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Original Research Article

Correlation between Reflux Symptom Index (RSI) and Reflux Finding Score (RFS) with Laryngopharyngeal Reflux Disease (LPRD)

Noopur Agarwal[1], Dewal Mani[2], Aditya Gupta[3]

[1]Senior Resident, Department of Otorhinolaryngology, Hind Institute of Medical Sciences, Safedabad, Barabanki, UP. India

[2]Assistant professor, Department of Otorhinolaryngology, Hind Institute of Medical Sciences, Ataria Sitapur, UP. India

[3]Senior Resident, Department of Otorhinolaryngology, Hind Institute of Medical Sciences, Ataria Sitapur, UP. India

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Corresponding Author: Dr. Aditya Gupta

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Abstract:

Background: Gastroesophageal Reflux Disease (GERD) is a common condition characterized by chronic symptoms or mucosal damage secondary to the abnormal reflux of gastric contents into the oesophagus. When GER affects the laryngopharynx it is called Laryngopharyngeal Reflux Disease (LPRD). LPR is known to be associated with many clinical entities such as chronic laryngitis, chronic dysphonia, laryngotracheal stenosis, head and neck carcinoma, cough, asthma, otitis media, dental caries and erosion, laryngeal papilloma, vocal fold granulomas and ulcers, laryngospasm, recurrent croup, paradoxical vocal fold movement disorder and laryngomalacia. LPRD is a common condition in patients attending ENT OPDs. Although esophageal manometry and 24 h pH monitoring is considered the gold standard for diagnosis, it is an expensive and time consuming investigation. Newer clinical scales have been developed for diagnosing LPR such as RSI, RFS, Carlsson-Dent, ReQuest, GerdQ, etc.

Aim and Objectives: The aim and objectives of this study was to compare RSI with RFS and to establish its effectiveness in quick diagnosing of LPRD among the study subjects.

Material and Methods: A total of 150 patients who visited ENT department (OPD), Hind Institute of Medical Sciences, Safedabad, Barabanki, UP, India, with features of LPRD were asked to fill RSI proforma (score C ≥13 abnormal), after which they were subjected to indirect laryngoscopy to obtain the RFS (score C≥ 7 diagnostic of LPRD). RSI was compared with RFS. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of RSI were noted.

Results: Out of 150 patients, 82, 54.66% were females. Mean RSI scores in males and females were 12.3 and 12.7 and mean RFS scores were 6.7 and 6.9 respectively. RSI had 80.1% sensitivity and 84.2% specificity in diagnosing LPRD with PPV 76.9%, NPV 87.2% and accuracy 86.6% (Chi square value 65.2, P ≤ 0.05). There was substantial agreement between RSI and RFS (Cohen's kappa: 0.627, P ≤ 0.01). RSI is a simple tool to diagnose LPRD which doesn't mandate invasive procedures such as endoscopy or esophageal manometry.

Conclusion: It is concluded that the RSI was used effectively to diagnose LPRD in ENT outpatients and subsequently initiated the treatment accordingly at the earliest.

Keywords: Reflux Symptom Index (RSI), Reflux Finding Score (RFS), Laryngopharyngeal reflux disease (LPRD).

Introduction

The word REFLUX is a Greek word which means ''backflow''. It refers to backflow of the stomach contents. Reflux was initially thought to be a disease and was first reported in 1935 by Winkelstein [1] who described it as ''peptic ulcer of the esophagus''. He postulated that injury of the esophagus occurred as a consequence of backflow of the contents from stomach. Gastroesophageal reflux disease (GERD) has been regarded as an etiology for laryngopharyngeal reflux (LPR). LPR refers to backflow of stomach contents into larynx and pharynx characterized by chronic laryngeal symptoms. Patients usually complain of throat burning, constant throat clearing, chronic dry cough, hoarseness of voice, globus sensation which occur secondary to laryngeal inflammation due to the reflux [2]. LPR can present with symptoms such as hoarseness of voice, globus, chronic throat

clearing, dysphagia, odynophagia, sore throat, excessive throat mucus, halitosis, exacerbation of asthma, heartburn etc. The main pathophysiology of LPR is lower oesophageal sphincter incompetence causing regurgitation of gastric secretions into the oesophagus, hence the gold standard test for diagnosing LPR is 24-h pH-metry. But it is an expensive and time consuming investigation. Thus there is delay in initiation of appropriate therapy [3].

