

# Reflux Symptom Index and Reflux Finding Score in the Diagnosis of Laryngopharyngeal Reflux and Its Improvement with Treatment

Simmi Jindal<sup>1</sup>, AGS Bawa<sup>2</sup>, Gurbax Singh<sup>3</sup>, Sumit Prinja<sup>4</sup>, Suchina Parmar<sup>5</sup>

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## ABSTRACT

**Aim:** The aim of our study was to diagnose laryngopharyngeal reflux (LPR) by scoring systems developed by Belafsky and to see the effect of antireflux treatment in treating laryngopharyngeal reflux.

**Materials and methods:** A prospective study was conducted at a Tertiary Care Hospital on 100 patients. Detailed history and complete examination of patient with GERD followed by flexible fiber optic endoscopy to diagnose LPR by reflux symptom index (RSI) and reflux finding score (RFS) scoring and then improvement at 4 and 8 weeks with treatment was done.

**Results:** In our study, 10 cases showed improvement from 0 to 4 weeks and 23 cases from 4 to 8 weeks after treatment in RSI score. In total 33 cases showed improvement after 8 weeks. In RFS, 20 cases showed improvement from 0 to 4 weeks and 22 cases showed improvement from 4 to 8 weeks after treatment. In total 42 cases showed improvement after 8 weeks.

**Conclusion:** From our study, we concluded that LPR was assessed by using RSI and RFS scoring systems. Patients with LPR showed improvement after treatment over weeks.

**Clinical significance:** Through this study, we can easily make the diagnosis of LPR by scoring systems and see the effectiveness of PPI in the treatment of LPR.

**Keywords:** Laryngoscopy, Laryngopharyngeal reflux, Reflux finding score, Reflux symptom index, Symptoms.

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## INTRODUCTION

The technological advances in past years, have created a new working class of young people. These people have been observed in the new group, who are suffering from laryngopharyngeal reflux. These individuals are usually working for long hours and attend evening classes, so not allowing them to have proper meals on proper time.<sup>1-3</sup>

It is commonly seen that eating habits such as large quantities of food, incomplete mastication, evening meals, and late-night meals might lead to gastroesophageal reflux and laryngopharyngeal reflux.<sup>4-6</sup>

Laryngopharyngeal reflux is described as the reverse flow of gastric contents to the laryngopharynx. Studies have shown that out of the total patients presenting to ENT outpatient clinics, 10% may suffer from laryngopharyngeal reflux.

To reduce symptoms of LPR, a major portion of the diet should consist of protein, which builds muscles.<sup>7</sup> However, junk food should be avoided, as it cause symptoms such as flatulence, pain in the epigastrium, pyrosis, postprandial fullness, and belching.<sup>8,9</sup> Gastric acid moistens the vocal cords leading to their inflammation and dysfunction.

The larynx is susceptible to gastric reflux, so patients present with laryngopharyngeal symptoms before GERD symptoms.<sup>10</sup>

The microaspiration theory states that there is direct injury to the larynx by gastric acid peptic contents, whereas esophageal bronchial reflex theory states that acidification of the terminal esophagus can cause laryngeal symptoms by a vagally mediated reflex.<sup>11</sup> The larynx is highly innervated, so any reflux would elicit

<sup>1,2</sup>Department of Otorhinolaryngology, Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab, India

<sup>3-5</sup>Department of ENT, Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab, India

**Corresponding Author:** Simmi Jindal, Department of Otorhinolaryngology, Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab, India, Phone: +91 9646657466, e-mail: dr.simmijindal@gmail.com

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a protective cough in a normal individual. However, this protective cough reflex might be changed in these patients; as confirmed by one study which shows, in response to endoscopic administration of air impulses, there is decreased laryngeal adductor reflexes in these patients. Due to the loss of this mechanism, there is increased stasis of harmful substances in the larynx.

Recent studies have shown the role of *Helicobacter pylori* in LPR with conflicting results.<sup>12-15</sup> There is one study which shows high *Helicobacter pylori* positivity in patients with LPR. Another study shows no significant relationship between symptoms of LPR and *helicobacter pylori* positivity.

