# Prevalence of gastroesophageal reflux disease in patients with idiopathic pulmonary fibrosis*

## Prevalência da doença do refluxo gastroesofágico em pacientes com fibrose pulmonar idiopática

Cristiane Dupont Bandeira, Adalberto Sperb Rubin, Paulo Francisco Guerreiro Cardoso, José da Silva Moreira, Mirna da Mota Machado

## Abstract

**Objective:** To determine the prevalence of gastroesophageal reflux disease (GERD) and to evaluate its clinical presentation, as well as the esophageal function profile in patients with idiopathic pulmonary fibrosis (IPF). **Methods:** In this prospective study, 28 consecutive patients with IPF underwent stationary esophageal manometry, 24-h esophageal pH-metry and pulmonary function tests. All patients also completed a symptom and quality of life in GERD questionnaire. **Results:** In the study sample, the prevalence of GERD was 35.7%. The patients were then divided into two groups: GERD+ (abnormal pH-metry; n = 10) and GERD– (normal pH-metry; n = 18). In the GERD+ group, 77.7% of the patients presented at least one typical GERD symptom. The pH-metry results showed that 8 (80%) of the GERD+ group patients had abnormal supine reflux, and that the reflux was exclusively in the supine position in 5 (50%). In the GERD+ and GERD– groups, respectively, 5 (50.0%) and 7 (38.8%) of the patients presented a hypotensive lower esophageal sphincter, 7 (70.0%) and 10 (55.5%), respectively, presenting lower esophageal dysmotility. There were no significant differences between the groups regarding demographic characteristics, pulmonary function, clinical presentation or manometric findings. **Conclusions:** The prevalence of GERD in the patients with IPF was high. However, the clinical and functional characteristics did not differ between the patients with GERD and those without.

**Keywords:** Pulmonary fibrosis; Gastroesophageal reflux; Prevalence; Manometry; Esophageal pH monitoring.

## Resumo

**Objetivo:** Determinar a prevalência da doença do refluxo gastroesofágico (DRGE) e sua apresentação clínica, além do perfil funcional do esôfago em pacientes com fibrose pulmonar idiopática (FPI). **Métodos:** Foram avaliados prospectivamente 28 pacientes com FPI. Os pacientes foram submetidos à esofagomanometria estacionária, pHmetria de 24 h e testes de função pulmonar, assim como responderam a questionários sobre sintomas e qualidade de vida em DRGE. **Resultados:** A prevalência de DRGE foi de 35,7%. Os pacientes foram divididos em dois grupos: grupo DRGE+ (pHmetria anormal; n = 10), e grupo DRGE– (pHmetria normal; n = 18). No grupo DRGE+, 77,7% dos pacientes apresentavam pelo menos um sintoma típico de DRGE. Nesse grupo de pacientes, 8 (80%) apresentaram refluxo em posição supina, e 5 (50%) apresentaram refluxo exclusivamente nessa posição. Nos grupos DRGE+ e DRGE–, respectivamente, 5 (50,0%) e 7 (38,8%) dos pacientes apresentaram hipotonia do esfíncter esofágico inferior, assim como 7 (70,0%) e 10 (55,5%) apresentaram hipomotilidade esofágica. Não houve diferenças significativas entre os grupos quanto a características demográficas, função pulmonar, apresentação clínica ou achados manométricos. **Conclusões:** A prevalência de DRGE nos pacientes com FPI foi elevada. Entretanto, as características clínicas e funcionais não diferiram significativamente entre os pacientes com e sem DRGE.

**Descritores:** Fibrose pulmonar; Refluxo gastroesofágico; Prevalência; Manometria; Monitoramento do pH esofágico.

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Correspondence to: Cristiane Dupont Bandeira. Rua Júlio da Silva Rodrigues, 190/102, Carianos, CEP 88047-616, Florianópolis, SC, Brasil.
Tel 55 48 8846-0508. Email: crisband_rs@yahoo.com.br
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## Introduction

Idiopathic pulmonary fibrosis (IPF) is a chronic and progressive interstitial disease characterized by the histological pattern of usual interstitial pneumonia. It is estimated that the annual incidence of IPF is approximately 10.7 cases/100,000 men and 7.4 cases/100,000 women, with a prevalence of up to 20.2 cases/100,000 population.[1] This disease typically evolves to severe respiratory failure and can be accompanied by other comorbidities. The mean survival of the individuals affected is approximately 3 years after diagnosis, and, among the treatment options available, none seems to substantially affect the progression of the disease.[2-4] The etiology of IPF is unknown. Various hypotheses have been investigated, and, among possible risk factors, smoking, environmental conditions, genetic predisposition, viral infections and chronic aspiration secondary to gastroesophageal reflux (GER) are considered.[5,6]

Since the end of the XIX century, when pulmonary complications were observed in patients with diffuse esophageal dilation, GER has been associated with respiratory symptoms.[7] In 1971, Pearson & Wilson found 6 cases (4.2%) of pulmonary fibrosis of unknown cause in a case series of 143 patients with achalasia.[8]

Interest in the association between IPF and GER was renewed after one group of authors[5] reported that the prevalence of GER disease (GERD), frequently asymptomatic, in patients with IPF and in patients with interstitial lung disease other than IPF (control group), all of whom were submitted to 24-h pH-metry, was 94% and 50%, respectively. Subsequently studies also suggested the existence of this association.[6,9]

The objective of this study was to determine the prevalence of GERD and to evaluate its clinical presentation, as well as the esophageal function profile (as measured by 24-h esophageal pH-metry and esophageal manometry), in a group of patients with IPF. In addition, we aimed at comparing the patients with GERD and those without regarding clinical characteristics.