A survey of almost 2000 individuals in Madison, Wisconsin revealed that 26% of pharyngeal and laryngeal symptoms group reported gastroesophageal reflux disease (GERD) and concurrent laryngeal symptoms, which together were concerning for LPR [4].However, the gold standard for diagnosing the condition is controversial and methods for diagnosing the condition vary significantly between physicians within, and outside, the field of otolaryngology. Consequently, efforts to evaluate LPR symptoms, contributed to an average of $5438 per patient, equating to over $50 billion annually. Thus, LPR poses a major healthcare burden [4].

Currently, the mainstays for LPR diagnosis include symptom scoring, laryngoscopy, and pH monitoring. The endoscopic diagnosis of LPR relies upon an endoscopic assessment of changes presumed to result from oropharyngeal acid exposure. The reflux finding score (RFS) is a semi-quantitative measure of the severity of endolaryngeal findings first proposed by Belafsky et al. and was validated against double-probe pH monitoring pre and post-proton pump inhibitor (PPI) therapy by two blinded laryngologists.[4] These studies did not validate the RFS against findings in asymptomatic subjects and other groups have found evidence for posterior laryngeal irritation in 90% of asymptomatic volunteers.[5]

Despite these findings, the RFS remains the most widely used scoring system for LPR, and additional laryngeal criteria beyond the RFS that may have diagnostic utility are under investigated.[6] A separate patient-reported tool developed by Belasky et al., coined the reflux symptom index, evaluates the severity of symptoms such as heartburn, throat clearing, hoarseness, and cough to create a composite score in which a reflux symptom index (RSI) >10 is suggestive of LPR. Finally, the seven-point global overall symptom scale (ranging from 1 = no problem to 7 = a very severe problem) is a patient-derived score utilized to reflect changes in symptom severity from baseline to post-intervention.[4,7]

Although conceptually the ‘gold standard’ for evaluation of gastroesophageal reflux disease, 24-hour dual-probe ambulatory pH monitoring may lack sensitivity to diagnose LPR, with concerns over placement variability, patient acceptance, costs, and uncertain clinical utility of heterogeneous findings.[8] The Restech Dx-pH system is an oropharyngeal probe was thus developed to detect reflux events in the forms of both liquid and aerosolized acid. A study suggested that oropharyngeal pH testing using the Restech probe did not predict laryngeal symptom response to PPI therapy and in fact signalled that the degree of oropharyngeal acid exposure was inversely related to PPI response. [9]

Due to the limited utility of current diagnostic modalities, empiric PPI trials are often prescribed without pH testing. Previous studies and meta analyses report that less than half of patients will have symptomatic improvement, with some reporting no significant improvement in LPR symptoms on PPI therapy when compared to placebo.[10] This was of increased concern because PPIs have been associated with adverse effects in patients, including Clostridium difficile-associated diarrhea, pneumonia, and most recently, myocardial infarction, chronic kidney disease, and dementia.[8,9,11] Thus, a mechanism to better predict response to PPI therapy was needed.

Therefore there are other newer clinical scales developed for diagnosing LPR such as Reflux Symptom Index [4], Reflux Finding Score [4], CarlssonDent [5], ReQuest [6], GerdQ [7], etc. These scales use either clinical symptoms or laryngoscopic findings to diagnose LPR and hence therapy can be initiated at the earliest.

The objective of the study was to compare RSI with RFS and to establish its effectiveness in diagnosing of LPRD among OPD patients.

Materials and Methods:

This study was a descriptive cross sectional study conducted in the Department of Otorhinolaryngology, Hind Institute of Medical Sciences, Safedabad, Barabanki, UP, India.

A total of 150 patients, both sexes, aged 18-70 years, attended ENT OPDs with clinical features of Laryngopharyngeal Reflux Disease (LPRD) such as voice changes, frequent clearing of throat, excess throat mucus, dysphagia, chronic cough, breathing difficulty, globus in throat, heartburn and chest pain, during October 2023 to December 2024, were selected for this study.

