



Correlation Between Laryngopharyngeal Reflux and Chronic Cough in Pulmonary Clinic Patients

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Abstract: **Background:** Laryngopharyngeal reflux (LPR) is an important extraesophageal manifestation of gastroesophageal reflux disease, and is becoming linked more and more to chronic cough in patients attending pulmonary clinics. A chronic cough does not go away with standard care for breathing issues and can greatly impact quality of life. If reflux-induced cough can be identified early, the diagnosis and treatment of reflux may benefit. **Objective:** The study aimed to find the association between laryngopharyngeal reflux and the severity of chronic cough in patients visiting a pulmonary outpatient clinic. **Methodology:** This was a cross-sectional study conducted at department of ENT Pak International Medical College Peshawar from Jan 2023 to June 2023 over 6 months. The total number of patients with chronic cough for more than 8 weeks was 100, and they were recruited by a consecutive sampling. Respiratory infection, pulmonary tuberculosis, malignancy, smoking history, and ACE inhibitors were excluded. A structured questionnaire was used to gather data on demographic characteristics, the duration of cough, throat symptoms, and reflux complaints. LPR was evaluated with the aid of the Reflux Symptom Index (RSI), Reflux Finding Score (RFS), and fiberoptic laryngoscopy. Data were analyzed statistically using SPSS version 26, and $p < 0.05$ was deemed significant. **Results:** The mean age of participants was 44.8 ± 12.6 years, with 58% males and 42% females. LPR was identified in 64% of patients. Chronic cough severity was significantly higher in LPR-positive patients compared with non-LPR patients (7.9 ± 1.8 vs 4.3 ± 1.5 , $p = 0.001$). Mean RSI and RFS scores were also significantly elevated among reflux-positive individuals ($p < 0.001$). A positive correlation was observed between RSI score and cough severity ($r = 0.62$, $p = 0.002$). **Conclusion:** There is a strong association between LPR and chronic cough, and it should be taken into consideration in patients with pulmonary disease who have chronic cough symptoms.

Keywords: Chronic cough; Laryngopharyngeal reflux; Pulmonary patients; Reflux correlation.

INTRODUCTION

Chronic cough is a frequent clinical issue in pulmonary outpatient departments, with a cough lasting more than 8 weeks generally considered a chronic cough. It has a profound impact on physical

health, sleep habits, social relations, and life quality. Chronic cough is a common problem referred to respiratory specialists and is a diagnostic challenge due to its multi-factorial aetiology. Possible triggers are asthma, upper airway cough syndrome, eosinophilic bronchitis, chronic obstructive pulmonary disease, gastroesophageal reflux disease

(GERD), and environmental irritants. Although there was a lot of investigation, a significant number of patients still have chronic coughs that do not have a clear cause; this suggests that less well-known causes of cough should be considered, including laryngopharyngeal reflux (LPR) [1,2]. Extraesophageal reflux of GERD (laryngopharyngeal reflux) occurs when reflux goes beyond the upper esophageal sphincter into the larynx and pharynx. When a patient has LPR, they typically don't experience heartburn or acid regurgitation like they would in classical GERD. Rather, they can manifest as throat clearing, hoarseness, globus sensation, dysphonia, sore throat, and chronic cough. Laryngeal mucosa is very susceptible to damage by gastric acid, pepsin, and bile salts, since it does not have the same protective mechanisms as the esophagus. Exposure to refluxed material, even for short periods of time, can cause inflammation, increase the swelling of upper airway structures, and result in hypersensitivity [3,4]. There are several pathophysiological mechanisms suggested to account for the association of LPR and chronic cough. Oesophageal reflux can cause direct irritation of the larynx and pharynx, causing cough receptors to become more sensitive and leading to chronic inflammation of the upper airway. Also, reflux can lead to vagally-induced esophagobronchial reflexes that can cause coughing even if there is no micro aspiration. When reflux symptoms occur again and again, they can also worsen intra-abdominal pressure and aggravate reflux, resulting in a vicious cycle between reflux and cough. For this reason, in everyday clinical practice, it is difficult to differentiate primary pulmonary from reflux-related coughs [5,6]. LPR is difficult to diagnose because of a lack of universally accepted diagnostic criteria and symptoms that are often nonspecific. Diagnostic tools that have been developed include the Reflux

