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Correlation of Voice Handicap Index 10 with Reflux Symptom Index and Reflux Finding Score in Patients with Dysphonia

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ABSTRACT

Background. Voice disturbance occurs when the quality, pitch, loudness, or flexibility of other people's voices differ according to age, gender, and similar cultural groups. The Voice Handicap Index (VHI) is one of the most widely used tools worldwide to measure the physical, functional, and emotional aspects of voice disorders. This study aims to determine the correlation of voice handicap index-10 with reflux symptom index and reflux finding scores in patients with dysphonia complaints at Dr. Mohammad Hoesin General Hospital Palembang. **Methods:** This study is a cross-sectional study using a correlation test design that aims to determine the correlation between VHI-10 and RSI and RFS in patients with dysphonia complaints. **Results:** The sample of this study includes the demographic factors of the research subjects, namely age, gender, and occupation. This study shows that patients with RFS ≥ 7 affect the VHI-10 score ≥ 11 with a proportion of 72%. **Conclusion**: There is a moderate positive correlation between the RFS score and the VHI-10 score, where the higher the RFS value, the higher the VHI-10 score in patients with dysphonic complaints.

1. Introduction

Dysphonia is a dysfunction in the ability to produce sound characterized by hoarse, breathy, or rough vocal qualities. Voice disturbance occurs when the quality, pitch, loudness, or flexibility of other people's voices differ according to age, gender, and similar cultural groups. The Voice Handicap Index (VHI) is one of the most widely used tools worldwide to measure the physical, functional and emotional aspects of voice disorders.[1,2]

One of the most common causes of dysphonia is laryngopharyngeal reflux (LPR) which occurs in 50% of cases. LPR can cause irritation and changes to the larynx.[1,2] Reflux Symptom Index (RSI) was used to subjectively assess the severity of LPR. A score of more than thirteen is considered abnormal and reflects LPR. The reflux finding score (RFS) is an eight-item index designed to assess clinical severity based on laryngoscopy findings, a score of 7 or more being considered an LPR.[3,4] The RSI was designed to raise the clinical suspicion of LPR in patients with ear, nose, and throat (ENT) symptoms, whereas the RFS was designed to characterize morphological lesions thought to be

associated with LPR. RSI and RFS can easily be used in the daily clinical care of patients suspected of having LPR and help in identifying patients who are highly likely to have a good response during treatment.[5,6]

The diagnosis of dysphonia in LPR patients is carried out through anamnesis related to dysphonic complaints, determining the possible etiology by physical examination and supporting examinations such as laryngoscopy. History related to subjective complaints of dysphonia can be done using the voice handicap index-10. Reflux symptom index can help determine the diagnosis of LPR based on clinical symptoms, while the RFS determines the diagnosis of LPR based on laryngoscopy findings. The voice handicap index is a validated instrument that measures the effect of voice problems on the patient's quality of life. The VHI has been used by several investigators to measure the effect of voice problems on patients' quality of life in patients with LPR. The mean VHI score was reported to be significantly higher in clinically diagnosed LPR patients than in healthy controls.[7] This study aims to determine the correlation of voice handicap index-10 with reflux symptom index and reflux finding score in patients with dysphonia complaints.

2. Methods

The research design is an analytical observational study with a cross-sectional approach to determine the correlation of voice handicap index-10 with reflux symptom index and reflux finding score in patients with dysphonia complaints. A total of 33 patients with dysphonic complaints participated in this study, with the inclusion criteria being patients with dysphonia complaints who went to the ENT polyclinic, Dr. Mohammad Hoesin, and the required medical record data are complete. This study has been approved by the Health Research Ethics Committee of Dr. Mohammad Hoesin General Hospital Palembang (No. 80/kepkrsmh/2021). The data collected in this study is secondary data obtained from the status in the medical records of patients with dysphonia complaints at Dr. Mohammad Hoesin General Hospital Palembang period January 2020 - July 2021. Data were collected and sorted to obtain samples that met the inclusion criteria, then recorded in Microsoft Excel according to the variables studied.