Patients who had organic causes such as rhinitis, sinusitis, pharyngitis, laryngitis, tumorous lesions or patients who were already on treatment for LPRD or patients who refused to give consent were excluded from the study.

After obtaining informed consent, they were asked to fill Reflux Symptom Index according to the severity of their illness, after which they were

subjected to indirect laryngoscopy to obtain the Reflux Finding Score. RSI was compared with RFS. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of RSI were analyzed. Microsoft excel is used to compile the data and IBM SPSS software version 26.3 was also used for various statistical analysis. Reflux Symptom Index (RSI) was a simple questionnaire consisting of nine questions regarding the symptoms of LPRD, where the patient was asked to score from zero to five depending on the severity of the symptom. RSI of ≥13 was considered as abnormal (Table-1). Reflux Finding Score was also a simple scoring system that pointed inflammatory laryngeal signs appeared in indirect laryngoscopy conducted in ENT-OPD. A score of ≥7 was considered as diagnostic of LPRD (Table-2).

Table 1: Reflux Symptom Index (*within the last month, how did the following problems affect you? 0 = no problem, 5 = severe problem) [4]

Sl.no	Questions*	Score- 0	Score- 1	Score- 2	Score- 3	Score- 4	Score- 5
1	Hoarseness or a problem with your voice	0	1	2	3	4	5
2	Clearing your throat	0	1	2	3	4	5
3	Excess throat mucus or postnasal drip						
4	Difficulty swallowing food, liquids or pills	0	1	2	3	4	5
5	Coughing after you ate or lying down						
6	Breathing difficulties or choking episodes	0	1	2	3	4	5
7	Troublesome or annoying cough	0	1	2	3	4	5
8	Sensation of something sticking in your throat or a lump in your throat						
9	Heartburn, chest pain, indigestion, or stomach acid coming up	0	1	2	3	4	5

Table 2: Reflux Finding Score [4]

Sl. No	Findings		Score
1	Subglottic edema	Present	2
		Absent	0
2	Ventricular obliteration	Partial	2
		Complete	4
3	Erythema/hyperemia	Arytenoids only	2
		Difuse	4
4	Vocal fold edema	Mild	1
		Moderate	2
		Severe	3
		polypoid	4
5	Diffuse laryngeal edema	Mild	1
		Moderate	2
		Severe	3
		Obstructing	4
6	Posterior commissure hypertrophy	Mild	1
		Moderate	2
		Severe	3
		Obstructing	4
7	Granuloma/granulation	Present	2
		Absent	0
8	Thick endolaryngeal mucus	Present	2
		Absent	0

Results

The study consisted of 150 patients, both sexes, aged 18-70 years of which, 82, 54.66% were females and 68, 45.33% males subsequently mean age was 42 ± 11 years. The most common symptoms were heartburn/chest (HB/CP), was in 143, 95.33% patients and foreign body sensation in the throat (FBST), was in 138,92 % patients.

Other symptoms were observed as frequent clearing of throat (FCT), in 128, 85.33%, dysphagia (DYSPA), in 120, 80%, excessive throat mucus (ETMU), in 112, 74.66%, troublesome cough (TRBLC), in 106, 70.66%, subsequently coughing after eating/lying down (CE/LD), in 98, 65.33%, hoarseness of voice (HNV), in 52, 34.66% and dyspnoea/choking (DYSP/CHO) in 26, 17.33% patients (Figure-1).