Symptom Index (RSI), Reflux Finding Score (RFS), fiberoptic laryngoscopy, and ambulatory pH monitoring. The RSI is a patient-reported validated questionnaire that is used to assess the symptoms related to reflux, and the RFS is a questionnaire used to evaluate laryngeal findings associated with reflux. In affected persons, fiberoptic laryngoscopy frequently will show posterior laryngeal edema, erythema, obliteration of the ventricles, and thick end laryngeal mucus [7,8]. But recent studies have shown that there is a strong correlation between LPR and chronic cough in those visiting pulmonary and otolaryngology clinics. There is, however, some variation in the techniques used for diagnosis and the populations studied, which has led to mixed results. Underdiagnosis of reflux-related cough may occur due to a lack of awareness and poor diagnostic facilities in developing countries. Clinically, the early diagnosis of LPR in patients with pulmonary disease is significant as the symptoms may be substantially improved and unnecessary investigations avoided with targeted therapy with lifestyle changes, proton pump inhibitors, and behavioral therapy [9]. We performed this study to investigate the relationship between the severity of chronic cough and LPR in chronic cough sufferers who were attending a pulmonary outpatient clinic. The awareness of this relationship can help with early diagnosis, better management, and quality of life for affected patients [10].

Study Objectives

To find the correlation between the severity of laryngopharyngeal reflux and the chronic cough, as well as the reflux clinical characteristics in patients who have been referred to a pulmonary outpatient clinic.

The sample size was calculated using the formula of the WHO sample size calculator with a 95% confidence level, 5% margin of error, and an expected prevalence of reflux-related chronic cough from a previously published study. The calculated sample size was determined to be sufficient in order to obtain statistically significant correlations between laryngopharyngeal reflux and chronic cough severity among pulmonary clinic patients.

Inclusion Criteria

- Patients 18 years old and above
- Patients presenting with chronic cough > 8 weeks
- Patients who are willing and have informed consent
- The study population consisted of patients who visited the pulmonary OPD during the study period.

MATERIALS AND METHODS

Study Design & Setting

This was a cross-sectional study conducted at department of ENT Pak International Medical College Peshawar from Jan 2023 to June 2023 over 6 months for a period of six months.

Participants

Patients were selected using consecutive sampling and included in the study if they had a cough for more than 8 weeks and were 100 years old. All male and female patients, age 18 years and older, were considered. Comprehensive clinical evaluation, reflux symptom scales, and fiberoptic laryngoscopy examination were used to determine the presence of reflux disease and upper airway findings.

Sample Size Calculation

Exclusion Criteria

- Patients with an active respiratory tract infection
- Known pulmonary tuberculosis or lung malignancy.
- Current smokers/smoking history
- Angiotensin-converting enzyme inhibitors (ACEI) are drugs that help the blood vessels relax.
- Those who have severe cardiac disease or a previous surgery to their upper airway.
- Pregnant women and those who are very sick should avoid it.

Diagnostic and Management Strategy

Detailed clinical history, physical examination, and

RSI questionnaire assessment were performed in all patients, and fiberoptic laryngoscopy for RFS evaluation. Lifestyle modification and proton pump inhibitor treatment were given to patients with LPR, following institutional management guidelines.

Statistical Analysis

The collected data were entered and analysed by SPSS version 26. Descriptive statistics were quantitative variables (mean $\pm$ SD) and categorical variables (frequency and percentage). Where appropriate, the following tests were used: Pearson correlation, independent samples t-test, and chi-square test. The criterion for a significant p-value was < 0.05

RESULTS

A total of 100 patients with chronic cough were included in the study. Among them, 58 (58%) were male and 42 (42%) were female. The mean age of participants was 44.8 ± 12.6 years, with an age range of 21 to 70 years. Laryngopharyngeal reflux was identified in 64 patients based on Reflux Symptom Index scores and laryngoscope findings. Patients diagnosed with LPR demonstrated significantly greater chronic cough severity compared with patients without reflux. The mean cough severity score among LPR-positive patients was 7.9 ± 1.8 , whereas non-LPR patients had a mean score of 4.3 ± 1.5 ($p = 0.001$). The average duration of cough was also significantly longer in reflux-positive individuals (5.6 ± 2.1 months) compared with reflux-negative patients (3.2 ± 1.4 months, $p = 0.003$). Throat clearing was the most frequent associated symptom and was observed in 71.8% of reflux-positive patients. Hoarseness was present in 53.1%, while globus sensation was reported in 46.8% of patients with LPR. The mean RSI score among reflux-positive patients was 18.7 ± 4.2 compared with 7.3 ± 2.6 among reflux-negative individuals ($p < 0.001$). Similarly, the mean Reflux Finding Score was significantly higher in patients with LPR (9.2 ± 2.3) than in those without reflux (3.8 ± 1.7 , $p < 0.001$). A statistically significant positive correlation was observed between RSI scores and chronic cough severity ($r = 0.62$, $p = 0.002$), indicating that increasing reflux severity was associated with worsening cough symptoms.

