Indian Journal of Basic and Applied Medical Research; March 2020: Vol.-9, Issue- 2. P. 436 – 443
DOI: 10.36848/IJBAMR/2020/18215.5176

Original article

Correlation between GERD symptoms and chronic throat complaints

Dr. Abhilesh Darade *

Assistant Professor, Dept of ENT, ERA's Lucknow Medical College & Hospital,Lucknow
*Corresponding author**

Abstract

Introduction: *The study shows the evaluation of the correlation of the Gastroesophageal Reflux Disease (GERD) and its complications which affects the throat and the upper part of the gastrointestinal tract, for different chronic condition.*

Method: *This prospective hospital-based study in India which includes the 80 patients of the age of 18 to 70 years for the assessment of the correlation of the symptoms of the GERD and the chronic complications of the throat. The Esophageal manometry is the 24-hour is the dual channel to regulate the ph and the data analysis have been done by the use of the IBM SPSS 22.*

Result: *The study among the 80 patients with specific reflux patterns. The patients with the GERD & LPR group showed the high mean score of RSI and the duration of the reflux, which indicates the severity and long duration of the reflux activity. iLPR patients, have high symptom of the throat reflux and the iGERD have high score of the symptom among the males. The study reveals that the GERD & LPR group has the highest mean RSI score (19.49 ± 7.25), followed by iLPR (18.21 ± 8.89), while the No RD group has the lowest (9.62 ± 6.70). GERD & LPR also shows significantly higher total reflux time (18.5 ± 17.9 min, p = 0.021) and percentage of total reflux time (1.39 ± 1.35%, p = 0.021) compared to iLPR. However, no significant differences are found between iGERD and GERD & LPR for distal esophageal reflux measures (p-values 0.295–0.982).*

Conclusion: *The group experiencing both GERD and LPR showed the most severe symptoms and longest reflux duration, indicating that having both gastroesophageal and laryngopharyngeal reflux leads to more intense and lasting symptoms.*

Keywords: *Gastroesophageal Reflux Disease (GERD); Laryngopharyngeal Reflux (LPR); Esophageal Manometry; Chronic Throat Symptoms.*

Introduction

The Gastroesophageal reflux disease (GERD) is a incidence where there is the retrograde flow of the contents in the stomach occurs such as in the oral cavity, the larynx, the lungs etc. and results in the inflammation in the esophageal mucosa. The American College of Gastroenterology explain the GERD as the chronic state and cause damage to the mucosa due to reflux of the abdomen in the esophagus [1, 2]. This conditions is classified as the nonerosive reflux disease which can have symptoms or without, causes the esophageal erosions also known as the erosive reflux disease. Men are much more predominant for the reflux esophagitis and the NERD is mostly common in women. In the western part of the world, the GERD is estimated to be around 10% to 20% and the severity is about 6%, while in Asia, this is approximately around 5% [3, 4]. This may arise in different complications like the esophagitis, bleeding in the upper part of the gastrointestinal part and the esophageal stricturing, dysphagia, and Barrett esophagus. Also the carcinoma in esophageal squamous cell and the events of laryngeal carcinoma can be associated [5, 6]. Barrett's esophagus enhances the risks associated with the distal esophageal adenocarcinoma, while the GERD also can be the outcome of several gastric complications like the

erosions, laryngitis, cough, asthma, sinusitis, and idiopathic pulmonary fibrosis [7]. Some common symptoms of the GERD is the heart burn, the regurgitation and also noncardiac chest pain. The GERD is mostly seen in case of men and women, but the ration of the Barrett esophagitis is 3:1 [8]. The event of the reflux esophagitis is mostly common between the age group of 60 to 70 and also decreases in the older age. The incidence also most commonly seen in case of among pediatric population. The report of the GERD is ranging from the 12% to 50% among the children of 0 to 18 years of age. The GERD is also observed among the infants [9]. Different factors, like genetics, the environmental and the lifestyle parameters have contributed to the formation of the esophageal reflux. The condition is very common for the pregnant women and also increases during the period, affects 20 to 30% of women in their first trimester and rest 40 to 45% in second and 60% in third trimester, [10]. Pathophysiologically, the Transient lower esophageal sphincter relaxation (TRLES) can lead to the regurgitation of the gastric acid, peptic enzymes, and bile acids in the esophagus and this effect can get worst in case of patients with the high abdominal pressure, like the ascites and the pregnant women. The hiatal hernia also damages the association of the crural diaphragm and the lower part of the esophagus and the function of the sphincter. The hernia is the site for the gastric components and exacerbate the reflux into the esophagus at the time of swallowing. This enhances the pressure at the gastroesophageal region which rises the TRLES phase frequency, results in the reflux in the esophagus. The impairment of the esophageal peristalsis can results in the clarity of the acids in the lower part of the esophagus, this can stop or reduce the neutralization of the acids in the esophagus. The pre-epithelial barrier which contains the water and the bicarbonate from the saliva and the submucous gland selection. The reduction in the supply of blood to the esophagus for defense occurs [11]. Also the pathogenesis and the complications are stimulated by the cytokines, which can lead to injury. The reflux esophagitis causes activation of the hypoxia-inducible factor (HIF) 2 alpha and the kappa-light-chain-enhancer of the active B cell, which rises the level of the cytokines for pro-inflammation, and the T cells get migrated and damages the esophagus [12, 13]. This study aim to evaluate and assess the correlation between the incidence of the GERD and the associated symptoms and complication with various chronic condition of throat.

