

## Study of Pulmonary Function Test in Clinically and Endoscopically Diagnosed GERD Cases

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### Original Research Article

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**Abstract:** GERD can be the primary cause of, or an aggravating contributor to a wide variety of conditions affecting extra esophageal structures. Many pulmonary disorders have been linked to GERD including aspiration pneumonia, interstitial fibrosis, and chronic bronchitis. This study was done to examine the correlation between respiratory disorders and endoscopic findings in patients with gastro esophageal reflux disease. The objective of the study was to determine whether patients with GERD can have asymptomatic respiratory disorder. 100 patients with Gastro-intestinal symptoms and upper GI endoscopy suggestive of GERD were included from a tertiary care teaching hospital. Spirometry was assessed in all patients. Patients suffered from upper GI symptoms in the form of heart burn, nausea and dysphagia. A total of 37 patients had abnormal PFT and the gender difference was statistically insignificant (Male: 27, Female: 10). It was observed in those patients with abnormal PFT, there were 4 (10.8%) patients with normal endoscopy study, 28 (75.7%) patients with mild oesophagitis and 5 (13.5%) patients with moderate oesophagitis. This study also indicates that, as the severity of GERD increases, the severity of pulmonary disorder increases. (P value<0.01)(S). the study confirms the strong link between gastro-esophageal reflux disease and various respiratory disorders. GERD can be associated with asymptomatic respiratory dysfunction. Hence GERD proven individual with long standing symptoms of GERD should undergo Pulmonary Function Test evaluation even though they are not having respiratory symptoms.

**Keywords:** Gastro-esophageal Reflux Disease, Pulmonary Function Test.

### INTRODUCTION

Gastroesophageal Reflux Disease (GERD) occurs due to abnormal gastric contents reflux into the oesophagus causing esophageal mucosal damage or development of acid reflux-related symptoms [1].

Heartburn and acid regurgitation are widely regarded as the two well-known manifestations of gastro-esophageal reflux disease (GERD) and are commonly referred to as 'typical' symptoms. Recent research suggests that GERD patients are at increased risk for experiencing 'atypical' symptoms such as dry coughing, wheezing, choking, non cardiac chest pain, night time snoring [2].

Gastro-esophageal reflux is associated with a wide range of respiratory disorders such as isolated chronic cough, idiopathic pulmonary fibrosis, asthma, chronic obstructive pulmonary disease and cystic fibrosis. In some individuals with specific pulmonary diseases, reflux can be substantial and reach the proximal margins of the oesophagus suggesting that this association is more than a coincidence. Proximal

oesophageal reflux in particular has led to concern that micro aspiration might have an important possibly even causal role in respiratory disease [3].

The relation between respiratory disorders and reflux symptoms has been debated since the beginning of the last century and the interest in this question has increased during the last few decades. This study aims to investigate the relation between respiratory disorders and GERD patients diagnosed clinically and endoscopically.

### AIM AND OBJECTIVES

To study the correlation between respiratory disorders and GERD patients diagnosed clinically and endoscopically.

### MATERIALS AND METHODS

This was a prospective study which was conducted in medicine inpatient and outpatient department of a tertiary care teaching hospital. All stable patients of Age>18 years with clinically and endoscopically diagnosed as GERD were enrolled

during the study period from May 2015 to August 2017. A volunteer-written consent was taken from all the patients before the study. This study was approved by the Institutional Human Ethical Committee. Patients with COPD, Asthma, Chronic smokers and pregnant women were excluded from the study.

All patients were subjected to PFT using a flow sensing spiroexcel-G (Fig-1) in the sitting position according to the standard procedures (Fig-2). Forced expiratory volume in one second (FEV1), forced vital capacity (FVC), forced expiratory volume in one

second/ forced vital capacity ratio (FEV1/FVC) and forced expiratory flow at 25-75% (FEF25-75%) were measured. Predicted values for each of the parameters were obtained from standardized references.

The patients has a normal PFT if FEV1, FVC, FEV1/FVC and FEF25-75% are >85%. If FEV1<80%, FVC<80% and FEV1/FVC >70%, there is restrictive defect. If FEV1<80% and FEV1/FVC<70% and FVC>80%, there is obstructive defect and if FEV1/FVC<70% and FVC<80%, there is mixed pattern.