The symptoms associated with LPR are dysphonia, chronic cough, painful swallowing, vocal fatigue and spasms of the larynx.<sup>16</sup> Other manifestations of LPR are globus sensation, difficult swallowing, nocturnal cough, chronic hemming, pain in the throat, mucus hypersecretion, postnasal discharge, burning sensation in the pharynx, foul-smelling breath, and earache.

There is a recently developed 9-item, self-administered, disease-specific outcome scoring system for LPR developed by Belafsky et al.<sup>17</sup> The symptom index system is easy to apply and highly consistent and has exhibited excellent construct and criterion-based validity. The reflux symptom Index (RSI) has proven to be helpful in building the initial diagnosis of LPR, to evaluate disease severity, and to detect treatment effects.

The most common signs of LPR are inter arytenoid erythema or hyperemia, subglottic edema (pseudosulcus), ventricular obliteration, granulation tissue in the inter arytenoid region, hypertrophy of the glottis and thick excessive endolaryngeal mucus.

Many laryngeal diseases such as subglottic stenosis reflux laryngitis, carcinoma, granuloma, contact ulcers, and vocal nodules occur due to undiagnosed LPR. As the signs and symptoms of the disease are nonspecific patients may suffer for a prolonged duration. These findings can be present in other causes such as vocal abuse, allergy, infection, irritant inhalation, heavy drinking or non-pathologic alterations. However, when these signs and symptoms present together, these are strong indicator of reflux.

However, there is another scoring system, the reflux finding score developed by Belafsky et al., which consists of eight laryngoscopic findings and has a score ranging from 0 (best) to 26 (worst).<sup>18</sup>

There is a remarkable overlap between symptoms of early laryngeal cancer and LPR, thus a complete detailed history and laryngeal examination are necessary.

The most common finding in patients with LPR is posterior laryngitis; however, this finding is not specific to LPR or reflux laryngitis. The laryngeal mucosa is highly susceptible to the effect of acid-induced injury. The mechanism of reflux laryngitis is supported by the presence of acid reflux in the hypopharynx in patients with clinical LPR.

Management options for gastroesophageal reflux disease include lifestyle changes, pharmacologic therapy, and surgical intervention.

The first treatment of LPR consists of basic education about the disorder and changes in diet and behavior that may play a role in the pathophysiology of LPR.

Medical management must be aimed at reducing inflammatory changes in the larynx. It has been seen that patients with LPR need a more aggressive and continuous treatment than patients with GERD.<sup>1</sup> Most patient's symptoms improve significantly after 2 or 3 months of medical management.

Medical treatment mainly consists of histamine-2 (H2) receptor antagonists, proton pump inhibitors (PPI), and prokinetic agents.

The candidates for surgical management are those who respond to anti-secretory therapy and those who have anatomical defects such as large hiatal hernias which need to be corrected.

The aim of the study was to diagnose LPR using a scoring system and to assess improvement with treatment.

## MATERIALS AND METHODS

A prospective study was conducted on 100 patients with gastroesophageal reflux disease in GGS Medical College for a time period of 18 months. An inclusion criteria was formulated for

the cases to be studied after approval by the Ethical Committee. Patients fulfilling the inclusion criteria were included in this study.

### Inclusion Criteria

Patients in the age group 18–60 years were included in this study. They had symptoms of heartburn, regurgitation, belching, odynophagia, dysphagia, and non-cardiac chest pain. At least 3 symptoms should be present to confirm the diagnosis of GERD. Every patient should undergo upper gastrointestinal endoscopy to confirm GERD.

### Exclusion Criteria

Patients with following conditions were not included:

- Pyloric obstruction
- Obstructive lesions of esophagus
- Esophageal motor disorders
- Previous gastric surgery
- Pregnancy
- Asthmatics
- Hypertensives on calcium channel blockers
- Achalasia cardia
- Hiatus hernia
- Smokers.

Patients enrolled in this study answered two questionnaires developed by Belafsky et al.

Belafsky et al. developed a nine-item questionnaire for the evaluation of symptoms in patients suffering from LPR. This questionnaire can be completed in <1 minute. The scale for each individual ranges from 0 (no problem) to 5 (severe problem), with a maximum score of 45. Reflux symptom index score >13 is defined as abnormal. Patients will be assessed for improvement of laryngeal signs and symptoms after 4–8 weeks of treatment for gastroesophageal reflux disease.