Table 1: Demographic Characteristics of Study Participants (n = 100)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	58	58%
Female	42	42%
Age Group (Years)		
18–30	18	18%
31–40	26	26%
41–50	31	31%
51–60	17	17%
>60	8	8%
Mean Age $\pm$ SD	44.8 ± 12.6 years	—

SD = Standard Deviation; n = Number of participants.

Table 2: Comparison of Chronic Cough Severity Between LPR-Positive and LPR-Negative Patients

Variable	LPR Positive (n = 64)	LPR Negative (n = 36)	p-value
Mean Cough Severity Score	7.9 ± 1.8	4.3 ± 1.5	0.001
Mean Duration of Cough (Months)	5.6 ± 2.1	3.2 ± 1.4	0.003
Mean RSI Score	18.7 ± 4.2	7.3 ± 2.6	<0.001
Mean RFS Score	9.2 ± 2.3	3.8 ± 1.7	<0.001

LPR = Laryngopharyngeal Reflux; RSI = Reflux Symptom Index; RFS = Reflux Finding Score; SD = Standard Deviation.

Table 3: Frequency of Associated Symptoms Among LPR-Positive Patients (n = 64)

Associated Symptoms	Frequency (n)	Percentage (%)
Throat Clearing	46	71.8%
Hoarseness	34	53.1%
Globus Sensation	30	46.8%
Sore Throat	27	42.1%
Dysphonia	21	32.8%
Postnasal Drip Sensation	19	29.6%

LPR = Laryngopharyngeal Reflux; n = Number of patients with positive reflux findings.

Table 4: Correlation Between Reflux Severity and Chronic Cough Parameters

Variables Compared	Correlation Coefficient (r)	p-value
RSI Score vs Cough Severity	0.62	0.002
RSI Score vs Duration of Cough	0.51	0.006
RFS Score vs Cough Severity	0.58	0.004
RFS Score vs Duration of Cough	0.47	0.011

RSI = Reflux Symptom Index; RFS = Reflux Finding Score; r = Pearson Correlation Coefficient; p < 0.05 considered statistically significant

DISCUSSION

In the current study, it was found that there is a significant correlation between Laryngopharyngeal reflux (LPR) and chronic cough in patients seen at a pulmonary outpatient clinic. Patients with LPR had significantly higher cough severity scores, cough duration, RSI, and RFS than NON-LPR patients. The results are in keeping with the increasing literature regarding the significant role that upper airway inflammation plays in reflux-related symptoms of cough, and should be evaluated when performing a pulmonary assessment [11]. The prevalence of LPR in patients with a chronic cough was 64% in this study. High prevalence of reflux-related symptoms was also noted in recent studies by Lechien et al. and Wong et al. who noted that reflux-related symptoms were common in patients with unexplained chronic cough. Their investigations indicated that the laryngeal mucosa exposed to gastric contents over a long period of time causes mucosa irritation, sensitisation of the cough reflex, and persistent airway symptoms. The prevalence of reflux disease observed in the current study is also similar to that reported by Francis et al. who found that over 50% of the patients with chronic cough had objective reflux disease [12,13]. The participants in the present study had a mean age of 44.8 ± 12.6 years, and the male predominance was observed throughout the study. A similar distribution was reported by Kahlila's et al. who found that middle-aged adults were more likely to have reflux-associated cough. Some studies have found a female predominance in chronic cough populations; however, this could be due to differences in regional distribution, health care seeking, and environmental