The data that has been obtained from medical records will be examined and grouped according to the research variables that have been determined previously. Then the data will be processed using the SPSS 24 statistical program. Furthermore, the data is analyzed and the research results are presented in the form of tables and graphs which are explained with narration. Univariate analysis was used to determine the frequency distribution pattern of the basic characteristics on the dependent variable (dysphonic patients) and independent variables (age, gender, voice handicap index-10 (VHI-10), reflux symptom index (RSI) and reflux finding score (RFS) researched. Bivariate analysis was conducted to assess the relationship between the dependent and independent variables, namely the Spearman correlation test. Multivariate analysis was performed to control for confounding variables. This multivariate analysis aims to analyze the factors associated with dysphonic patients.

3. Results

Based on age, the mean of the research subjects was 51.61 ± 13.49 with the smallest age being 17 years and the largest being 74 years. The most gender was male with 18 subjects (54.5%). The most frequent occupations were non-professional voice users (PVU) as many as 31 subjects (93.9%). Approximately 18 patients (54.5) had a VHI-10 score greater than 11. The mean VHI score was 14.7 ± 10.54. The mean RSI score was 11.97 ± 6.87. The mean RFS score was 4.94 ± 3.41. The mean RSI score was 11.97 ± 6.87 (Table 1).

Table 1. Characteristics of research subjects

Variable	N (%)	Median (Min-Max)	X ± SD
Age (years) 12-25 years 26-45 years >45 years	 2 (6.1) 8 (24.2) 23 (69.7)	50 (17 – 74)	51.61 ± 13.49
Gender Male Female	 18 (54.5) 15 (45.5)	-	-
Occupation Not PVU PVU	 31 (93.9) 2 (6.1)	-	-
Dysphonia Yes (VHI ≥ 11) No (VHI < 11)	 18 (54.5) 15 (45.5)	-	-
RSI RSI ≥ 13 RSI < 13	 13 (39.4) 20 (60.6)	-	-
RFS RFS ≥ 7 RFS < 7	 13 (39.4) 20 (60.6)	-	-
VHI score		13 (0 – 35)	14.70 ± 10.54
RSI score		10 (2 – 31)	11.97 ± 6.87
RFS score		4 (0 – 11)	4.94 ± 3.41

Correlation analysis of RFS and RSI scores against VHI can be seen in table 2. It was found that according to the Spearman test, there was a significant correlation between the VHI-10 score and the RSI score with a positive correlation strength moderate (p=0.004, R=0.484). This shows that the higher the RSI score, the higher the VHI score in dysphonic patients. A significant correlation was found between VHI-10 and RFS scores with a moderate positive correlation strength (p=<0.005, R=0.661). This shows that the higher the RFS score, the higher the VHI score in patients with dysphonia complaints.

Table 2. Correlation of RSI and RFS scores to VHI-10

Variable	VHI-10	
	p-value*	Correlation coefficient (R)*
RSI	0.004	0.484
RFS	<0.005	0.661

*Spearman

From the Backward analysis (Table 3), the significance value was obtained in the last step <0.05, i.e. <0.005. This shows that this linear regression equation can be used to predict the effect of the independent variable on the VHI-10 score variable and this indicates that there is a significant effect on the RFS score.

Table 3. Backward linear regression analysis of all independent and confounding variables

Model		Coefficient		Partial correlation	P-value
		B	Standard error		
1	Constant	7.917	7.881	-	0.324
	Age	0.039	0.130	0.057	0.769
	Gender	-2.295	3.534	-0.124	0.522
	Type of occupation	-8.514	5.793	-0.272	0.153
	score	-0.521	0.445	-0.220	0.252
	RFS Score	2.640	0.826	0.524	0.004
5	Constant	5.259	2.601	-	0.052
	RFS Score 1.911	1.911	0.435	0.619	0.005

Regression equation:

$$Y = \alpha + X2\ (ß_2)$$

The combination of the most influential factors is formulated with the final equation as above. Description: Y = Score VHI-10 ; ß1 = RFS Score Coefficient = =1.911; X1 = RFS Score Variable; α = Constant = 5.259

Y value obtained if it is assumed that in patients with dysphonia there is an RFS score of 7, then the VHI-10 score is 18 with the following calculation: Y = 5.259 + 1.911 (7); Y = 18.6 ~ 18.