However as scoring of symptoms from 0 to 5 was not clear in this scoring system so we used RSI labelled as:

- 0–No problem
- 1–Mild problem
- 2–Moderate problem
- 3–Severe problem

### Reflux Symptom Index

*How did the problems listed below affect you since last month? Please circle.*

Hoarseness or voice problems	0	1	2	3
Throat clearing	0	1	2	3
Mucus	0	1	2	3
Difficulty in swallowing solids, fluids or tablets	0	1	2	3
Coughing after eating or lying down	0	1	2	3
Breathing difficulty or choking episodes	0	1	2	3
Annoying cough	0	1	2	3
Sensation of a lump or foreign body in throat	0	1	2	3
Burning, heartburn, chest pain, indigestion, or regurgitation	0	1	2	3

RSI score >10 is defined as abnormal

Another scoring system developed by Belafsky et al. is reflux finding score (RFS) which is based on findings of fiber optic

laryngoscopy. Scoring of each item is done according to severity, location and presence or absence, for a total score of 26.

**Reflux Finding Score**

Subglottic edema (pseudosulcus)	0 = absent 2 = present
Ventricular obliteration	0 = absent 2 = partial 4 = complete
Erythema/hyperemia	0 = absent 2 = only in the arytenoid 4 = diffuse
Vocal fold edema	0 = absent 1 = mild 2 = moderate 3 = severe 4 = polypoid
Diffuse laryngeal edema	0 = absent 1 = mild 2 = moderate 3 = severe 4 = obstruction
Posterior commissure hypertrophy	0 = absent 1 = mild 2 = moderate 3 = severe 4 = obstruction
Granuloma/granulation tissue	0 = absent 2 = present
Thick endolaryngeal mucus	0 = absent 2 = present

A score of 7 or higher is considered as having LPR

All patients enrolled in this study diagnosed with GERD underwent 2 questionnaires developed by Belafsky et al. These patients were assessed for laryngeal manifestations of LPR by fiber optic endoscopy.

Patients will be assessed for improvement of laryngeal signs and symptoms of LPR after –8 weeks of treatment of gastroesophageal reflux disease.

**RESULTS**

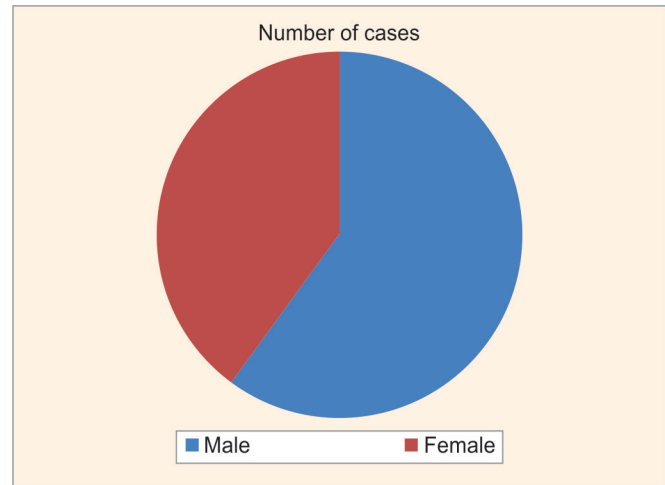
This study consists of 100 patients having laryngeal manifestations of gastroesophageal reflux disease. In our study a maximum number of patients, 36% were in the age group of 31–40 years and the minimum, i.e., 16% were in the age group of 41–50 years (Table 1).

In our study, 60% of patients were females and 40% of patients were males (Fig. 1). The majority of patients presented with burning or heartburn (83%), followed by foreign body sensations (Table 2). The most common sign was erythema (84%), followed by granuloma (70%), followed by diffuse laryngeal edema (Table 3).

