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PREVALENCE AND CHARACTERISTICS OF OROPHARYNGEAL DYSPHAGIA IN HEAD AND NECK CANCER PATIENTS IN A TERTIARY HOSPITAL IN INDONESIA

I Putu Santhi Dewantara [1, 2, *], I Wayan Sucipta[1, 2], Putu Dian Ariyanti Putri [1, 2] and Nyoman Raditya Adiprayoga [3]

[1] Otorhinolaryngology Head and Neck Surgery Department, Faculty of Medicine, Udayana University.
[2] Otorhinolaryngology Head and Neck Surgery Department, Ngoerah Hospital.
[3] Otorhinolaryngology–Head and Neck Surgery (ORL-HNS) Specialist Program, Faculty of Medicine, Udayana University.
* Corresponding Author

ORCID Details
I Putu Santhi Dewantara: https://orcid.org/0009-0007-1325-0972
I Wayan Sucipta: https://orcid.org/0009-0002-2837-2933
Putu Dian Ariyanti Putri: https://orcid.org/0009-0001-6243-1768
Nyoman Raditya Adiprayoga: https://orcid.org/0009-0001-9524-8409

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ABSTRACT

Background: Oropharyngeal dysphagia is a common concern in head and neck malignancies patients and may affect nutrition, aspiration risk, and quality of life. Oropharyngeal dysphagia may remain unrecognized in clinical practice. The aims of this study are to determine the prevalence and characteristics associated with oropharyngeal dysphagia in patients with head and neck cancers.

Method: A cross-sectional study was conducted among histopathologically confirmed head and neck cancer patients at the ORL-HNS outpatient clinic, Ngoerah Hospital, Bali, Indonesia, from April to August 2025. Demographic, oncological, and therapeutic characteristics were obtained from medical records, while oropharyngeal dysphagia was assessed using the Eating Assessment Tool-10 (EAT-10). Functional oral intake was evaluated using the Functional Oral Intake Scale (FOIS), and body mass index (BMI) was calculated from measured height and weight. Data were analyzed using cross-tabulation with the chi-square test (2×2 tables) or linear-by-linear association test (2×n tables), with $p<0.05$ considered statistically significant.

Result: Oropharyngeal dysphagia was identified in 41 patients (40.2%). Significant associations were found with treatment modality ($p=0.001$), tracheostomy ($p=0.044$), and FOIS ($p<0.001$). Dysphagia occurred in 75.0% of patients with tracheostomy and 100% of those receiving tube feeding (FOIS 1-3). No significant associations were found with sex, age, tumor location, histopathology, stage, or BMI.

Conclusion: The prevalence of oropharyngeal dysphagia is quite prevalent in head and neck cancer patients. Treatment modality, tracheostomy, and functional oral intake were significantly associated with dysphagia, highlighting the importance of routine swallowing assessment.

Keywords: oropharyngeal dysphagia; Head And Neck Cancer; Prevalence; Characteristics

1 INTRODUCTION

Head and neck cancers show an increasing trend in incidence from year to year. In 2018, this cancer ranked seventh worldwide and rose to sixth place in 2022 [1,2,3]. The cumulative incidence of head and neck cancers in Indonesia was 8.69% in 2022, making it the fifth most common cancer in Indonesia [3,4].

Recent technological developments have provided various options for treatment modalities for patients with head and neck cancers. These therapies can be highly precise and are said to be able to preserve the organs involved. However, it turns out that organ preservation is not always accompanied by the preservation of its function. One of the functions that frequently experiences impairment in patients with head and neck cancers is swallowing, which manifests as oropharyngeal dysphagia. Oropharyngeal dysphagia in head and neck cancers can be caused by various factors, namely neurological, neuromuscular, structural, and iatrogenic disorders [5,6]. This will cause impairment in the transport of the food bolus and liquids from the oral cavity to the esophagus [7,8,9,10].

The prevalence of oropharyngeal dysphagia in patients with head and neck cancers has been reported to vary between 21.3 and 85.5% in previous studies [7,11,12,13,14,15,16,17]. Although its prevalence is quite high, oropharyngeal dysphagia is still often underestimated [6]. Various complications can arise as a result of oropharyngeal dysphagia, such as dehydration, malnutrition, cachexia, choking, aspiration pneumonia, a decreased quality of life, and even death [6,18,19].