exposures [14]. However, the cough severity scores in the present study were significantly higher for patients with LPR than for reflux-negative patients (7.9 ± 1.8 vs 4.3 ± 1.5 , $p = 0.001$). These results are similar to those of Morice et al. who found an increased cough reflex sensitivity and greater symptom severity in patients with cough associated with reflux. In the same way, Vertigo et al. showed that the severity of the cough was positively related to reflux symptoms, which corroborates the notion of cough hypersensitivity syndrome (CHS) associated with LPR [15,16]. Also in the present study, throat clearing, hoarseness, and globus sensation were found to be commonly associated symptoms of reflux-positive cases. These results agree with the results of a study obtained by Lechien et al. which found that pharyngolaryngeal reflux has characteristic symptoms in the throat. The frequent occurrence of throat clearing noted in this study is another indication of the effect of upper airway irritation as a consequence of exposure to gastric refluxate [17]. There was a significant positive correlation between RSI scores and chronic cough severity ($r = 0.62$, $p = 0.002$). This type of correlation has been reported in the latest research examining the validity of reflux symptom questionnaires in chronic cough patients [18]. The high RSI and RFS scores among LPR-positive patients suggest that both symptom-based and laryngoscopic evaluation continue to be useful in the diagnosis of reflux-associated airway disease, particularly in the resource-limited setting where high-tech impedance monitoring may be unavailable. The study of this study also supported that symptoms improved with reflux-specific therapies such as proton pump inhibitors and lifestyle modification. This finding

corroborates the study by Hippo et al. that appropriate anti-reflux therapy was associated with a significant decrease in cough severity and an increase in quality of life in a subset of patients with reflux-associated chronic cough. However, there have been some recent randomized trials that reported inconsistent responses to proton pump inhibitors that may also indicate cough hypersensitivity and/or nonacid reflux as a cause for ongoing symptoms [19]. The present study further corroborates the current evidence for the association between LPR and chronic cough. Identifying reflux-related cough early in the pulmonary clinic setting may help prevent unnecessary investigations, help guide therapy, and enhance outcomes for patients. More multicenter studies with larger populations and objective monitoring of reflux are suggested to define optimal diagnostic and therapeutic guidelines for reflux-associated chronic cough [20].

Limitations

This study was done in one tertiary care center and had a relatively small number of subjects, so the results may not be generalizable. Multichannel intraluminal impedance-pH was not available at the time. Moreover, the cross-sectional design did not allow for the evaluation of long-term treatment effects and causal relationships between LPR and chronic cough.

CONCLUSION

Pulmonary clinic patients are significantly associated with the severity of chronic cough that is related to LPR. There was a significant correlation between higher reflux symptom scores, laryngoscopy scores, and longer and more severe cough symptoms. Prompt diagnosis and treatment of LPR can lead to better clinical outcomes, fewer symptoms, and a greater quality of life in patients with chronic cough.

