RESEARCH ARTICLE

Dysphagia and obstructive sleep apnoea in post-extubated intensive care unit patients

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Abstract

Objective: To determine the relationship between dysphagia and obstructive sleep apnoea and its association with age, gender and Glasgow Coma Scale in post-extubated patients in an intensive care setting.

Methods: The correlational study was conducted from July 1 to October 31, 2021, at the intensive care unit of Evercare Hospital, Lahore, Pakistan, and comprised post-extubated patients of either ender aged 45-70 years within 72 hours following extubation and having Glasgow comma scale score 11-15. Gugging Swallowing Screen and Obstructive Sleep Apnoea questionnaires were used for data collection. Data was analysed using SPSS 25.

Results: Of the 29 patients with a mean age of 57.45±8.74 years, 18(62.1%) were males. There was a significant correlation between dysphagia and obstructive sleep apnoea (p=0.005). The Obstructive Sleep apnoea score had a significant negative correlation with Glasgow Coma Scale score (p=0.01), while dysphagia revealed a significant positive correlation (p<0.001) with Glasgow Coma Scale score. Age and gender had no significant association with either dysphagia or obstructive sleep apnoea (p>0.05).

Conclusion: There was a significant correlation between dysphagia and obstructive sleep apnoea in post-extubated patients under intensive care. Both dysphagia and obstructive sleep apnoea had a significant correlation with Glasgow Coma Scale score.

Keywords: Dysphagia, Berlin questionnaire, Gugging swallowing screen, Glasgow coma scale, Obstructive sleep apnoea, Post-extubation. (JPMA 73: 826; 2023) **DOI: https://doi.org/10.47391/JPMA.6688**

Submission completion date: 15-04-2022 **- Acceptance date:** 24-11-2022

Introduction

Patients with narrowing of the pharynx may complain of both sleep-related breathing issues as well as swallowing difficulties.[1] Same is the case with endotracheal intubation which can result in a number of complications. Post-extubation dysphagia (PED) is one of them and it is defined as the inability or difficulty to transfer food and liquid safely and effectively from the oral cavity to the stomach following extubation of an oro-tracheal or naso-tracheal tube.[2] Swallowing disorders are commonly encountered in critically ill intensive care unit (ICU) patients, mostly following extubation, with a wide incidence range of 3-62% and with PED persistence noted in >80% cases at the time of discharge from the ICU.[3] Opioid use, which is common in ICUs, can also contribute to central sleep apnoea with prevalence being quite high (24%)[4] and is associated with clinically adverse outcomes.[3]

PED is associated with high burden of swallowing disorders on healthcare system with higher risk of aspiration which can lead to reduced quality of life (Qol), increased hospital stays, and increased morbidity or mortality.[5] A number of risk factors are proposed with deficiency in understanding the underlying mechanism of dysphagia in ICU cases.[3] Higher risk has been reported with low Glasgow Coma Scale (GCS) score, age >55, pre-existing stroke, diseases of the neuromuscular system, mechanical ventilation over a prolonged period and the nasogastric tube[2] with conflicting evidence regarding worse outcomes in elderly patients being reported with post-extubation dysphagia.[6] PED is considered clinically significant since it can result in serious complications, like aspiration pneumonia, bronchospasm, and chemical pneumonitis, mechanical obstruction with atelectasis or transient hypoxaemia.[2] Pizzorni N et al. reported that 15% cases of obstructive sleep apnoea (OSA) reported with dysphagia and revealed a significantly lower food bolus location during the start of swallowing, more remaining residue in the pharynx and increased frequency as well as extent of aspiration penetration.[7]

Sleep apnoea is cessation of inspiratory air flow during sleep for a minimum 10 seconds with drop in oxyhaemoglobin concentration in arterial blood and, hence, arousal, restoration of breathing, thus affecting the breathing pattern of sleep and awakening, resulting in daytime somnolence.[8] It is classified as central sleep

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apnoea (CSA) when it occurs due to lack of generation of breathing rhythm from the pontomedullary area of the brain, and OSA or due to upper airway obstruction, like falling back of tongue. Both the phenomena can occur simultaneously.[8] A review noted that OSA was highly prevalent with 34% males and 17% females being affected, and it can result in increased incidence of high blood pressure (BP), stroke, cardiac failure, coronary cardiac disease and atrial fibrillation.[8]