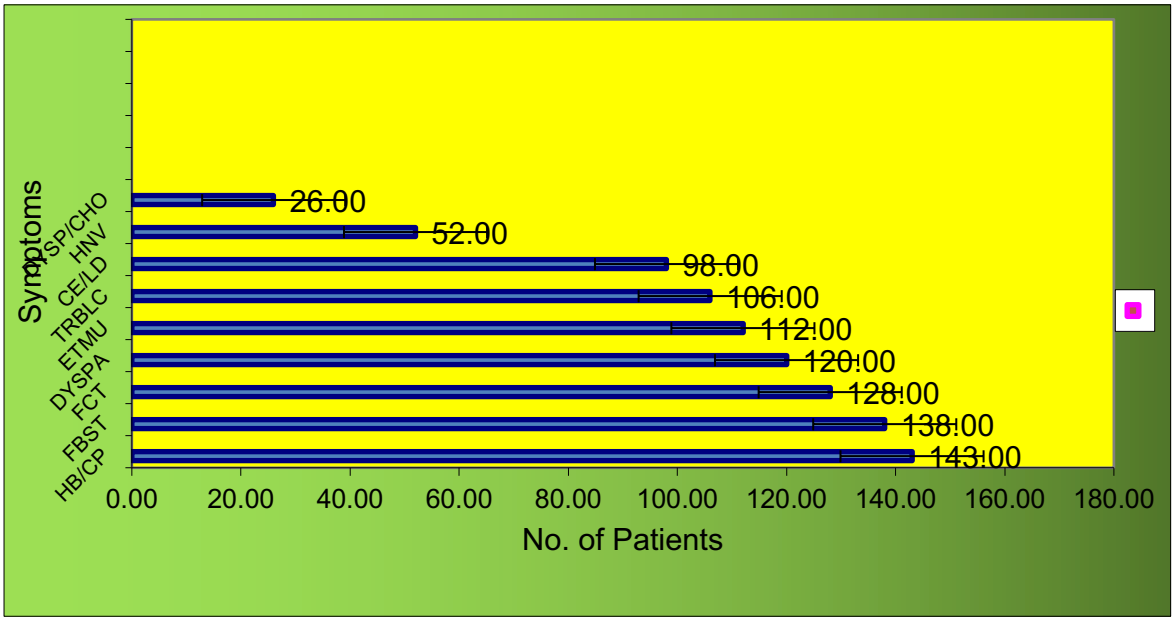

Figure 1: Symptoms of LPRD in the study subjects:

Figure-1, illustrated the symptoms of LPRD in patients.

Abnormalities have been observed on indirect laryngoscopy were erythema/hyperemia (ER/HYP), 140, 93.33%, vocal fold edema (VFED), 109, 72.66%, diffuse laryngeal edema (DLED),70, 46.66%, partial ventricular obliteration (PVOER), 55, 36.66%, subglottic edema (SUBED), 30, 20%, granulations(GRAN),14, 9.33%, posterior commissure hypertrophy (PCHYP), 11, 7.33% and thick endolaryngeal mucus (THLMU),8, 5.33% (Figure-2)

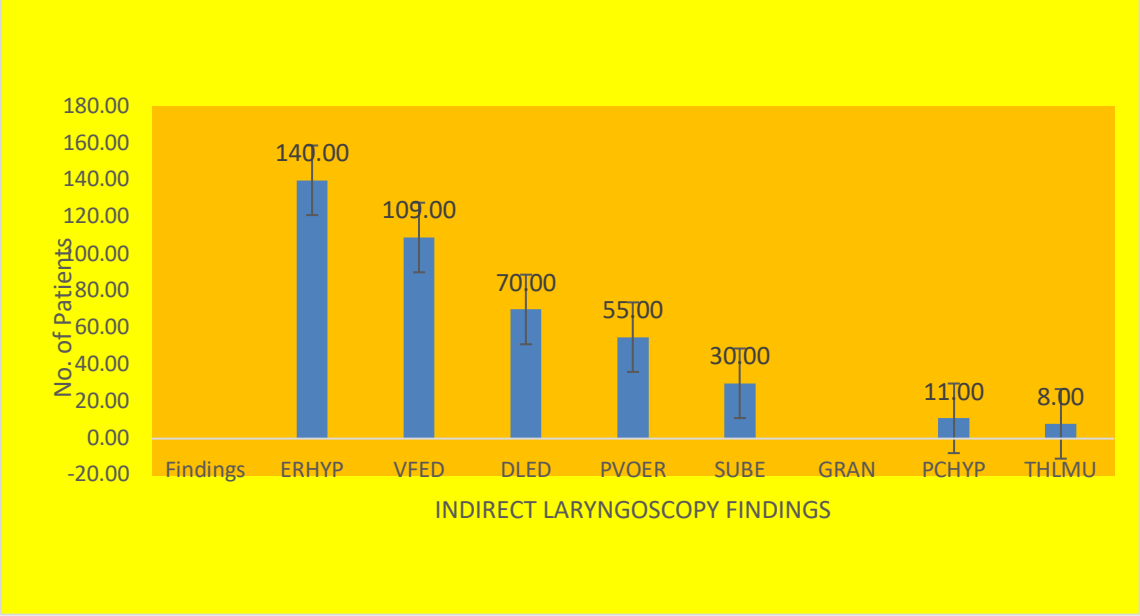

Figure 2: Indirect laryngoscopy findings of LPRD in study subjects.