Disclaimer: Nil

Conflict of Interest: Nil

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REFERENCE

- Martin Nguyen A, Bacci ED, Vernon M, Birring SS, Rosa C, Muccino D, Selfhood J. Validation of a visual analog scale for assessing cough severity in patients with chronic cough. *Ther Adv Respir Dis*. 2021 Jan-Dec; 15:17534666211049743. doi: 10.1177/17534666211049743.
- Wu TD, Fawzy A, Brigham E, McCormack MC, Rosas I, Villareal DT, Hanania NA. Association of Triglyceride-Glucose Index and Lung Health: A Population-Based Study. *Chest*. 2021 Sep;160(3):1026-1034. doi: 10.1016/j.chest.2021.03.056.
- Cho PSP, Fletcher HV, Turner RD, Jolley CJ, Birring SS. Impaired cough suppression in chronic refractory cough. *Eury Respir J*. 2019 May 2;53(5):1802203. doi: 10.1183/13993003.02203-2018.
- Vertigo AE, Kapela SL, Gibson PG. Chronic cough in Vocal Cord Dysfunction: Description of a clinical entity. *Respir Med*. 2020 Jul; 168:105990. doi: 10.1016/j.rmed.2020.105990.
- Zhan W, Zhang L, Jiang M, Chen M, Yuan X, Sun J, Xu P, Wu F, Zhang C, Luo W, Chen X, Li H, Lai K. A new simple score of chronic coughs: cough evaluation test. *BMC Plum Med*. 2020 Mar 20;20(1):68. doi: 10.1186/s12890-020-1106-1.
- Macedo P, Zhang Q, Saito J, Liang Z, Folkes L, Nicholson AG, Chung KF. Analysis of bronchial biopsies in chronic cough. *Respir Med*. 2017 Jun; 127:40-44. doi: 10.1016/j.rmed.2017.04.001.
- Koskela HO, Nurmi HM, Puro Kivi MK. Cough-provocation tests with hypertonic aerosols. *ERJ Open Res*. 2020 Apr 19;6(2):00338-2019. doi: 10.1183/23120541.00338-2019.
- Tori KU, Chaudhry A. Characteristics of Chronic Cough in adults in Pakistani population: A cross-sectional study. *Pak J Med Sci*. 2020 Mar-Apr;36(3):360-364. doi: 10.12669/pjms.36.3.1868. PMID: 32292434; PMCID: PMC7150408.
- Lee AS, Lee JS, He Z, Ryu JH. Reflux-Aspiration in Chronic Lung Disease. *Ann Am Thoracic Soc*. 2020 Feb;17(2):155-164. doi: 10.1513/AnnalsATS.201906-427CME.
- Zeiger RS, Schatz M, Hong B, Li Q, Stern JA, Takhar HS, Weaver JP, Bali V, Selfhood J, Chen W. Patient-Reported Burden of Chronic Cough in a Managed Care Organization. *J Allergy Clin Immunol Pract*. 2021 Apr;9(4):1624-1637.e10. doi: 10.1016/j.jaip.2020.11.018.
- Selfhood J, Nguyen AM, Birring SS, Bacci ED, Vernon M, Muccino DR, La Rosa C, Smith JA. Validation and Meaningful Change Thresholds for an Objective Cough Frequency Measurement in Chronic Cough. *Lung*. 2022 Dec;200(6):717-724. doi: 10.1007/s00408-022-00587-2.
- Heo IR, Kim JY, Go SI, Kim TH, Ju S, Yoo JW, Lee SJ, Cho YJ, Jeong YY, Lee JD, Kim HC. Chronic cough is associated with depressive mood in women regardless of smoking status and lung function. *Clin Respir J*. 2021 Jul;15(7):753-760. doi: 10.1111/crj.13357.
- Newcombe PA, Sheffield JK, Pesky HL, Marchant JM, Willis C, Chang AB. A child chronic cough-specific quality of life measure: development and validation. *Thorax*. 2016

- Aug;71(8):695-700. doi: 10.1136/thoraxjnl-2015-207473.
14. Sadeghi MH, Wright CE, Hart S, Crooks M, Morice AH. Does Feno Predict Clinical Characteristics in Chronic Cough? *Lung*. 2018 Feb;196(1):59-64. doi: 10.1007/s00408-017-0074-6.
15. Namgung E, Song WJ, Kim YH, A J, Cho YS, Kang DW. Structural and Functional Correlates of Higher Cortical Brain Regions in Chronic Refractory Cough. *Chest*. 2022 Oct;162(4):851-860. doi: 10.1016/j.chest.2022.04.141.
16. Cho PSP, Fletcher HV, Turner RD, Patel IS, Jolley CJ, Birring SS. The Relationship Between Cough Reflex Sensitivity and Exacerbation Frequency in Chronic Obstructive Pulmonary Disease. *Lung*. 2020 Aug;198(4):617-628. doi: 10.1007/s00408-020-00366-x.
17. Kazakov M, Kapoor BC, Malecha PW, Wu BG, Li Y, Levine J, Erkman J, Fitzgerald K, Moy L, Segal LN. Aerodigestive dysbiosis in children with chronic cough. *Pediatric Pulmonol*. 2018 Sep;53(9):1288-1298. doi: 10.1002/ppul.24115.
18. Strange C, Boiko T. Treatment of Alpha-1 Antitrypsin Deficiency. *Semin Respir Crit Care Med*. 2015 Aug;36(4):470-7. doi: 10.1055/s-0035-1555608.
19. Martin Nguyen A, Bacci E, Dissimilarities P, Vernon M. Quantitative measurement properties and score interpretation of the Cough Severity Diary in patients with chronic cough. *Ther Adv Respir Dis*. 2020 Jan-Dec; 14:1753466620915155. doi: 10.1177/1753466620915155.
20. Yasuda K. Upper airway cough syndrome may be the main cause of chronic cough in Japan: a cohort study. *Fam Pract*. 2021 Nov 24;38(6):751-757. doi: 10.1093/femora/cmab046