Early identification and intervention of oropharyngeal dysphagia in patients with head and neck cancers can optimize the overall therapeutic and functional outcomes of the patient. However, research regarding oropharyngeal dysphagia in head and neck cancers in Indonesia is still limited. The purpose of this study is to determine the prevalence and characteristics associated with oropharyngeal dysphagia in patients with head and neck cancers.

2 METHODS

This study is a cross-sectional study involving patients with head and neck cancers who visited the ORL-HNS (Otorhinolaryngology-Head and Neck Surgery) outpatient clinic at Ngoerah Hospital, Bali, Indonesia, during the period of April to August 2025. Ethical clearance number 0704/UN14.2.2.VII.14/LT/2025 had been granted by the Research Ethics Committee of the Faculty of Medicine of Udayana University. The inclusion criteria for this study were patients with histopathologically confirmed head and neck cancers, aged 18 years and above, and willing to participate in the study by signing an informed consent form. The exclusion criteria were patients with a history of stroke, head and neck trauma, autoimmune diseases, and degenerative diseases (Parkinson's, Alzheimer's, amyotrophic lateral sclerosis, myasthenia gravis, Guillain-Barré syndrome); incomplete completion of the Eating Assessment Tool-10 (EAT-10) and the Functional Oral Intake Scale (FOIS); and incomplete medical record data.

Head and neck cancer patients who met the research criteria and were willing to participate in the study were examined after being given an explanation and signing the informed consent form. Demographic characteristics (age, sex), oncological characteristics (tumor location, histopathological diagnosis, clinical stage), and therapeutic characteristics (chemotherapy, radiotherapy, surgery, tracheostomy) were obtain from the patients' medical records. Patients were then asked to complete the Eating Assessment Tool-10 (EAT-10) to determine whether or not they were experiencing oropharyngeal dysphagia. This questionnaire has been translated into various languages including Indonesian, demonstrating good reliability, validity, and a strong correlation with positive findings on fiberoptic endoscopic evaluation of swallowing (FEES) examinations [20]. This questionnaire consists of 10 statements related to swallowing disorders, and patients were asked to rate each statement from 0 to 4. A score of 0 indicates no problem, while a score of 4 indicates a severe problem. Patients were categorized as having oropharyngeal dysphagia if their total EAT-10 score was greater than 3 (EAT-10>3).

The patients' oral intake status was determined using the Functional Oral Intake Scale (FOIS), which consists of 7 levels. Level 1 indicates that the patient is tube-dependent and unable to swallow orally at all. Level 2-3 indicate that the patient is tube-dependent but still capable of oral intake. Level 4-6 indicate that the patient is fully capable of oral intake but with certain restrictions or modifications, and level 7 indicates that the patient can eat and swallow orally without any restrictions or modifications. The patients' weight and height were measured to determine their body mass index (BMI).

The obtained data were then tabulated, presented in tables, and analyzed using SPSS version 25. The prevalence of oropharyngeal dysphagia was determined using descriptive statistical analysis based on the total EAT-10 score. The relationship between oropharyngeal dysphagia and demographic, oncological, and therapeutic characteristics, as well as FOIS and BMI, was analyzed using cross-tabulation. The Pearson chi-square test (for 2x2 tables) and the linear-by-linear association test (for 2xn tables) were used if assumptions were violated. Statistical significance was defined as a p-value less than 0.05 ($p<0.05$).

3 RESULTS

A total of 102 patients met the study criteria, with a male proportion of 65.7%. The majority of patients belonged to the 40-59 age group (62.7%). The prevalence of dysphagia based on EAT-10 scores was 40.2%. Most patients had a primary tumor located in the nasopharynx (70.6%). Squamous cell carcinoma (29.4%) was the most frequently observed histopathological type. The vast majority of patients presented with advanced stage (stage III-IV) disease, accounting for 93.1%.

The most common treatment modality received by patients was chemotherapy (45.1%), followed by chemotherapy + radiotherapy (35.3%). A total of 5.9% of patients were treatment-naive, and 47.0% of patients received multimodality therapy. A total of 7.8% of patients required a tracheostomy. The number of patients achieving full oral intake (FOIS>3) was 90.1%; however, those capable of oral intake without restrictions or modifications (FOIS 7) accounted for 73.5%. A total of 9.9% of patients were dependent on a feeding tube (FOIS 1-3), and 6.9% received absolutely no oral intake at all (FOIS 1). Patients categorized as underweight accounted for 18.6%. The demographic data and patient characteristics are presented in Table 1.