The occurrence of OSA is observed quite frequently due to nasopharyngeal tract narrowing following recent intubation which may be one of the causes since it can cause inflammation, and secretions/fluids may also obstruct the tract, leaving the patient with OSA. A study on Caucasian ICU patients in 2018 reported a high prevalence of sleep apnoea (71%)[9] with reduced Qol. It has also been reported that pre-extubation high dose of opioids can increase post-extubation sleep apnoea since the respiratory tract, which is already structurally vulnerable, is further compromised.[9]

The chances of OSA being overlooked are reported quite often when managing the risk factors of stroke. Being a modifiable risk factor of stroke, the identification is essential since catering to the improvement can be achieved in the management of stroke risk factors, and neglecting this can delay recovery and may result in long-term disability.[10] It should also be kept in mind that OSA patients may have subclinical dysphagia,[1] compromising their Qol.

Losurdo A et al. reported association of obstructive apnoea with speech and swallowing complications.[1] The association of OSA and dysphagia was more common in the elderly, those with higher body mass index (BMI), wide neck, diabetes mellitus (DM) and hypertension (HTN).[1]

There is a dearth of relevant local literature in Pakistan. The current study was planned to fill the gap by determining the relationship between dysphagia and OSA, and the association with age, gender and GCS in post-extubated ICU patients.

Patients and Methods

The correlational study was conducted from July 1 to October 31, 2021, at the intensive care unit of Evercare Hospital, Lahore, Pakistan. After approval from the ethics review committee of Riphah College of Rehabilitation and Allied Health Sciences, Riphah International University, Lahore, Pakistan, the sample size was calculated using the formula:[11]

$$N = \frac{z^2_{\alpha/2} * p * (1-p) * DEFF}{d^2}$$

with prevalence proportion 0.033, confidence level 0.05, absolute precision 0.06 and effect size DEFF=1. The sample was raised using non-probability consecutive sampling technique, and comprised post-extubated patients of either gender aged 45-70 years within 72 hours following extubation and having GCS score 11-15. Patients with intellectual disability, Wernicke's aphasia, memory loss, past history of sleep apnoea, and those having coronavirus disease-2019 (COVID-19) positivity were excluded.

After taking informed consent from the patients, data was collected using the Gugging Swallow Screen (GUSS) score for dysphagia and OSA score, also called the Berlin Score, questionnaires. GUSS is a reliable and sensitive instrument for dysphagia screening.[12] It has excellent validity and reliability and can predict the risk of aspiration as well.[13] It consists of 4 subtests and is divided into 2 parts; indirect and direct swallow test. Keeping in view the convenience and comfort of the patient in ICU, evaluation was based on taking prior appointment from the patient. The cases who could not pass the indirect swallow test were not considered for direct swallow test and were labelled dysphagic on the basis of indirect swallow test score. Those who passed the indirect swallow test were enrolled for the direct swallow test of GUSS.

The OSA questionnaire consists of 3 categories and 10 items related to the risk of having sleep, and has a high sensitivity (86%) and specificity (77%).[14]

Data was entered into Mircrosoft (MS) Excel and analysed using SPSS 25. Descriptive statistics were utilised and results of demographic variables were presented as frequencies and percentages, while mean and satandard deviation values for the two questionnaires were calculated. T-test and analysis of variance (ANOVA) statistics were used to assess difference with demographic variables. Bivariate correlation matrix was utilised to see correlation between dysphagia and OSA. $P<0.05$ was considered statistically significant.

Results

Of the 32 patients enrolled, 3(9.4%) dropped out and the study was completed by 29(90.6%). The mean age of the patients was 57.45±8.74 years. There were 18(62.1%) male patients, 9(31%) were aged 45-50 years, and 9(31%) had a GCS score 11 (Table 1).

Overall, 20(69%) patients had GUSS score 0-9, indicating the failure of the preliminary semisolid swallow test, and 2(6.9%) scored 10-14 indicating that only semisolid swallow was successful, while 7(24.1%) scored 20, indicating that semisolid/ liquid and solid texture was successful and dysphagia was not present.