Methodology

Research design

The study is a prospective study for the evaluation of the correlation of the GERD associated symptoms and the chronic throat complications. The study was conducted in our hospital in India. The study was conducted during the period of one Year. The total number of patients was 80, and selection was done based on the inclusion and the exclusion criteria and the proper informed and written consent is required for the conduction of the study.

Inclusion criteria

- Patient with one symptom for the reflux symptom index (RSI)
- The age group of patients in the age of 18 to 70 years are considered for the study.
- Patients should ensure, without any consumption of the proton pump inhibitor and the histamine 2 receptor (H2R) in one month prior to the study.
- Patient with normal communicative and cognitive abilities are included for the study.

Exclusion criteria

- Mental patients or any events of the loss of the consciousness were excluded.
- Severe condition of the patients or intolerable esophageal manometry are not considered.
- If the patient endoscopy report have revealed the presence of any peptic ulcer or upper gastro

- Intestinal tumor, which can impact the study were excluded.

Grouping

The grouping of patients in this study was based on the type of reflux disease they exhibited, as determined by the Reflux Symptom Index (RSI). A total of 80 patients were included and assigned to four distinct groups. The first group, No RD (No Reflux Disease), consisted of patients who showed no significant reflux symptoms. The second group, iLPR (Isolated Laryngopharyngeal Reflux), included patients with isolated throat reflux symptoms. The third group, GERD & LPR (Gastroesophageal Reflux Disease & Laryngopharyngeal Reflux), was composed of patients with both gastroesophageal and laryngopharyngeal reflux. Lastly, the iGERD (Isolated Gastroesophageal Reflux Disease) group included patients with isolated gastroesophageal reflux symptoms. Grouping was based on the presence and type of reflux symptoms to allow for a detailed analysis of the correlation between these conditions and chronic throat complications.

Procedure

Esophageal Manometry

The aim of the esophageal manometry procedure for the identification of the position in the anatomy of the upper esophageal sphincter (UES) and lower esophageal sphincter (LES), was to exclude the disorders related to the esophageal motility. The process was performed by the use of the water-perfused manometric system (Medical Measurement Systems) which composed of the electrical pump (Mui Scientific) and along with a 6-channel (E6-1-1-5-5-5) esophageal water-perfused catheter. This is kept like this for 8 hours and the insertion of the catheter was done transnasally for recording the position of the UES and LES and also the change of the pressure in the body of the esophagus and the sphincter were also recorded. The lengths from the upper part of the edge of the UES and LES up to the nostril was measured and recorded and the distance calculation was also done which is also known as the DBULES.

Ambulatory 24-Hour pH regulation

During the post esophageal manometry, patients were performed with the ambulatory laryngopharyngeal and esophageal pH regulation process by the use of the Digitraper MK III recorder (CTD SYNECTICS Medical), which contains the dual channel for the ph probe, having the sensors for both laryngopharyngeal and distal esophagus. The distance of the inter-sensor was ranging from the 15 to 21 cm jhaving a gradient of 2cm, which is determined by the use of the formula pH probe spacing (cm) = DBULES (cm) − 3 (if DBULES is even) or − 4 (if DBULES is odd). Calibrated probe was used for the insertion, to maintain the 5cm gap of the distal esophageal sensor just above of the upper part of the LES. The regulation was continued for a day and the analysis of the data was performed by the use of the Polygram for Windows release 2.04. The Laryngopharyngeal reflux was meant by the ≥7 reflux events, where the ph is < 4.0 and in the reflux area index it was ≥6.3. The gastroesophageal reflux disease (GERD) was also meant by the DeMeester score which was ≥14.7.