Table 1: Demographic data and patient characteristics

Characteristics	**n**	**%**
Sex		
Male	67	65.7
Female	35	34.3
Age groups		
18-39 years old	11	10.8
40-59 years old	64	62.7
60-69 years old	20	19.6
>=70 years old	7	6.9
Dysphagia status		
Dysphagia (score EAT-10 $\geq$ 3)	41	40.2
No Dysphagia (score EAT-10 < 3)	61	59.8
Primary tumor location		
Nasopharynx	71	70.6
Larynx	11	10.8
Sinonasal	8	7.8
Tongue	6	5.9
Parotid	3	2.9
External auditory canal	2	2.0
Histopathological diagnosis		
Squamous cell carcinoma	30	29.4
Non-keratinizing squamous cell carcinoma	39	38.2
Undifferentiated carcinoma	31	30.4

Adenocarcinoma	1	1.0
Other	1	1.0
Clinical stage		
Early (stage I-II)	7	6.9
Advanced (stage III-IV)	95	93.1
Therapy		
No prior treatment	6	5.9
Chemotherapy	46	45.1
Radiotherapy	1	1.0
Surgery	1	1.0
Chemotherapy and surgery	4	3.9
Chemotherapy and radiotherapy	36	35.3
Chemotherapy, radiotherapy, and surgery	8	7.8
Tracheostomy status		
With tracheostomy	8	7.8
Without tracheostomy	94	92.2
Functional oral intake scale (FOIS)		
1	7	6.9
2	2	2.0
3	1	1.0
4	3	2.9
5	3	2.9
6	11	10.8
7	75	73.5
Body mass index (BMI)		
Underweight	19	18.6
Normal	64	62.7
Overweight	9	8.8
Obese	10	9.8

The proportion of patients experiencing oropharyngeal dysphagia did not differ substantially between males and females, at 40.3% and 40.0% respectively. The age group with the highest proportion of oropharyngeal dysphagia was the 60-69 years group, with 11 patients (55%); however, the highest total number of patients with oropharyngeal dysphagia was found in the 40-59 years group, with 26 patients (40.6%).

Patients with primary tumor locations in the larynx and tongue showed a higher proportion of oropharyngeal dysphagia compared to other tumor sites, at 63.3% and 66.7%, respectively. A total of 53.3% of patients with squamous cell carcinoma histopathology experienced oropharyngeal dysphagia, whereas for other histopathological types, the proportion of patients who did not experience oropharyngeal dysphagia was higher (>60%). Patients with early clinical stages who experienced oropharyngeal dysphagia accounted for 57.1%, whereas those in the advanced clinical stages accounted for 38.9%. Only one patient underwent radiotherapy alone and experienced oropharyngeal dysphagia, resulting in a proportion of 100%. Other treatment groups with a higher proportion of oropharyngeal dysphagia were those who received chemotherapy + surgery (75%) and chemotherapy + radiotherapy (66.7%). The majority of patients with a tracheostomy (75%) experienced oropharyngeal dysphagia, whereas only a minority of patients without a tracheostomy experienced oropharyngeal dysphagia (37.2%).

All patients (100%) who were dependent on a feeding tube (FOIS 1-3) and nearly all patients (94.1%) who required dietary restriction or modification (FOIS 4-6) experienced oropharyngeal dysphagia. In contrast, only 20% of patients experienced oropharyngeal dysphagia in the group that achieved full oral intake without modification or restriction (FOIS 7). A total of 57.9% of patients categorized as underweight experienced oropharyngeal dysphagia, whereas the majority of patients with a normal or higher BMI did not experience oropharyngeal dysphagia.

Correlation testing revealed that the characteristics of sex (p=0.977), age group (p=0.835), primary tumor location (p=0.197), histopathological diagnosis (p=0.129), clinical stage (p=0.343), and body mass index (p=0.319) did not show significant correlations. The characteristics that correlated significantly (p<0.05) with oropharyngeal dysphagia in head and neck cancer patients in this study were therapy (p=0,001), tracheostomy status (p=0.044), and FOIS (<0.001**)**. The distribution of each characteristic in patients with and without oropharyngeal dysphagia, as well as their correlations, are presented in Table 2.