In our study we concluded that if the RSI score was 10 or <10, then it was considered normal which means LPR was absent and if the RSI score was >10 then it was considered abnormal means LPR was present (Table 4). In our study, 10 cases showed improvement from 0 to 4 weeks and 23 cases showed improvement

**Table 1: Age distribution (N = 100)**

Age-group (years)	Frequency	Percentage
20–30	17	17.0
31–40	36	36.0
41–50	16	16.0
51–60	31	31.0
Total	100	100.0



**Fig. 1: Pie chart of gender distribution (N = 100)**

**Table 2: Distribution of laryngeal symptoms (N = 100)**

Laryngeal symptoms	Number of cases	Percent
Hoarseness/voice problems	53	53
Throat clearing	63	63
Excess mucus	69	69
Difficulty in swallowing	29	29
Coughing after eating	65	65
Breathing difficulty or choking	15	15
Annoying cough	25	25
Foreign body sensation	80	80
Burning or heart burn	83	83

N, total number of cases

**Table 3: Distribution of laryngeal signs (N = 100)**

Laryngeal signs	Number of cases	Percent
Subglottic edema	2	2
Ventricular obliteration	12	12
Erythema	84	84
Vocal fold edema	63	63
Diffuse laryngeal edema	66	66
Posterior commissure hypertrophy	26	26
Granuloma	70	70
Thick endolaryngeal mucus	40	40

N, total number of cases

from 4 to 8 weeks after continuous treatment. In total 33 cases showed improvement from 0 to 8 weeks after treatment (Table 5).

**Table 4:** Reflux symptom index (RSI) (0–45) at 0, 4, 8 weeks

RSI	Normal ( $\leq 10$ )	Abnormal ( $> 10$ )
At 0 week	44	56
At 4 weeks	54	46
At 8 weeks	77	23

**Table 5:** Comparison of reflux symptom index score between different time intervals

Comparison	Improvement in cases	z-value	p-value
At 0 week to 4 weeks	10	3.162	0.002*
At 4 weeks to 8 weeks	23	4.796	<0.001**
At 0 week to 8 weeks	33	5.745	<0.001**

Wilcoxon signed rank test: \* $p < 0.05$ ; Significant; \*\* $p < 0.001$ ; Highly significant

**Table 6:** Reflux finding score (0–26) at 0, 4, 8 weeks

RFS	Number	Percentage
RFS at 0 week	46	54
RFS at 4 weeks	68	32
RFS at 8 weeks	88	12

In our study, we concluded that if the reflux finding score was  $< 7$  then LPR was not present and if the reflux finding score was 7 or  $> 7$  then LPR was present

**Table 7:** Comparison of reflux finding score between different time intervals

Comparison	Improvement in cases	z-value	p-value
At 0 week to 4 weeks	20	4.690	<0.001**
At 4 weeks to 8 weeks	22	4.472	<0.001**
At 0 week to 8 weeks	42	6.481	<0.001**

Wilcoxon signed rank test: \* $p < 0.05$ ; Significant; \*\* $p < 0.001$ ; Highly significant

In our study, we concluded that if the reflux finding score was  $< 7$  then LPR was not present and if RFS was 7 or  $> 7$  then LPR was present (Table 6). In our study, 22 cases showed improvement from 0 to 4 weeks as the treatment continued. 20 cases showed improvement from 4 to 8 weeks as treatment continued. After continuous treatment of 8 weeks, 42 cases showed improvement (Table 7).

## DISCUSSION

In our study, we had taken 100 patients of age group 18–60 years with GERD. It was found that the majority of cases were in 31–40 years (36%), then 51–60 years (31%) followed by 20–30 years (17%), and lastly in the age group of 41–50 years (16%). The mean age was 42.18. The mean age of patients among males was 42.43 and among females was 41.80. In a study by Barbosa AB et al., a maximum number of patients was in the age group of 20–40 with extremes between 20 and 85 years of age, and the mean was 45.3 year.<sup>19</sup> In a study by Ramzy Iman et al., the mean age was 40.4.<sup>20</sup> In a study by Alam KH et al., mean age of patients was 39.6 years.<sup>21</sup>

As mentioned above, this age range between the third decade and fifth decade has the highest number of patients. As shown in

the studies this range covers the economically stressed population. Hence this group is susceptible to conditions leading to GERD and LPR.