Statistical analysis

The data has been analysed by use of the IBM SPSS version 27. The one-way analysis of variance (ANOVA) was performed for comparing the means in multiple groups. The data for the normal distribution was represented by mean ± standard deviation. The differences for considering the statistical significance was maintained and the p value was considered less than 0.05.

Results

Table 1 presents the distribution of different reflux diseases (No RD, iLPR, GERD & LPR, and iGERD) across a sample of 80 participants, broken down by gender, age, and mean RSI score. It shows that the mean age of participants varied significantly among the groups, with the "No RD" group being the oldest (83 ± 18 years), followed by the "iLPR" group (43 ± 18 years), "GERD & LPR" group (55 ± 15 years), and the "iGERD" group (54 ± 11 years). The mean RSI score, which indicates the severity of symptoms, was highest in the "GERD & LPR" group (19.49 ± 7.25) and the "iLPR" group (18.21 ± 8.89), followed by the "iGERD" group (13.32 ± 8.90) and the "No RD" group (9.62 ± 6.70). This suggests that the groups with GERD and LPR-related conditions have higher RSI scores, indicating more severe symptoms compared to those without reflux disease (No RD). There are 43 females and 37 males across the entire sample, with no specific statistical analysis provided in this table for gender differences.

Table 1: Distribution of the reflux disease

Group	n	Female (n)	Male (n)	Age (years) (Mean ± SD)	Mean RSI Score (Mean ± SD)
No RD	32	21	11	83 ± 18	9.62 ± 6.70
iLPR	14	9	5	43 ± 18	18.21 ± 8.89
GERD & LPR	15	6	9	55 ± 15	19.49 ± 7.25
iGERD	19	7	12	54 ± 11	13.32 ± 8.90
Total	80	43	37	—	—

In this comparison between iLPR (n = 14) and GERD & LPR (n = 15), various reflux-related events and times are analyzed. The findings show that the mean values for upright reflux events, total reflux events, and upright reflux times are somewhat higher in the GERD & LPR group, but the differences are not statistically significant, as evidenced by the p-values of 0.512, 0.341, and 0.083, respectively. However, total reflux time in minutes (p = 0.021) and the percentage of total reflux time (p = 0.021) show statistically significant differences, with the GERD & LPR group exhibiting higher values in both metrics. The percentage of upright reflux time shows no

significant difference (p = 0.188). This suggests that while the GERD & LPR group tends to have more severe reflux events overall, the significant differences are more apparent in the total reflux time and the percentage of total reflux time, rather than in individual reflux events or time spent upright (Table 2).

Table 2: The comparison between the Laryngopharyngeal Reflux (iLPR) and the combination of the Gastroesophageal and Laryngopharyngeal Reflux (GERD & LPR)

Item	iLPR (n = 14) (Mean ± SD)	GERD & LPR (n = 15) (Mean ± SD)	P-value
Upright reflux event	18 ± 29	27 ± 33	0.512
Total reflux event	19 ± 28	28 ± 30	0.341
Upright reflux time (min)	7.2 ± 8.1	13.1 ± 15.8	0.083
Total reflux time (min)	10.2 ± 9.3	18.5 ± 17.9	0.021
% of upright reflux time	1.05 ± 1.18	1.52 ± 1.69	0.188
% of total reflux time	0.76 ± 0.68	1.39 ± 1.35	0.021

Table 3 compares reflux events and reflux time for the distal esophagus between iGERD (n = 19) and GERD & LPR (n = 15). The findings indicate that for most parameters, including upright reflux events, total reflux events, and both upright and total reflux times, there are no significant differences between the two groups (p-values ranging from 0.295 to 0.982). The p-values for the percentage of upright reflux time and the percentage of total reflux time are also non-significant (0.451 and 0.438, respectively). These results suggest that reflux patterns and the severity of reflux in the distal esophagus are largely similar between the two groups, indicating no clear advantage of one condition over the other in terms of these specific measures. The high p-values indicate that any observed differences are likely due to random variation rather than true clinical distinctions.