Figure-2, illustrated the Indirect Laryngoscopy Findings of LPRD in patients.

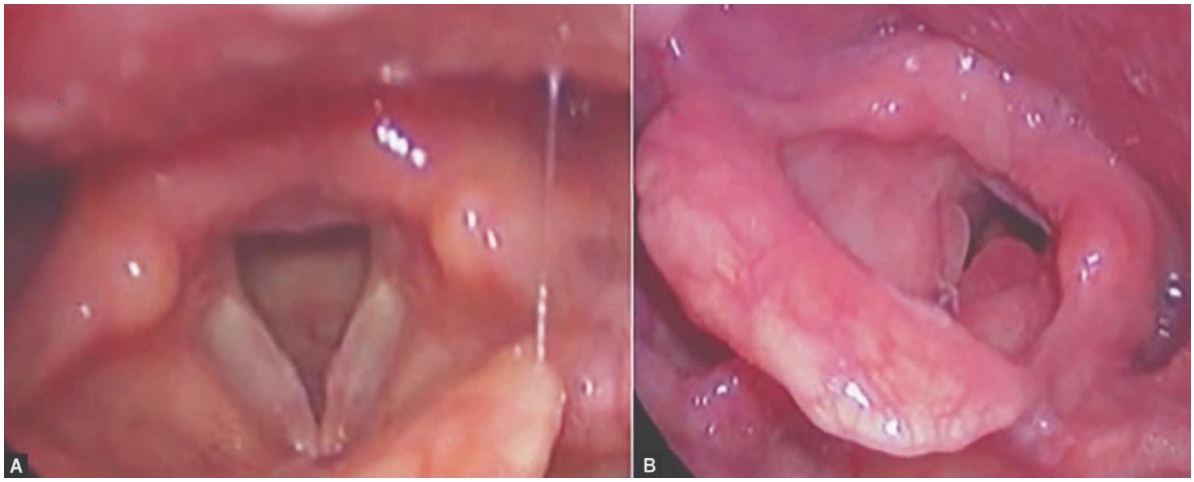

Figure 3: Laryngoscopic images of diffused laryngeal edema:

Figure-3: illustrated the Laryngopharyngeal Reflux. Mean RSI scores in males and females were 12.3 and 12.7 and mean RFS scores were 6.7 and 6.9 respectively (Table-3). RSI had 80.1% sensitivity and 84.2% specificity in diagnosing LPRD with positive predictive value 76.9%,negative predictive value 87.2% and accuracy 86.6% (Chi square value 65.2, P=0.05). There was substantial agreement between RSI and RFS (Cohen's kappa: 0.627, P=0.01 B).

Table 3: RSI and RFS

Sl No.	Symptoms/ Findings		Frequency (n=150)	Percentage %	Mean	
					Male	Female
1	Reflux Symptom Index	≥13 = Positive	79	52.66	12.3 12.7 12.5± 3.8	
		≤13= Negative	71	47.33		
2	Reflux Finding Score	≥7= Positive	68	45.33	6.7 6.9 6.8± 3.62	
		≤7+Negative	82	54.66		

Discussion

Laryngopharyngeal reflux refers to backflow of stomach contents into larynx and pharynx (voice box and throat). LPR can occur during day or night, and many people who have LPR will not have heartburn and hence it is sometimes called 'silent reflux' [12]. The primary cause of the laryngeal symptoms is reflux of gastric contents through the upper esophageal sphincter producing laryngeal inflammation [12].

