Received: 17 May 2021 | Revised: 30 January 2022 | Accepted: 29 March 2022

DOI: 10.1002/lio2.799

ORIGINAL RESEARCH

Laryngoscope Investigative Otolaryngology

Utility of reflux finding score and reflux symptom index in diagnosis of laryngopharyngeal reflux disease

Zephania Saitabau Abraham MD, MMed[1] | Aveline Aloyce Kahinga MD, MMed[2]

[1]Department of Surgery, University of Dodoma, School of Medicine and Dentistry, Dodoma, Tanzania

[2]Department of Otorhinolaryngology, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

Correspondence
Zephania Saitabau Abraham, Department of Surgery-University of Dodoma, Dodoma, Tanzania.
Email: zsaitabau@yahoo.com

Funding information
University of Pennsylvania

Abstract

Objective: The study aimed to determine the utility of reflux finding score (RFS) and reflux symptom index (RSI) in the diagnosis of laryngopharyngeal reflux disease (LPRD) in Dar es Salaam, Tanzania.

Methods: A prospective hospital-based cross-sectional study was conducted at a private hospital in Dar es Salaam, Tanzania. Data were analyzed using Statistical Package for Social Sciences version 21. Relationship between independent and dependent variables was established using chi-square test, a variable with *p*-value of equal or less than 0.05 was considered to be statistically significant.

Results: In this study, a total of 2500 patients were recruited, out of which 800 (32.0%) were males and 1700 (68.0%) were female. Out of the 2500, 1520 (60.8%) patients were found to have a RSI of >13. Out of the 1520 patients subjected to 70-degree laryngoscopy, 1425 patients (95.0%) were found to have a RFS > 7. Of the 1425 patients with RFS > 7, 260 were males (18.2%) and 1165 were females (81.8%).

Conclusion: RFS and RSI have demonstrated their role in establishing the diagnosis of LPRD.

Level of Evidence: 4

KEYWORDS
laryngopharyngeal, prevalence, reflux, disease, Tanzania

1 | INTRODUCTION

Laryngopharyngeal reflux (LPR) refers to a phenomenon where there is back flow of contents of the stomach into the lowermost part of the pharynx.[1–3] It has been described as an extra esophageal variant of GERD.[1–5] It is believed that the primary defect in LPR might be upper esophageal sphincter dysfunction in less than half of LPR patients with GERD.[2,4,6–9] For the larynx, as few as three episodes of reflux in a week have been shown to be associated with the development of significant diseases, such as laryngeal cancer and chronic laryngitis.[2]

An estimate of 4%–10% of the patients referred to an otolaryngology clinic has symptoms and/or signs related to LPR.[2] The LPR may be manifested as laryngeal symptoms such as cough, sore throat, hoarseness, dysphonia, and globus, as well as signs of laryngeal irritation on laryngoscopy.[1–4,6,8,10–12]

Studies have found the prevalence of GERD to increase almost every year and in the study which was conducted by El-Serag et al.,[13] such prevalence was found to increase by 4% every year since 1976. Similarly, Altman et al. found a significant increase in hospital visits due to similar complaints and such increase has been found to account for the majority of cases of dysphonia.[5,9]

A diagnosis of LPR may be established by asking patients about specific symptoms, laryngoscopy or 24-h double probe pH monitoring which remains to be the diagnostic test for LPRD.[1,2,10–12]

There are two scoring tools that are used to establish the diagnosis of LPR which are reflux symptom index (RSI) and reflux finding score (RFS) and they have been developed by Belafsky et al. to simplify the diagnosis of LPR. RSI is a scoring tool that consists of nine items used to assess various symptoms associated with LPR. Each item has a scale ranging from zero (no complaints) to five (severe complaints), with a maximum of 45 indicating the most severe symptoms. A RSI score higher than 13 is considered abnormal and suggests LPR. Similarly, RFS is a scoring tool used to establish the diagnosis of LPR and the score uses an endoscopic examination of the larynx with eight criteria. RFS score more magnificent than seven suggests LPR.[14]

This study was designed to describe the utility of RFS and RSI in diagnosis of LPRD at Tanzania's largest city.