Fig-1



Fig-2

## RESULTS

A total of 100 patients were studied. The mean age of the study group was  $49.28 \pm 14.63$  years, 79 males and 21 females. Most common upper GI symptom was Heartburn, present in 97 patients (76 males, 21 females). In 60 patients, upper GI symptoms and Erosive Reflux Disease (ERD) was observed in the form of mild oesophagitis (54 patients) and moderate oesophagitis (6 patients). In remaining 40 patients only upper GI symptoms was observed and had Normal

Endoscopy Study (NES). Out of 100 patients, 63 patients had normal PFT and 37 patients had abnormal PFT.

It was observed that, in patients with abnormal PFT, there were 28(75.7%) patients in mild oesophagitis group, 5(13.5%) patients in moderate oesophagitis group and 4(10.8%) patients in normal endoscopy group and was statistically significant (P value<0.001) as shown in Table 1.

**Table-1: Distribution of the PFT pattern in GERD patients**

UGI endoscopy	PFT results		Total
	Normal PFT	Abnormal PFT	
NES	36(57.1%)	4(10.8%)	40(40%)
Mild Oesophagitis	26(41.3%)	28(75.7%)	54(54%)
Moderate Oesophagitis	1(1.6%)	5(13.5%)	6(6%)
Total	63(100%)	37(100%)	100(100%)

In NES group, 36 patients had normal PFT and only 4 patients had mild restriction. In mild oesophagitis group, 26 patients had normal PFT and 28 patients had abnormal PFT in the form of mild restriction (18 patients), moderate restriction (5 patients), severe restriction (2 patients), mixed pattern

(2 patients) and moderate obstruction (1 patient) and were statistically significant (P value<0.001). In moderate oesophagitis group, 5 patients had abnormal PFT in the form of severe restriction (3 patients) and moderate restriction (2 patients) and 1 patient had normal PFT as shown in Table 2.

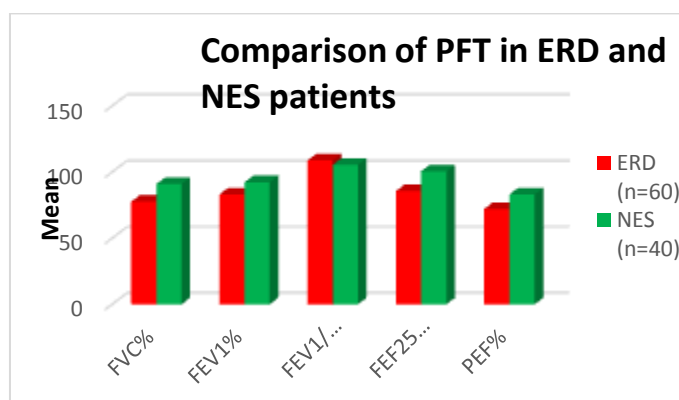
**Table-2: Distribution of the patients based on GERD and PFT**

PFT	Total	UGI endoscopy		
		NES	Mild Oesophagitis	Moderate Oesophagitis
Normal Study	63	36(57.1%)	26(41.3%)	1(1.6%)
Mild restriction	22	4(18.2%)	18(81.8%)	0(0%)
Moderate restriction	7	0(0%)	5(71.4%)	2(28.6%)
Severe restriction	5	0(0%)	2(40%)	3(60%)
Moderate obstruction	1	0(0%)	1(100%)	0(0%)
Mixed Pattern	2	0(0%)	2(100%)	0(0%)
Total	100	40(40%)	54(54%)	6(6%)

In ERD patients the mean FVC predicted was  $77.5 \pm 17.7$ , mean FEV1 predicted was  $83.01 \pm 21.21$ , mean FEV1/FVC ratio predicted was  $108.8 \pm 14.23$ , mean FEF25-75% predicted was  $85.52 \pm 31.76$ , which revealed decrease in FVC, FEV1 which was <85% and FEV1/FVC% ratio and FEF25-75 % was >85%(Normal). In NES patients the mean FVC predicted was  $90.9 \pm 12.8$ , mean FEV1 predicted was  $92.26 \pm 13.36$ , mean FEV1/FVC ratio predicted was

$105.5 \pm 7.61$ , mean FEF25-75% predicted was  $100.6 \pm 21.23$ . All the 4 parameters were >85% predicted and was found to be normal.