Table 2: Correlation between demographic, oncological, therapeutic, and nutritional characteristics with oropharyngeal dysphagia.

Characteristics	**Oropharyngeal dysphagia**	**No oropharyngeal dysphagia**	**p-value**
	n (%)	n (%)	
Sex			
Male	27 (40.3)	40 (59.7)	0.977
Female	14 (40)	21 (60)	
Age group			
18-39	3 (27.3)	8 (72.7)	0.835
40-59	26 (40.6)	38 (59.4)	
60-69	11 (55)	9 (45)	
>=70	1 (14.4)	6 (85.7)	
Primary tumor location			
Nasopharynx	27 (37.5)	45 (62.5)	0.197
Larynx	7 (63.6)	4 (36.4)	
Sinonasal	2 (25)	6 (75)	
Tongue	4 (66.7)	2 (33.3)	
Parotid	0 (0)	3 (100)	
External auditory canal	1 (50)	1 (50)	
Histopathological diagnosis			
Squamous cell carcinoma	16 (53.3)	14 (46.7)	0.129
Non-keratinizing squamous cell carcinoma	13 (33.3)	26 (66.7)	
Undifferentiated carcinoma	12 (38.7)	19 (61.3)	
Adenocarcinoma	0 (0)	1 (100)	
Others	0 (0)	1 (100)	
Clinical stage			
Early (stages I-II)	4 (57.1)	3 (42.9)	0.343
Advanced (stages III-IV)	37 (38.9)	58 (61.1)	
Therapy			
No prior treatment	2 (33.3)	4 (66.7)	0.001
Chemotherapy	9 (19.6)	37 (80.4)	

Radiotherapy	1 (100)	0 (0)	
Surgery	0 (0)	1 (100)	
Chemotherapy and surgery	3 (75)	1 (25)	
Chemotherapy and radiotherapy	24 (66.7)	12 (33.3)	
Chemotherapy, radiotherapy, and surgery	2 (25)	6 (75)	
Tracheostomy status			
With tracheostomy	6 (75)	2 (25)	0.044
Without tracheostomy	35 (37.2)	59 (62.8)	
Functional Oral Intake Scale (FOIS)			
Dependent on feeding tube (1-3)	10 (100)	0 (0)	<0.001
Oral intake with modification/restriction (4-6)	16 (94.1)	1 (5.9)	
Oral intake without modification/restriction (7)	15 (20)	60 (80)	
Body Mass Index (BMI)			
Underweight	11 (57.9)	8 (42.1)	0.319
Normal	23 (35.9)	41 (64.1)	
Overweight	3 (33.3)	6 (66.7)	
Obese	4 (40)	6 (60)	

4 DISCUSSION

This study found a 40.2% prevalence of oropharyngeal dysphagia among head and neck cancer patients across various treatment statuses (pre-, intra-, and post-treatment). These findings are consistent with rates reported in previous studies by Pezdirec et al.[12] (41.3%), Cristofaro et al. [13] (48.3%), and Husmeela et al. [14] (43.3%). In contrast, other studies have reported varying prevalences of oropharyngeal dysphagia, including Florie et al. [7] at 21.3%, Linn et al. [21] at 59.1%, Carmignani et al. [11] at 71.0%, and Sharma et al. [17] at 85.5%. These discrepancies may be attributed to differences in study design, the diagnostic instruments used to detect oropharyngeal dysphagia, and patient population characteristics. As this study included head and neck cancer patients across various primary tumor sites, stages, histopathological types, and treatment statuses, it provides a more comprehensive overview of oropharyngeal dysphagia prevalence within this population.

Age has been reported to affect swallowing function. Compared to younger counterparts, older individuals demonstrate increased pharyngeal transit time, extended swallowing apnea durations, prolonged total swallowing time, and a more posteriorly positioned bolus. These factors increase the risk of penetration and aspiration [22,23,24]. Sex differences also impact the swallowing process. Females are known to exhibit longer oropharyngeal transit times, prolonged laryngeal closure, and a longer duration of upper esophageal sphincter opening compared to males. In contrast, males are known to swallow larger bolus volumes than females. However, this capacity has been reported to decline with age; consequently, in individuals aged 60 years and older, this difference in capacity is no longer statistically significant between males and females [23].