2 | MATERIALS AND METHODS

2.1 | Study design, setting, and duration

This was a hospital-based descriptive cross-sectional study that was conducted from to June 2017 to June 2018 in Dar es Salaam, Tanzania's most populated city.

2.2 | Inclusion criteria

Patients with throat and voice complaints for more than a month provided they have no other underlying cause such as tumors of the aerodigestive system or chronic irritants of the larynx such as cigarette smoking or those with misuse of voice such as choir singers, teachers.

2.3 | Exclusion criteria

Patients with throat and voice complaints for a duration of less than a month or those having other possible underlying causes of voice changes such as tumors of the aerodigestive system or chronic irritants of the larynx such as cigarette smoking or those with misuse of voice such as choir singers, teachers were excluded.

2.4 | Statistical analysis

SPSS version 21 was used to analyze data in this study. Quantitative variables were expressed in terms of frequencies and percentages. Accuracy and consistency prior analysis was ensured by cross-checking the entered data to ensure all variables were well fed to completion. Results were presented in frequency tables, cross-tabulations. Relationship between independent and dependent variables was established using chi-square test, a variable with p-value of equal or less than 0.05 was considered to be statistically significant.

2.5 | Data collection tool

Assessment of symptoms related to LPRD was performed using the RSI.[1] Each item ranges from 0 (absent problem) to 5 (significant problem), with a maximum score of 45 (Table 1). A diagnosis of reflux was made if the patient had a RSI score > 13. Patients were followed up in 1-month intervals up to 3 months and 70-degree rigid laryngoscopy was repeated every month to notice any improvement in the RFS of the studied patients.

Meanwhile, diet and lifestyle modifications were recommended to patients such as regular exercise, avoiding spicy and oily foods, timely intake of meals, cease cigarette smoking, tobacco or alcohol consumption. Proton pump inhibitors (PPI) twice a day before meals were administered to patients.

Patients who were found to have a RSI score > 13 were subjected to 70-degree rigid laryngoscopy and their laryngeal findings were noted and scored according to the RFS.[8](Table 2).

The scoring tool used to scale the features of LPRD evaluates eight items such as: subglottic edema, ventricular obliteration, erythema or hyperemia, vocal fold edema, generalized laryngeal edema, posterior commissure hypertrophy, granuloma or granulation tissue, and excess laryngeal mucus. Individual items were scored according to severity, anatomical site, and presence or absence of the relevant finding, for a total score of 26 (Table 2). Patients who had a score of 7 or higher were considered to have LPRD.

3 | ETHICAL CONSIDERATIONS

Ethics and research committee of the Hospital granted an ethical clearance on 12th January 2017 with an approval number ESH/2017/10. A written informed consent for participants' participation and similarly a consent for sharing the research findings was obtained. All research procedures complied with 2013 Geneva declaration.

4 | RESULTS

A total of 2500 patients had voice and throat complaints for more than a month in the department of otorhinolaryngology at Ekenywa Specialized Hospital where 800 (32.0%) were male and 1700 (68.0%) were females. Out of the 2500, 1520 (60.8%) patients were found to have a RSI of >13. Out of the 1520 patients subjected to 70-degree laryngoscopy, 1425 patients (95%) were found to have a RFS >7. Of the 1425 patients with RFS > 7, 1165 were females (81.8%) and 260 were males (18.2%). The association between sex and RFS was statistically significant (p-value = 0.03). (Table 3).