PFT parameters were compared in ERD and NES patients and FVC, FEV1 and FEF25-75% were found to be statistically significant (P Value <0.05). Only FEV1/FVC was statistically insignificant. [Figure 3]



**Fig-3: Comparison of PFT in Normal Endoscopy Study patients and Erosive Reflux Disease patients**

**DISCUSSION**

Gastro-esophageal reflux disease (GERD) is a common disorder which is caused by the reflux of gastric content into the esophagus. In the present study, we depended only on endoscopic findings without studying pH difference. We studied the prevalence and relation of respiratory disorders in relation to GERD

patients who did not have symptomatic respiratory disorder.

Irwin RS *et al.* and D’Urzo *a et al.* studies reported that GERD is currently considered the third leading cause of the chronic cough affecting an estimated 20% of patients [4, 5]. Maha MM study showed that, 27.2% of study population suffered from

chronic cough, with frequency being higher for ERD compared to NERD (29% vs. 21.2%, respectively). A significant prevalence of chronic cough in patients with erosive oesophagitis has been observed [6]. This study revealed 37 patients (37%) with abnormal PFT and majority of them were male patients 27(34.2%) (P value was 0.257) (NS). The major pattern of abnormality was mild restriction which constitutes 22% of the abnormal PFT [7]. Mixed pattern was observed in 2% of patients and Obstructive pattern was observed in 1% of patients. This study showed that as the severity of GERD increases, the severity of pulmonary disorder also increases. (P value <0.001)(S). There is mounting epidemiological evidence of an association between GERD and asthma affecting 5% and 10% of the global population, as well as of a strong correlation between reflux episodes and respiratory symptoms[8]. This association has been intensively studied; patients with oesophagitis are more likely to have asthma than patients without esophagitis [9, 10]. Raghu and coworkers found no correlation between the severity of acid GERD and severity of restrictive type of defect measured by PFT [11]. But in the other studies there is significant positive correlation between asthma and chronic bronchitis and endoscopic grading grade C and D (P <0.001, P <0.003 respectively) and there is significant association of severity of PFT to the severity of GERD [6]. In a study done by Rajha *et al.* [12] patients with abnormal GOR had lower vital capacity (VC %) than those with normal pH monitoring result (92 vs 102, p=0.032) but FEV1% did not differ between these two groups. Mainly a restrictive ventilator defect was associated with GORD in elderly patients [12]. Raghu and coworkers [11]. Found a prevalence of distal and proximal reflux of 76% and 63% among 46 patients with IPF. The possible mechanism of IPF being micro aspiration of gastric contents into extra esophageal structures during reflux episodes [13].

In this study, there were statistically significant differences in FVC%, FEV1%, FEF25-75% (P<0.05) in ERD patients (mild and moderate oesophagitis) as compared with NES (Normal endoscopy study) patients. Therefore, these results illustrated the presence of restrictive pattern, large airway obstruction, and small airway narrowing in ERD patients as compared to NES patients.

Vraney and Pokorny, measured PFT in patients with gastroesophageal reflux. Results of PFT were grouped according to smoking history and demonstrated reflux. The difference noted between the smoker and nonsmoker groups was slightly greater than that between the reflux and non-reflux groups.<sup>14</sup>In the present study, one of the strengthening points is exclusion of smokers.

Atalay *et al.* pulmonary function tests (PFTs) in acid reflux positive and negative patients diagnosed with 24 h pH monetarization. PFTs of reflux positive

patients were not significantly different from those of reflux negative patients. They concluded that both lung disease and GER have a high prevalence worldwide, and these conditions are frequently coexistent [15].

A number of reviews reported beneficial results of medical and surgical anti-reflux therapy on asthma outcome [16, 17]. The difference between the two previous studies and our study is firstly, the presence of a less percentage of our patients with cough, exclusion of smokers and our dependence mainly on endoscopic parameters for diagnosing GERD and not on pH monitoring. These are the main causes for significant respiratory function values in our study as compared with other studies.

All the studies done till now, had assessed pulmonary function with symptomatic disorder, this prospective study has revealed a strong link between gastroesophageal symptoms and various respiratory disorders (asymptomatic). The prevalence of pulmonary function abnormality is statistically significant among ERD patients, with a positive correlation to the degree of severity.

## CONCLUSION

This study strengthened the possible relation of pulmonary disorder with clinically and endoscopically documented GERD patients. Patients who are asymptomatic (without respiratory symptom) can have PFT abnormality, proportionate to the severity of GERD and they are benefited, if treated for GERD. Hence PFT should be done in all patients with GERD to identify associated asymptomatic respiratory disorder and if detected should be treated early to prevent morbidity and mortality.