This study found no significant correlation between age or sex and oropharyngeal dysphagia. This suggests that all head and neck cancer patients share a similar risk of developing oropharyngeal dysphagia, regardless of age group or sex. Similar findings have been reported in previous studies [14,15,17]. In contrast, Liou et al. [25] reported that advanced age is associated with poorer PAS scores, reflecting impaired swallowing function in head and neck cancer patients.

The most common primary tumor location in this study was the nasopharynx (70.6%). This finding differs from previous reports, particularly those from Western countries, which are predominantly dominated by oropharyngeal, laryngeal, and oral cavity malignancies. Nasopharyngeal carcinoma (NPC) exhibits a specific geographic prevalence, with a higher incidence in China and Southeast Asia compared to Western Europe and North America [26]. Data from

2020 showed that NPC ranks sixth among all malignancies in Indonesia. Furthermore, the incidence of NPC in Indonesia (4.6%) is also reported to exceed its global incidence (0.6%) [2,4].

Previous studies have identified a significant correlation between the primary tumor location of head and neck cancers and the incidence of oropharyngeal dysphagia. Pezdirec et al [12] reported a significantly higher prevalence of oropharyngeal dysphagia in patients with tumors originating from organs directly involved in the swallowing process (oral cavity, oropharynx, hypopharynx, and larynx) compared to those that are not (nasal cavity, paranasal sinuses, nasopharynx, and metastatic head and neck cancers). Similar findings were also reported by Florie et al. [7], Husmeela et al. [14], Zebralla et al. [15], and Varghese et al. [27].

Patients with malignancies originating from the oral cavity experience greater difficulty with bolus control, although this does not always lead to aspiration. The tongue is a critical structure in deglutition, particularly during mastication and bolus propulsion. Even minimal tissue loss or structural alteration of the tongue can impair bolus formation and transport [21,27]. The oropharynx and hypopharynx facilitate bolus propulsion toward the esophagus; thus, impairments in these structures result in obstructed bolus transport and pharyngeal residue. Because the larynx protects the airway during swallowing, structural loss or functional impairment of the larynx can lead to the entry of secretions and the bolus into the airway, causing penetration and aspiration, and increasing the risk of aspiration pneumonia [5,12,28].

Patients with primary tumors in the oropharynx and oral cavity exhibit greater residue and prolonged pharyngeal transit times on videofluoroscopic evaluation compared to those with primary tumors in the larynx. Conversely, patients with advanced-stage primary tumors in the larynx and hypopharynx carry a higher risk of aspiration than those with primary tumors in the oropharynx and oral cavity [27]. Other studies have found that patients with primary hypopharyngeal and laryngeal tumors demonstrate better swallowing function than those with primary tumors of the oral cavity and oropharynx [11,25].

Although the proportion of patients presenting with oropharyngeal dysphagia was higher among those with primary tumors in organs directly involved in the swallowing process compared to those in organs not directly involved, this study found no statistically significant correlation between primary tumor location and oropharyngeal dysphagia ($p = 0.197$). This lack of significance may be attributed to the fact that the majority of primary tumors in this cohort originated in the nasopharynx. Sharma et al. [17] similarly reported no significant correlation between primary tumor location and oropharyngeal dysphagia.

In this study, histopathological diagnosis demonstrated no significant correlation with oropharyngeal dysphagia. To our knowledge, there are no published reports evaluating the correlation between histopathology and oropharyngeal dysphagia in head and neck cancers. The clinical stage of a tumor reflects its structural progression, determined by primary tumor extension (T), regional lymph node involvement (N), and the presence of distant metastasis (M). Patients with advanced-stage head and neck cancers are highly likely to experience more severe disruption of the upper aerodigestive tract, resulting from either primary tumor expansion or locoregional invasion into the cranial nerves, muscles, and other critical structures essential for deglutition. Advanced stage is also associated with systemic metabolic inflammation, cancer-induced catabolism, and skeletal muscle wasting, all of which can ultimately precipitate oropharyngeal dysphagia [7]. Furthermore, patients with advanced-stage disease typically undergo multimodal therapies, which are heavily implicated in the development of oropharyngeal dysphagia [5,17].

Published data on the correlation between tumor stage and oropharyngeal dysphagia remain conflicting; while several studies [12,15,27] identified a significant correlation, others [14,16,17] reported no such association. In the present study, no statistically significant correlation was found between clinical tumor stage and oropharyngeal dysphagia in head and neck cancer patients. Interestingly, this cohort exhibited a higher percentage of oropharyngeal dysphagia in patients with early-stage disease compared to those with advanced-stage disease. This paradoxical finding may be attributed to the limited sample size of patients presenting with early-stage tumors in this study.

