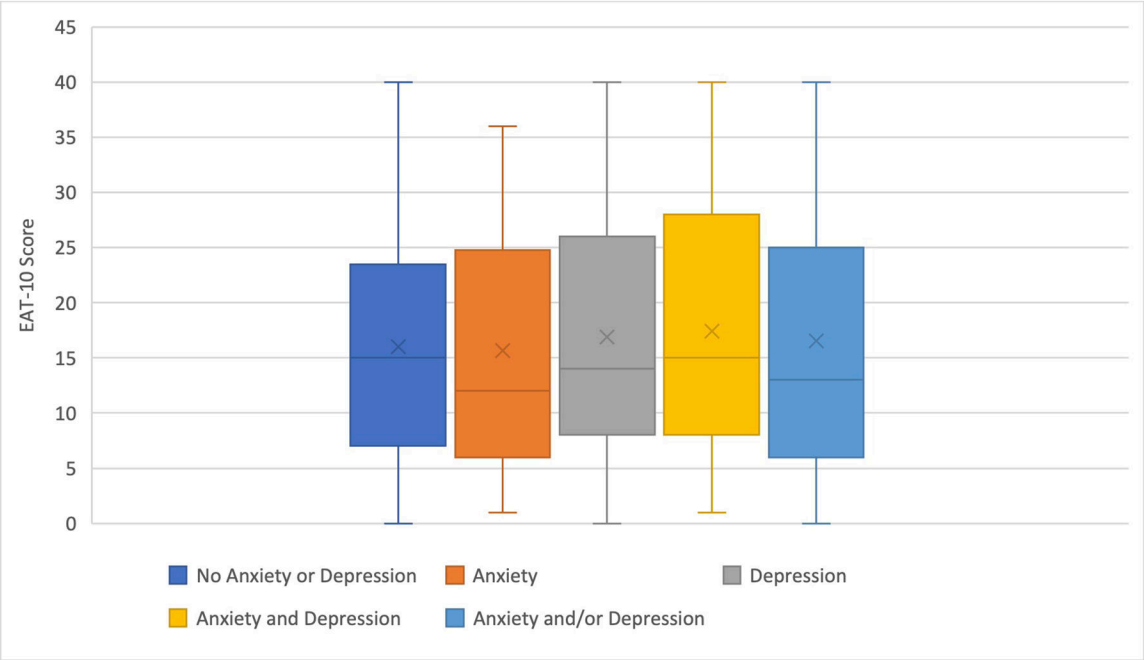

Figure 1 -
Median and mean EAT-10 scores by mental health status among all patients. Box, interquartile

Table 1:

Detailed distribution of patients according to presence of Anxiety and/or Depression and type of swallowing dysfunction

	Anxiety and/or Depression (Group 1)				Control (Group 2)	Total (Group 1 + 2)
	Anxiety	**Depression**	**Anxiety + Depression**	**Total**		
Normal swallowing	19	7	4	30	29	59
Abnormal swallowing	41	42	32	115	116	231
Oropharyngeal	7	13	10	30	36	66
Esophageal	22	25	16	63	46	109
Oropharyngeal and Esophageal	12	4	6	22	34	56

Group 1: Patients with no anxiety and/or depression, Group 2: Patients with diagnosis of anxiety and/or depression.

Table 2:

Comparison of mean EAT-10 score per mental health status with no significant difference across all groups (p=0.85 by ANOVA test and p=0.84 by Kruskal-Wallis test)

Condition	N	Mean EAT-10	Standard Deviation	Min	Max
Anxiety	60	15.7	11.5	1	36
Depression	49	16.9	11.2	0	40
Anxiety + Depression	36	17.4	11.4	1	40
None	145	16.0	11.0	0	40
Total	290	16.3	11.1	0	40

Table 3:

Comparison of mean EAT-10 score per absence or presence of anxiety and/or depression. Mean EAT-10 score slightly higher in patients with anxiety and/or depression, but no significant difference found (p=0.69 by two-sample t-test).

Group Statistics					
	Anxiety/Depression	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
EAT-10 score	None	145	16.0	11.0	0.9
	Anxiety/Depression	145	16.5	11.3	0.9

Table 4:

Comparison of mean EAT-10 scores of each group. Mean EAT-10 score appears to be statistically higher in patients with anxiety/depression (vs. neither), in the subgroup of patients with normal swallowing function (n=59) (p=0.023).

Swallowing Dysfunction		n	Mean EAT-10	Std. Dev.	p (by t-test)
Normal	Group 1	30	14.6	11.4	**0.023**
	Group 2	29	8.9	6.6	
Oropharyngeal	Group 1	30	20.3	13.1	0.7
	Group 2	36	21.5	12.1	
Esophageal	Group 1	63	16.1	10.6	0.587
	Group 2	46	14.9	10.3	
Oropharyngeal+esophageal	Group 1	22	15.3	10.2	0.4
	Group 2	34	17.7	10.2	

Group 1: Patients with anxiety and/or depression, Group 2: Patients with no diagnosis of anxiety and/or depression.