In our study, we observed higher prevalence in females (60%) and lower in males (40%). In a study by Sereg Bahar Maja et al., among a total of 43 patients, 25 were women and 18 were men, which had almost the same ratio as our study.<sup>22</sup> In a study by Makhadoom Naeem et al., 53.33% were females and 46.67% were males.<sup>23</sup> In a study by Barbosa AB et al., 69% were females and 31% were males.<sup>19</sup> In a study by Dilen da Silva CE et al., the majority of patients were women.<sup>24</sup>

In our study among the symptoms of LPR, the commonest symptom was heartburn (83%) followed by foreign body sensation (80%). Schneider JA and Vaezi MF found dysphonia (71%) was the most common symptom, followed by cough (51%), and globus pharyngeus (47%).<sup>25</sup> Campagnolo AM et al. reported throat clearing in 87%, and heartburn in 20% of patients.<sup>26</sup> Dilen da Silva CE et al. found that the most frequent symptom was a dry cough followed by foreign body sensation.<sup>24</sup>

In our study among the signs of Laryngopharyngeal Reflux, the commonest sign was Erythema (84%) followed by granuloma (70%) and diffuse laryngeal edema (66%). Ford CN revealed that the common finding was the thickening of vocal folds, erythema, and contact granuloma in 65–74%, and pseudosulcus in 90%.<sup>27</sup> Krishna Kumar SB et al. found that the most common symptom was interarytenoid erythema followed by vocal cord erythema followed by granular pharyngitis and vocal nodule.<sup>28</sup>

Reflux symptom index score was normal in 44% of patients and abnormal in 56% of patients at 0 weeks. In our study, total of 33 cases showed improvement from 0 to 8 weeks after treatment. Belafsky et al. found that the mean RSI improved from 19.3 to 13.9 after 2 months of therapy with proton pump inhibitors in patients with LPR.<sup>17</sup> In a study by Campagnolo AM et al., RSI value was significantly higher in LPR patients than in controls.<sup>26</sup>

In a study by Ezzeldin H and Haseba AA all voice symptoms measured using the RSI – namely, hoarseness of voice, throat clearing, excess mucus, and difficulty in swallowing – improved in all patients in both groups, one receiving only proton pump inhibitors and the second group receiving both proton pump inhibitors and voice therapy. Moreover, on comparing these symptoms with the pretreatment baseline, both groups demonstrated a decrease in total RSI scores.<sup>29</sup>

The difference between our results and other studies as mentioned above is possibly due to different perceptions of symptoms and variations in explaining the symptoms by the patient.

In our study, at 0 weeks, LPR was absent in 46% of patients and present in 54% of patients. In our study, a total of 42 cases showed improvement from 0 to 8 weeks after treatment. In a study conducted by Vashani et al.<sup>30</sup> and Belafsky et al.<sup>31</sup> they reported alleviation of symptoms and signs in patients with LPR after using regular PPI for 3 months duration. In a study by Sevil Ergun et al., if the RFS score was higher than 7, then LPR was considered to be present.<sup>32</sup>

In this study, we had concluded the most common laryngeal manifestations of LPR. We concluded that proton pump inhibitors were effective in the treatment of LPR.

The variable results may be due to the absence of a standard definition for LPR because of the lack of a standard gold diagnostic test. This could lead to the inclusion of patients with non-reflux-



related symptoms, and thus affecting the negative findings. Moreover, the signs of LPR are not very specific and it has been noticed that many healthy adults can have these signs without any symptoms. Another important dilemma in diagnosis, is that there are variations in the observation of signs which lead to inconsistency in results in various studies. Now, given the high variability in observations, there have been increased efforts to develop a standard scoring system.

## CONCLUSION

In our study, we concluded that the majority of patients were in the 31–40 years of age group. LPR was more common in females. The most common laryngeal symptom was heartburn, followed by foreign body sensation and excess mucus. From our study, we had concluded that RSI and RFS scoring systems were useful in early diagnosis of LPR and to see improvement in patients with treatment over weeks.

## Clinical Significance

Through this study, we can easily make the diagnosis of LPR by scoring systems and see the effectiveness of PPI in the management of these patients.

## ORCID

Simmi Jindal  <https://orcid.org/0000-0002-5888-0579>

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