TABLE 1 Reflux symptom index (RSI)

Impact of the below symptoms since the previous month. (Circle the appropriate response)	0 = Absent problem5 = Significant problem					
Hoarseness of voice	0	1	2	3	4	5
Excessive throat clearing	0	1	2	3	4	5
Excess throat mucus or postnasal drip	0	1	2	3	4	5
Difficulty in swallowing solid, liquid foods and tablets	0	1	2	3	4	5
Episodes of cough following eating or lying down	0	1	2	3	4	5
Difficulty in breathing or episodes of choking	0	1	2	3	4	5
Irritable cough	0	1	2	3	4	5
Globus/lump sensation	0	1	2	3	4	5
Heartburn, chest pain, sense of indigestion or reflux of gastric acid	0	1	2	3	4	5

TABLE 2 Reflux finding score (RFS)

Subglottic edema	0 = Absent 2 = Present
Ventricular obliteration	0 = Absent
	2 = Partial
	4 = Complete
Erythema/hyperemia of endolarynx	0 = Absent
	2 = Only in arytenoids
	4 = Diffuse
Vocal fold edema	0 = Absent
	1 = Mild
	2 = Moderate
	3 = Severe
	4 = Polypoidal
Diffuse laryngeal edema	0 = Absent
	1 = Mild
	2 = Moderate
	3 = Severe
	4 = Obstructing
Posterior commissure hypertrophy	0 = Absent
	1 = Mild
	2 = Moderate
	3 = Severe
	4 = Obstructing
Granuloma/granulation tissue	0 = Absent
	2 = Present
Thick endolaryngeal mucus	0 = Absent
	2 = Present

Regarding symptoms reported by patients with LPRD as per RSI and RFS, the most common symptom from RSI was globus or foreign body in throat, followed by excess throat mucus and throat clearing and episodes of cough following eating or lying down. The most common signs noted on RFS were hyperemia/erythema of the endolarynx, followed by thick endolaryngeal mucus and posterior commissure hypertrophy.

TABLE 3 Distribution of study participants by reflux finding score (RFS) and Reflux symptom index (RSI)

	Males, *n* (%)	Females, *n* (%)	Total, *n*
Participants	800 (32.0%)	1700 (68.0%)	2500
RSI > 13	320 (21.1%)	1200 (78.9%)	1520
RFS > 7	260 (18.2%)	1165 (81.8%)	1425

Upon scheduled follow up at the clinic, majority of the patients showed improvement in RFS scores in the first month of initiation of treatment for LPRD. Out of 1425 patients only 15 patients (1.05%) failed to show any improvement after 3-month therapy comprising PPIs and antacid twice daily. Those with refractory response to the scheduled regimen for LPRD were counseled to undergo esophagogastroduodenoscopy and were then referred to gastroenterologists.

5 | DISCUSSION

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 underdiagnosed entity in clinical practice especially when it falls under physicians' care. Of all the 1425 study participants with RFS > 7, majority (81.8%) were females contrary to what has been reported by other studies.[2,10,12]

The most frequently encountered symptom in this study was globus/lump sensation, 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.[8,11] Both scores were easily reproducible thus aiding in the follow up of the patients and helping monitor treatment outcomes.

In this study, 60.8% patients were found to have a RSI of >13 and 95% were found to have a RFS > 7. Contrary to pH studies, Italy reported a very low frequency (12.2%) of GERD on pH studies in patients with LPR.[15] While another study from Malaysia detected GERD on a pH study in 25% patients with chronic laryngitis.[16]

The duration of treatment for LPRD to date remains unstandardized. In this study, treatment was advocated for 3 months with a PPI twice a day and antacids along with dietary and lifestyle modification. Following 3 months of treatment, patients were advised to adhere to the recommended dietary and lifestyle modification. This calls for the urgent need to establish standardized treatment protocols for LPRD similar to what has been practicable with GERD. Regarding response to treatment as per our study, the results were promising and encouraging since only 15 patients (1.05%) out of the 1425 participants failed to show any improvement with PPIs and antacids. The few patients who came back with relapse of symptoms after 3 months of treatment were put on PPIs until resolution of symptoms was noted. Therefore, long-term follow-up of patients with LPRD remain to be important during the course of their treatment.