4. Discussion

Reflux symptom index (RSI) assessed nine symptoms that included sounds and symptoms of gastroesophageal reflux and included such things as nausea, cough, bloating, and dysphonia. In this study, there was a significant correlation between RSI and VHI-10 scores with a moderate positive correlation strength. That is, the higher the RSI score, the higher the VHI score in patients with dysphonia complaints. This study showed that patients with an RSI score of 13 affected a VHI-10 score 11, with the proportion of 72% experiencing dysphonia. This finding is in line with a study in which of 446 subjects, 62.2% complained of voice problems and/or reflux. The study found 43.1% and 14.6% of individuals from the general population had positive RSI and VHI-10 scores, respectively. Overall, the RSI score was significantly positively correlated with the VHI-10 score. Another study found, using a validated RSI threshold, 31% of 42 singers had an RSI score of 13 as an indication of suspected LPR, in which a strong positive correlation was found between singer-specific VHI-10 scores and an RSI score with an r of 0.87.[8] Another study found that in 546 dysphonic patients with a mean VHI-10 of 47.7 (standard deviation 27.9), the mean RSI score was 20.9 (standard deviation 10.2).[9] Another study found that in 18 dysphonic patients with a mean VHI-10 of 25.5 (range 11-30), an average RSI score of 18.5 (range 9-22) and a moderately positive correlation r=0.4, $p<0.05$).[10]

Reflux finding score (RFS) was formulated to standardize laryngeal findings from LPR so that ENT specialists can better diagnose, evaluate clinical improvement, and assess the therapeutic efficacy of patients with LPR. The RFS consists of an 8-item scale that can document the clinical severity of LPR by fiberoptic laryngoscopic examination. In this study, there was a significant correlation between RFS and VHI-10 scores with a moderate positive correlation strength. That is, the higher the RFS score, the higher the VHI score in dysphonic patients. This study showed that patients with RFS 7 affected the VHI-10 score of 11, with the proportion of 72% experiencing dysphonia. This is in line with the study which found that 68% of 100 dysphonic patients had an RFS value of 7.11. The study also found a strong positive correlation between the VHI-10 value and the increase in the RFS value another study found that the severity of gastric acid reflux complaints and hoarseness had a strong positive correlation with RFS scores in 97 dysphonic patients.[12] The effect of LPR on the pathogenesis of laryngeal changes has been extensively studied, but its implications for vocal production are not well understood.[13-18] Of the most frequent vocal symptoms in patients with LPR, hoarseness is one of them, as LPR can be experienced in up to 50% of patients with dysphonia and is involved in 75% of patients with symptoms of the ear and larynx.[19-23] The

pathophysiology of dysphonia in LPR remains unknown, although a recent systematic review has shown that the disease alters the mucosa at the vocal cord vibrational margins due to exposure to acid and pepsin. These changes may be associated with epithelial cell dehiscence, microtrauma, inflammatory infiltration, dryness of Reinke's space, drying of the mucosa, and thickening of the epithelium. However, due to the microscopic nature of these changes, many patients with LPR cannot be diagnosed using conventional techniques, such as videolaryngostroboscopy.[24-26]

The results of the multivariate linear regression analysis using the ANOVA method as much as 5 times the elimination of 5 variables resulted in 1 factor that had the most influence on the VHI-10 score. That factor is the RFS score. This shows that this linear regression equation can be used to predict the effect of the independent variable on the VHI-10 score variable and this indicates that there is a significant effect on the RFS score. In multivariate analysis, the RFS score is the most influential factor on VHI-10 (p=<0.005). From the linear equation, the VHI value is more than or equal to 18, the RFS value is more than or equal to 7. So from this study, it can be concluded that with a VHI score of more than or equal to 18, an RFS score of more or equal to 7 is obtained so that we can provide more specific therapy to patients, namely PPI administration.

5. Conclusion

There is a moderate positive correlation between the RFS score and the VHI-10 score, where the higher the RFS score, the higher the VHI-10 score in patients with dysphonia complaints.

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