LPR is a multi-factorial clinical entity with multiple clinical presentations, so it requires a multidisciplinary approach. LPR presents with nonspecific symptoms and signs. Symptoms of LPR significantly overlap with symptoms of other disorders. To minimize the subjective evaluation of RSI, in 2001 Belafsky et al validated RFS as a diagnostic parameter of LPR.[4] The RFS has demonstrated high reproducibility and reliability of 94% with score above [7].However, Branski et al. concluded that only laryngoscopic finding as a diagnostic tool was highly subjective, so for evaluating the patients with LPR, RSI along with RFS will be helpful to override overlapping signs and symptoms with other disorders[7] RSI and RFS are simple, noninvasive and inexpensive so, have been widely used for diagnosis of LPR as reported in various studies [13-17]. Moreover, It was difficult to estimate LPR prevalence in the general population. Looking at the laryngeal and pharyngeal symptoms of those patients with LPR some authors point out that 50%1 and even 64% of those patients who visited an otorhinolaryngologists for "voice problems" have underlying LPR [18,19].

This study had an objective of describing the epidemiological profile of patients with LPRD among those with throat and voice complaints for more than a month. LPR is often an under diagnosed entity in clinical practice especially when it falls under physicians' care. Of all the 150 study participants with RFS > 7, majority (54.66%) were females contrary to what has been reported by other studies.[2,10,12]

In this study the most frequently encountered symptoms were heartburn/chest (HB/CP), was in 143, 95.33% patients and foreign body sensation in

the throat (FBST), was in 138,92 % patients, followed by pooling of mucus on the throat and frequent throat clearing, episodes of cough upon feeding or lying down and a chronic irritating cough. Patients with such complaints often overlook these symptoms. The majority of patients were initially treated as cases with allergic triggers and thus given antihistamines and cough syrups without relief. This calls for the need for otorhinolaryngologists to execute proper diagnosis and management of these patients.

The study also has shown that RSI and RFS are of importance in establishing the diagnosis of LPRD without delays when patients seek consultation from otorhinolaryngologists. This tends to be in line with what was standardized so as to design RSI and the RFS to aid in the diagnosis of LPRD.[8,16] Both scores were easily reproducible thus aiding in the follow up of the patients and helping monitor treatment outcomes.

As we compared mean RSI and RFS scores with various other studies (Table 4), our study had the least mean RSI and RFS values. However our study has established a strong positive correlation between RSI and RFS (P= 0.01), which was consistent with most of the studies [3, 10, 12, 14]. Similarly, in another study, conducted on 34 patients, a statistically significant correlation was found between the RSI and RFS (r = 0.3, p = 0.007).[18] Unlike all these studies, a study result also showed no correlation between the RSI and RFS (p=0.501)[14], that may be due to small sample size[21].

A previous study found the sensitivity and specificity of RSI to be 75.6% and 18.8% respectively and RSI had lower validity than RFS.[20] However our study showed RSI's sensitivity and specificity to be 80.1% and 84.2% respectively with accuracy of 86.6%. The diagnostic evaluation of LPR also includes laryngoscopic examination, to look for signs such as edema and diffuse laryngeal hyperemia, edema of the vocal folds, edema of vestibular folds, edema of the subglottic mucosa, interarytenoid region hypertrophy, thick endolarynx mucus, and granuloma or granulation tissue. These signs are also common to other diseases affecting the larynx and pharynx, hence diagnosing the disease remains difficul [22]. To minimize the subjectivity of these signs, Belafsky et al. [4] proposed a scoring system, the RFS, based on the endolaryngeal inflammatory changes supposedly due to reflux and it has been widely used in the literature as a diagnosis parameter of LPR. The RFS has demonstrated high reproducibility and reliability, and a patient with scores above ≥7 points has 94% probability of presenting LPR. Hence, our study reports on strong positive correlation between RSI and RFS (P= 0.01) for the diagnostic evaluation of LPRD to initiate the treatment accordingly at the earliest, may be considered with a few limitation as the post treatment correlation between reflux symptom index and reflux finding score has not been done in the present study.

Conclusion

LPR is a common entity. There was a moderate correlation between the reflux symptom index and reflux finding score. The combined use of questionnaires and laryngoscopic findings can be more precise, practical and cost effective way to diagnose LPRD.

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