Table 3: Comparison between different reflux factors between the iGERD and the GERD & LPR for Distal Esophagus

Item	iGERD (n = 19) (Mean ± SD)	GERD & LPR (n = 15) (Mean ± SD)	P-value
Upright reflux event	85 ± 58	102 ± 72	0.295
Total reflux event	111 ± 70	130 ± 86	0.341
Upright reflux time (min)	89.8 ± 59.7	101.4 ± 67.2	0.418
Total reflux time (min)	158.2 ± 128.9	164.8 ± 95.6	0.982
% of upright reflux time	12.05 ± 8.21	13.51 ± 8.04	0.451
% of total reflux time	12.16 ± 9.44	14.12 ± 13.7	0.438

Discussion

The study have revealed the laryngopharyngeal reflux (LPR) is an independent entity obtained from the GERD condition, which emphasized the complications of the upper aero-digestive tract, including the chronic cough, hoarseness, throat clearing, and globus sensation. Often the patients with the typical condition of the LPR, lacking in the symptoms like the heartburn, which made the diagnosis more difficult. Also the study have outlined the diagnosis by the laryngoscopy and also symptoms like the erythema, posterior commissure hypertrophy, and edema as the crucial indicator for the diagnosis. The 24-hour dual-probe pH monitoring is also the crucial and standard diagnostic tool for the detection. The study results the efficiency of the use of the proton pump inhibitors (PPIs) during the early phase can cause improvement of the throat related complications and also restore the vocal function [14]. Another study have been performed for the assessing the function of the sore throat and erythematous hypopharynx which can increase the risk of reflux, also discussed about the limitation of the diagnosis of the GERD. Various throat related symptoms can be occurred like the soreness, globus, or irritation can enhance the acid reflux. Often he PPI therapy alone cannot help with this condition, then

the reflux testing like the monitoring of the ph can confirm [15]. The review article provides the summarization of the diagnosis and the treatment of the laryngopharyngeal reflux (LPR) for the evaluation of the chronic throat and the voice symptoms. The study also implies the significance of the evaluation of the laryngoscopy and the ph testing for the differentiation of the LPR from the different allergic problems. The PPIs is the main approach for the treatment, which suggests the urgency for the modification of the lifestyle. The study concluded the LPR is an underdiagnosed, but important cause for the discomfort of the chronic throat and the dysphonia [16]. The study have analysed the treatment of the clinicians by the use of the PPIs despite their limitation. There is a diagnostic gap, but some researchers have used the ph monitoring technique before any therapy. The study emphasized the association between the multidisciplinary approach for the diagnosis and the management [17]. The study revealed the association of the chronic cough with the GERD condition and identified the acid reflux the possible reason for the chronic cough. The study have revealed the use of the objective testing like the ph regulation. The use of the PPIs can be used in such cases with the reflux symptoms like the heartburn or regurgitation and also highlighted the nature of the chronic cough like the laryngeal hypersensitivity and neurogenic mechanisms. The study highlighted the targeted and more strategic approach than the use of the PPI for the incidence of the chronic throat or cough complaints [18]. The systematic review and meta-analysis have assessed the diagnosis of the patient outcome about the LPR, and the use of the PPI therapy have revealed the variation and limited effectivity, for the acid reflux patients. This combination therapy which includes the dietary and the lifestyle alterations, have causes improvement of the symptoms. The study also highlighted the heterogeneity for the diagnosis and the consistent limits for the success rate [19]. This is prospective study which have highlighted the prevalence of the GERD condition among patients with the incidence of the laryngitis. The study revealed that approximately 60% of the patients have chronic throat related symptoms like the exposure to the esophageal acid which is detected and confirmed after the 24 hour ph regulation. The 8 week course of the PPI therapy, revealed that two third of the patients have shown improvement from the symptoms, leads to the strong association between the GERD and the laryngitis [20].

Conclusion

This study concludes the clinical profiles and reflux features found in patients with various reflux disorders. The study has concluded that the group experiencing both GERD and LPR showed the most severe symptoms and longest reflux duration, indicating that having both gastroesophageal and laryngopharyngeal reflux leads to more intense and lasting symptoms. On the other hand, isolated LPR cases were mostly observed in younger patients, who had significantly higher RSI scores, pointing to more pronounced laryngopharyngeal symptoms. In contrast, isolated GERD was more prevalent among males and typically showed moderate reflux parameters. Although most differences didn't reach statistical significance, the longer mean reflux durations and higher percentages in the GERD & LPR group suggest a greater reflux burden. These findings highlight the need for accurate diagnostic evaluations using esophageal manometry and dual pH monitoring to distinguish between reflux subtypes and tailor effective, individualized treatment plans.

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