## REFERENCES

1. Sugimoto M, Hasegawa T, Nishino M, Sahara S, Uotani T, Ichikawa H, Kagami T, Sugimoto K, Yamato Y, Togawa D, Kobayashi S. Improvement of gastroesophageal reflux disease in Japanese patients with spinal kyphotic deformity who underwent surgical spinal correction. *Digestive Endoscopy*. 2016 Jan 1;28(1):50-8.
2. Dean BB, Aguilar D, Johnson LF, McGuigan JE, Orr WC, Fass R, Yan N, Morgenstern D, Dubois RW. Night-time and daytime atypical manifestations of gastro-oesophageal reflux disease: frequency, severity and impact on health-related quality of life. *Alimentary pharmacology & therapeutics*. 2008 Feb 1;27(4):327-37.
3. Houghton LA, Lee AS, Badri H, DeVault KR, Smith JA. Respiratory disease and the esophagus: reflux, reflexes and micro aspiration. *Nature Reviews Gastroenterology and Hepatology*. 2016 Aug;13(8):445.
4. Irwin RS, Madison JM, Anatomic diagnostic protocol in evaluating chronic cough with specific

- reference to gastroesophageal reflux disease. *Am J Med* 2000; 108:126S-30S.
5. D'Urzo A, Jugovic P. Chronic cough. Three most common causes. *Can FAM Physician* 2002; 48:1311-6.
  6. Maher MM, Darwish AA. Study of respiratory disorders in endoscopically negative and positive gastroesophageal reflux disease. *Saudi J Gastroenterol* 2010; 16:84-9.
  7. Sweet MP, Patti MG, Leard LE, Golden JA, Hays SR, Hoopes C, Theodore PR. Gastroesophageal reflux in patients with idiopathic pulmonary fibrosis referred for lung transplantation. *The Journal of Thoracic and Cardiovascular Surgery*. 2007 Apr 1;133(4):1078-84.
  8. Kiljander TO, Laitinen JO. The prevalence of gastroesophageal reflux disease in adult asthmatics. *Chest* 2004; 126:1490-4.
  9. EL-Serag H, Sonnenberg A. Comorbid occurrence of laryngeal or pulmonary disease with esophagitis in United States military veterans. *Gastroenterology*. 1997; 113:755-760.
  10. Nordenstedt H, Nilsson M, Johansson S, Wallander MA, Johnsen R, Hveem K, Lagergren J. The relation between gastroesophageal reflux and respiratory symptoms in a population-based study: the Nord-Trøndelag health survey. *Chest*. 2006 Apr 1;129(4):1051-6.
  11. Raghu G, Freudemberger TD, Yang S, Curtis JR, Spada C, Hayes J, Sillery JK, Pope C2, Pellegrini CA. High prevalence of abnormal acid gastro-oesophageal reflux in idiopathic pulmonary fibrosis. *European Respiratory Journal*. 2006 Jan 1;27(1):136-42.
  12. Rajha IH, Ivaska K, Sourander B. Pulmonary Function in Gastro-oesophageal Reflux Disease of Elderly People. *Age Ageing* 1992; 21:368-373.
  13. DeVault KR. Extra oesophageal symptoms of GERD. *Cleveland clinic journal of medicine*. Vol 70(5) Nov.2003.
  14. Vraney GA, Pokorny C. Pulmonary function in patients with gastroesophageal reflux. *Chest* 1979; 76:678-80.
  15. Atalay F, Dagli U, Kuran S, Ozin Y, Renam D, Sahin B. Does acid reflux cause pulmonary disease? *Turk J Gastroenterol* 2005; 16:199-202.56.
  16. Field SJ, Sutherland LR. Does medical antireflux therapy improve asthma in asthmatics with gastroesophageal reflux? a critical review of the literature. *Chest*. 1998 Jul 1; 114(1):275-83.
  17. Maher MM, Darwish AA. Study of respiratory disorders in endoscopically negative and positive gastroesophageal reflux disease. *Saudi J Gastroenterol* 2010; 16:84-957.
  18. Field SK, Gelfand GA, McFadden SD. The effects of antireflux surgery on asthmatics with gastroesophageal reflux. *Chest* 1999; 116:766-74.