The selection of therapeutic modalities for head and neck cancers depends on patient performance status, primary tumor location, clinical stage, and tumor resectability. Early-stage patients can be managed with single-modality therapy, whereas advanced-stage patients frequently require multimodal interventions [5]. Current therapeutic options for head and neck cancers comprise surgery, chemotherapy, and radiotherapy, all of which can precipitate oropharyngeal dysphagia. Surgery causes structural defects due to tumor resection, subsequently impairing the function of the resulting dysphagia depend heavily on the specific anatomical structures involved and the extent of the surgical resection [12,28].

Radiotherapy for head and neck cancers can inadvertently affect the surrounding normal structures essential for deglutition. Radiotherapy-induced oropharyngeal dysphagia can be categorized into acute and late-onset forms. The pathophysiology of the acute onset is driven by the rapid turnover of epithelial cells, manifesting clinically as mucositis

and dermatitis. The resulting tissue edema narrows the lumen and the anatomical recesses of the upper aerodigestive tract–such as the vallecula and pyriform sinuses–thereby impeding bolus transit and predisposing patients to penetration and aspiration. These acute symptoms typically manifest within 90 days of initiating therapy and largely resolve within 6 months post-treatment. Conversely, late-onset oropharyngeal dysphagia is hypothesized to result from aberrant tissue remodeling, which leads to chronic fibrosis, microvascular impairment, muscle atrophy, and neuropathy. Radiotherapy-induced fibrosis characteristically peaks 12 to 18 months post-therapy [16,28]. This fibrotic process can precipitate tongue atrophy, vocal fold paralysis, velopharyngeal incompetence, and pharyngeal constriction weakness. Furthermore, post-radiation mucosal alterations can impair sensory feedback mechanisms, thereby increasing the risk of silent aspiration [12,25].

Chemotherapy can induce a spectrum of systemic complications–including nausea, vomiting, neutropenia, generalized weakness, and fatigue–all of which can compromise deglutition. Furthermore, chemotherapeutic agents can disrupt neuromuscular junctions, thereby impairing the complex coordination required for swallowing. Currently, chemotherapy is frequently administered concurrently with radiotherapy. Approximately 40% of patients undergoing single-modality chemoradiotherapy experience this complication. Over the long term, ulcerative mucositis can precipitate severe dysphagia as a result of fibrotic stricture formation [9,15].

Numerous previous studies have reported a significant correlation between treatment modality and oropharyngeal dysphagia in head and neck cancers, a finding mirrored in the current study ($p = 0.001$). Zebralla et al. [15] and Sharma et al. [17] demonstrated that patients undergoing multimodal therapy exhibit a significantly higher incidence of oropharyngeal dysphagia compared to those receiving single-modality treatment. In this cohort, a higher proportion of oropharyngeal dysphagia was observed in patients treated with combination chemotherapy and surgery (75.0%) or concurrent chemoradiotherapy (66.7%). Interestingly, the proportion of dysphagia among patients who received all three therapeutic modalities was only 25.0%. This paradoxical finding maybe attributed to the relatively small sample size within this specific treatment subgroup.

Tracheostomy is indicated for patients presenting with upper airway obstruction, caused either by the primary tumor itself or by tissue edema secondary to surgical resection or ongoing radiotherapy. The physiological impact of a tracheostomy on deglutition has been well-documented in previous literature; key disruptions include prolonged pharyngeal transit time, esophageal compression, altered laryngeal sensation and reflexes, loss of subglottic pressure, reduced laryngeal elevation, a blunted cough reflex, and impaired cricopharyngeal opening. These physiological alterations can significantly compromise swallowing function and airway protection, thereby increasing the risk of aspiration [5,28,29].

The underlying mechanisms of aspiration in tracheostomized patients can be categorized into mechanical and neurophysiological factors. Mechanical factors include restricted laryngeal elevation, frequently resulting from the surgical anchoring of the trachea to the skin, and the stasis of secretions within the upper airway and cervical esophagus caused by the compressive effect of an inflated cuff. Furthermore, material and secretions pooling superior to the cuff can pass below the vocal folds, precipitating micro aspiration. Conversely, neurophysiological factors comprise the desensitization of the cough reflex and the loss of coordinated laryngeal closure [5,28].