Table-1: Gugging Swallowing Screen (GUSS) and Obstructive Sleep Apnoea (OSA) scores versus age, gender, Glasgow Coma Scale (GCS) (n=29).

Variable	Group	n (%)	Tool			
			GUSS		OSA	
			Mean±SD	t/f,p	Mean±SD	*p*-value
Gender	Male	18(62.1)	7.06±8.69	0.412, 0.684	1.44±0.51	0.333
	Female	11(37.9)	5.73±7.94		1.64±0.50	
Age (years)	45-50	9(310)	10.33±8.49	1.025, 0.415	1.22±0.44	0.138
	52-55	5(17.2)	5.20±8.32		1.40±0.55	
	56-60	5(17.2)	1.20±0.84		1.60±0.55	
	61-65	3(10.3)	6.67±11.55		1.67±0.58	
	66-70	7(24.1)	6.43±9.34		1.86±0.38	
GCS	11	9(31)	0.67±1.00	10.397, <0.001	1.67±0.50	0.17
	12	5(17.2)	1.20±1.30		1.80±0.45	
	13	5(17.2)	5.20±8.32		1.60±0.55	
	14	5(17.2)	16.20±8.50		1.20±0.45	
	15	5(17.2)	14.20±5.59		1.20±0.45	

SD: Standard deviation.

Table-2: Bivariate correlation matrix for Glasgow Coma Scale (GCS), Gugging Swallowing Screen (GUSS) category and Obstructive Sleep Apnoea (OSA) score.

Variable	Pearson Correlation	Glasgow Coma Scale score	Dysphagia (GUSS Score)	OSA (Berlin Score)
Glasgow Coma Scale score	*r*	1	0.734**	-0.468*
	p-value		<0.001	0.01
Dysphagia (GUSS Score)	*r*	0.734**	1	-0.507**
	p-value	<0.001		0.005
OSA (Berlin Score)	*r*	-0.468*	-0.507**	1
	p-value	0.01	0.005	

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

OSA score revealed higher risk in 15(51.7%) cases and lower risk in 14(48.3%).

There was a significant correlation between dysphagia and OSA (p=0.005). OSA score had a significant negative correlation with GCS score (p=0.01), while dysphagia revealed a significant positive correlation (p<0.001) with GCS score. Age and gender had no significant association with either dysphagia or OSA (p>0.05) (Table 2).

Discussion

The current study revealed a significant correlation between dysphagia and OSA.

Literature revealed the presence of dysphagia in post-extubation ICU cases.[15] The present study revealed significant negative correlation between GUSS and OSA scores, which has been reported earlier as well.[15,17] However, contradictory results have also been reported in literature.[18-21] The association of dysphagia with OSA may be due to the fact that impaired sensory input from the oropharynx results in attenuation of central control of the swallowing function of the upper airway among such patients.[22]

In the current study, high GUSS scores were noted for patients with GCS 14 and the lowest for GCS 11 (p<0.001). A study reported significant association of GCS score (p<0.01) with dysphagia, with <14 GCS having more cases with dysphagia compared to those with >14.[23] Another study found significant association (p<0.001) of lower GCS with dysphagia.[24]

In present study, ANOVA showed no significant association of Berlin score with GCS, but bivariate correlation indicated there was a significant negative correlation, which is in line with literature.[25]

In the present study, males had higher GUSS score but not significantly. In contrast, earlier studies revealed the association of female gender with dysphagia[20,26] while. one study reported similar to current findings.[27]

The present study found no significant association of OSA with age, but older age has earlier been shown to be associated with OSA.[16]

In the current study, age did not have significant association with dysphagia. In contrast, a study reported that dysphagia was significantly (p<0.001) common in stroke cases with mean age 74.3±13 years compared to those aged 69.6±14 years.[26] Another study revealed significant association (p<0.001) of dysphagia with age.[27]

A small sample size is the limitation of the current study which means the findings are not generalizable.

Conclusion

There was found to be a significant correlation between dysphagia and OSA in post-extubated patients in ICU. Both dysphagia and OSA had significant correlation with GCS score.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

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