pH studies are of importance in establishing the diagnosis of LPRD as an adjunct to RFS and RSI when facilities permits. A study that was conducted at Boston to compare what traditional diagnostic tools used for esophageal reflux would detect and diagnose compared with what a combined hypopharyngeal-esophageal MII catheter with dual pH (HEMII-pH) can detect in the esophagus and pharynx in patients with suspected LPRD found (81%) tested positive for pharyngeal reflux. To compound the diagnostic utility of pH/impedance in diagnostic of acid reflux, all patients who tested positive with the proximal impedance criteria also tested positive using pharyngeal criteria, and similarly the patients who tested negative using traditional criteria, 72% were positive based on pharyngeal criteria.[17]

Regarding occurrence of acid reflux and position of patients as whether supine or upright, a study from California, found the mean pharyngeal pH to be lower during the supine period than during the upright period (6.8 vs. 7.2, $p < 0.0001$). Such observation is of importance in counseling patents about the occurrence of LPRD in both positions.[18]

Another study from the USA evaluated patients with otolaryngologic disorders having suspected of suffering from GERD where ambulatory 24-h intraesophageal pH monitoring was performed. Of the patients who underwent diagnostic pH monitoring, 62% had abnormal esophageal pH studies, and 30% demonstrated reflux into the pharynx. This suggests the utility of pH studies in diagnosis of LPRD and remains an adjunct to RSI and RFS in sophisticated health facilities.[19]

Generally, RFS and RSI have shown a great utility in establishing the diagnosis of LPRD and instituting prompt management of patients with such an established diagnosis and therefore, having a positive impact in the treatment paradigm especially in resource limited settings.

This was a single institutional based study and therefore the study findings cannot be generalizable and thus a limitation of this study.

6 | CONCLUSION

Among Tanzanians who presented at the private hospital, the most common symptoms for patients diagnosed with LPRD were globus sensation, pooling of mucus on the throat and frequent throat clearing. The most common signs were hyperemia/erythema of endolarynx, thick endolaryngeal mucus and posterior commissure hypertrophy. RFS and RSI have shown some utility in management of patients with LPRD, but not as stand-alone metrics since they should be coupled with oral and oropharyngeal findings and also because there are some other diagnostic methods such as 24-h dual-probe esophageal pH study.

ACKNOWLEDGMENT

Dr. Mary Jue Xu from the Department of Surgical Oncology, University of Pennsylvania, USA is highly acknowledge for her valuable inputs including technical review of the manuscript and grammar editing.

CONFLICT OF INTEREST

The authors report no conflicts of interest. The authors are responsible for the content and writing of the article.

ORCID

Zephania Saitabau Abraham https://orcid.org/0000-0002-7738-9902

Aveline Aloyce Kahinga https://orcid.org/0000-0001-7238-3299

REFERENCES

1. Karakaya NE, Akbulut S, Altıntaş H, Demir MG, Demir N, Berk D. The reflux finding score: reliability and correlation to the reflux symptom index. *J Academic Res Med*. 2015;5(2):68-74.
2. Bhargava A, Shakeel M, Srivastava AP, Varshney P, Saxena S, Agarwal E. Role of reflux symptom index and reflux finding score in evaluation of treatment outcome in patients with laryngopharyngeal reflux. *Int J Phonosurg Laryngol*. 2017 Dec;7:39-43.
3. Campagnolo AM, Priston J, Thoen RH, Medeiros T, Assunção AR. Laryngopharyngeal reflux: diagnosis, treatment, and latest research. *Int Arch Otorhinolaryngol*. 2014;18(02):184-191.
4. Gaur RS, Patra P, Rs G, Otorhinolaryngol IJ, Neck H, Mar S. Cross sectional study of prevalence of LPRD at tertiary care hospital. *Int J Otorhinolaryngol Head Neck Surg*. 2019;5(2):445-448.
5. Altman KW, Stephens RM, Lyttle CS, Weiss KB. Changing impact of gastroesophageal reflux in medical and otolaryngology practice. *Laryngoscope*. 2005;115(7):1145-1153.
6. Salihefendic N, Zildzic M, Cabric E. Laryngopharyngeal reflux disease. *Med Arch*. 2017;71(3):215-218.