The current study demonstrated a significant correlation between the presence of a tracheostomy and oropharyngeal dysphagia ($p = 0.044$). Ding and Logemann [30] observed that post-tracheostomy patients with an inflated cuff exhibited a higher incidence of silent aspiration and restricted laryngeal elevation compared to those with a deflated cuff. Contradictory results were reported by Galli et al. [31], who found no significant differences in bolus transit duration, oral, pharyngeal, or esophageal residue, or the incidence of aspiration between postoperative head and neck cancer patients with and without tracheostomy.

The vast majority of patients (90.1%) in this cohort maintained the capacity for full oral intake, and the proportion of patients achieving full oral intake without food restrictions or modifications (FOIS 7) was notably high (73.5%). These outcomes compare favorably with the literature; Husmeela et al. [14] reported that 76.9% of patients sustained full oral intake, while 23.1% required an enteral feeding tube. Similarly, Varghese et al. [27] reported that 91.7% of their total patient cohort achieved full oral intake without the need for an enteral feeding tube (FOIS >3). However, only 34.8% of their patients were capable of total oral intake without restrictions of modifications (FOIS 7).

The current study demonstrated a significant correlation between FOIS score and oropharyngeal dysphagia ($p < 0.001$). Patients with oropharyngeal dysphagia tend to adapt to their impaired swallowing function by avoiding certain consistencies or utilizing compensatory maneuvers to assist deglutition, such as liquid flushing or multiple swallows, which are subsequently reflected in their FOIS scores.

It is noteworthy that despite 40.2% of the patients experiencing oropharyngeal dysphagia, 73.5% of them still maintained a FOIS score of 7. This suggests that a subgroup of patients experiencing oropharyngeal dysphagia continued

to tolerate a full oral diet without requiring restrictions or modifications. These patients may have experienced mild symptoms of oropharyngeal dysphagia, leading them to overlook the issue, thereby maintaining an unrestricted or unmodified diet. Advanced swallowing evaluations should be performed to verify swallowing safety and efficiency in this patient population to avoid potential complications, including aspiration and pneumonia. In addition, the high prevalence of nasopharyngeal malignancies within this study cohort influenced the correspondingly high proportion of patients maintaining high FOIS scores. This aligns with findings by Liou et al. [25], who reported a significantly higher median FOIS score among patients with nasopharyngeal carcinoma compared to other anatomical locations.

Oropharyngeal dysphagia without adequate nutritional supplementation can trigger weight loss. These patients risk entering a vicious cycle, as malnutrition leads to decreased activity, which ultimately induces lethargy and further weight loss [15]. However, the findings of this study revealed that the majority of patients presented with a normal BMI (62.7%), and no significant association was found between BMI and oropharyngeal dysphagia ($p = 0.319$). This may be related to the rising trend of obesity among individuals, including patients with head and neck cancers, consequently, even when patients experience significant weight loss, they may still fall within the normal BMI category [32]. Additional contributing factors may include patient adaptation to dysphagia, with improved swallowing efficiency over time, and provision of adequate nutritional support through dietary modification, nutritional supplements, and feeding tubes [9].

Zebralla et al. [15] found that a BMI less than 20 kg/m^2 was associated with worse swallowing function compared to obese individuals. This aligns with Cristofaro et al. [13] who also observed a significantly lower mean BMI in head and neck cancer patients presenting with dysphagia.

The primary limitation of this study lies in its cross-sectional approach; consequently, a causal relationship between the investigated variables and oropharyngeal dysphagia could not be established. Additionally, the sample size of this study remains limited, which prevents sufficient stratification across individual sub variables, such as primary tumor site, histopathology, clinical stage, and treatment modality. Moreover, the sample was drawn from a single center, meaning the findings may not reflect the general population of patients with head and neck cancers.

5 CONCLUSION

The prevalence of oropharyngeal dysphagia is relatively high among head and neck cancer patients overall, thus, swallowing function evaluation is essential for all patients both pre- and post- treatment. Therapy, tracheostomy use, and FOIS scores correlate significantly with oropharyngeal dysphagia in these patients.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript.

Statement of ethical approval

This study was conducted and was approved by Research Ethics Committee of the Faculty of Medicine of Udayana University, Bali, Indonesia (Ethical clearance number 0704/UN14.2.2.VII.14/LT/2025).

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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