7. Martinucci I, de Bortoli N, Savarino E, Nacci A, Romeo SO, Bellini M, Savarino V, Fattori B, Marchi S. Optimal treatment of laryngopharyngeal reflux disease. *Therapeutic Adv Chronic Dis* 2013 Nov;4(6):287–301.
8. Belafsky PC, Postma GN, Koufman JA. The validity and reliability of the reflux finding score (RFS). *Laryngoscope* 2001 Aug;111(8):1313–7.
9. Altman KW, Prufer N, Vaezi MF. The challenge of protocols for reflux disease: a review and development of a critical pathway. *Otolaryngol Head Neck Surg*. 2011;145(1):7-14.
10. de la Iglesia FV, González SF, de la Cámara Gómez M. Laryngopharyngeal reflux: correlation between symptoms and signs by means of clinical assessment questionnaires and fibroendoscopy. *Is this Sufficient for Diagnosis?*. *Acta Otorrinolaringologica*. (English Edition). 2007;58(9):421-425.
11. Belafsky PC, Postma GN, Koufman JA. Validity and reliability of the reflux symptom index (RSI). *J Voice* 2002 Jun 1;16(2):274–7.
12. Nunes HS, Pinto JA, Zavanela AR, Cavallini AF, Freitas GS, Garcia FE. Comparison between the reflux finding score and the reflux symptom index in the practice of otorhinolaryngology. *Int Arch Otorhinolaryngol*. 2016;20(03):218-221.
13. El-Serag HB. Time trends of gastroesophageal reflux disease: a systematic review. *Clin Gastroenterol Hepatol*. 2007;5(1):17-26.
14. Munifah AP, Perdana RF, Juniati SH, Yusuf M, Dewi ER. The profile of laryngopharyngeal reflux patients at Dr. Soetomo teaching hospital, Surabaya Indonesia. *Indian J Forensic Med Toxicol*. 2020;14(4):4160-4166.
15. De Bortoli N, Nacci A, Savarino E, Martinucci I, Bellini M, Fattori B, Ceccarelli L, Costa F, Mumolo MG, Ricchiuti A, Savarino V. How many cases of laryngopharyngeal reflux suspected by laryngoscopy are gastroesophageal reflux disease-related?. *World J Gastroenterol: WJG* 2012 28;18(32):4363, 4370.
16. Qua CS, Wong CH, Gopala K, Goh KL. Gastro-oesophageal reflux disease in chronic laryngitis: prevalence and response to acid-suppressive therapy. *Aliment Pharmacol Ther*. 2007 Feb;25(3):287-295.
17. Borges LF, Chan WW, Carroll TL. Dual pH probes without proximal esophageal and pharyngeal impedance may be deficient in diagnosing LPR. *J Voice* 2019 1;33(5):697–703.
18. Ayazi S, Lipham JC, Hagen JA, et al. A new technique for measurement of pharyngeal pH: normal values and discriminating pH threshold. *J Gastrointest Surg*. 2009 Aug;13(8):1422-1429.
19. Koufman JA. The otolaryngologic manifestations of gastroesophageal reflux disease (GERD): a clinical investigation of 225 patients using ambulatory 24-hour pH monitoring and an experimental investigation of the role of acid and pepsin in the development of laryngeal injury. *Laryngoscope*. 1991;101:1-78.

How to cite this article: Abraham ZS, Kahinga AA. Utility of reflux finding score and reflux symptom index in diagnosis of laryngopharyngeal reflux disease. *Laryngoscope Investigative Otolaryngology*. 2022;7(3):785-789. doi:10.1002/lio2.799