## Methods

This was a prospective case study evaluating patients treated at the Interstitial Diseases Clinic of the Santa Casa Hospital in Porto Alegre, at the Lung Transplant Outpatient Clinics of the Santa Casa Hospital in Porto Alegre and the General Hospital in Porto Alegre and at the Pulmonology Clinic of these two institutions. Between 2004 and 2008, we evaluated 34 patients who met the American Thoracic Society (ATS) and European Respiratory Society (ERS)[3] criteria for the diagnosis of IPF. Of those 34, 6 were excluded for the following reasons: death before the completion of the study (2 patients); concomitant lung cancer (1 patient); previous repair of hiatal hernia (1 patient); withdrawal from the study (1 patient); and loss to follow-up (1 patient). Therefore, 28 patients completed the evaluation. In17 (60.3%) of those 28 patients, the histological diagnosis of IPF was confirmed by surgical open lung biopsy, whereas, in the remaining 11, the diagnosis was based on the ATS/ERS criteria for a diagnosis of IPF in the absence of open lung biopsy[3]: exclusion of other known causes for interstitial lung disease; abnormal pulmonary function testing results (evidence of restricted or impaired gas exchange); HRCT findings of bibasilar reticular abnormalities with minimal ground-glass opacities; and a clinical history consistent with the diagnosis.

After giving written informed consent, patients completed a general questionnaire on respiratory and digestive symptoms, as well as the Quality of Life Scale for Gastroesophageal Reflux Disease (GERD-QoL), modified and validated for use in Brazil. The GERD-QoL comprises 11 questions, and points from 0 to 5 are used in order to respond to 10 of these questions as follows: 0, no symptoms; 1, symptoms that do not affect the daily routine; and so on, progressively, up to 5, which indicates constant symptoms that affect activities of daily living. The last question, also rated from 0 to 5, refers to patient satisfaction with the present situation.[10] Therefore, the maximum score is 55.

Patients were submitted to pulmonary function tests, and the values of FVC, $FEV_1$, the $FEV_1$/FVC ratio, TLC and corrected DLCO were analyzed. All tests were performed using a Collins/GS Plus device (Warren E. Collins, Inc., Braintree, MA, USA), in accordance with the guidelines of the Brazilian Thoracic Association.[11]

Esophageal manometry was performed using a computerized stationary manometry system, consisting of a catheter with 4 distal radial and

4 longitudinal channels axially distributed at intervals of 5 cm (Synectics Medical, Stockholm, Sweden). We used a system of continuous perfusion involving a low-compliance capillary pneumohydraulic pump (Mui Scientific, Mississauga, Ontario, Canada), connected to external pressure transducers. Pressures were registered by a digital computerized polygraph (PC Polygraf HR; Synetics Medical), with graphic records being made in real time. The analysis was performed using specific software (Polygram; Synectics Medical). All procedures were performed after a fast of at least 4 h. The tone, position, extent and relaxation of the lower esophageal sphincter (LES) and upper esophageal sphincter (UES) were analyzed, as were the morphology, amplitude and duration of the esophageal contractions generated by the sequence of 10 swallows of 5 mL of water at 30-s intervals. The results were based on the criteria for normality obtained in our laboratory,[12] which are similar to those found in the literature.[13] The length of the esophagus was defined as the distance between the proximal border of the LES and the distal border of the UES. The criteria for the definition of the primary and secondary esophageal disorders were based on the literature.[14]

In order to perform pH-metry, we used an external reference electrode connected to a semi-disposable catheter with antimony electrodes, either a single electrode (Zinectics; Medtronic-Synetics, Skorlunde, Denmark) or a pair of electrodes (Alacer Biomédica, São Paulo, Brazil), connected to a portable computerized recorder (Digitrapper MK III; Synectics Medical) capable of registering one pH measurement every 4 s over a 24-h period. The distal pH-metry electrode was placed 5 cm above the proximal border of the LES, which had been previously located via esophageal manometry. When the dual-electrode catheter was used, the distance between the two electrodes was 15 cm. Prior to each test, the electrodes were calibrated in buffer solutions (Alacer Biomédica) at pH 7 and pH 1. Patients were instructed to discontinue the use of antacids and prokinetic agents 7 days prior to the test, as well as to fast for 4 h before the test. A log was provided for recording meal start and end times, as well as time spent in the supine position and any symptoms. At the end of the 24-h period, the patients returned to the laboratory for removal of the catheter and analysis of the data recorded (Esophogram; Synectics Medical). In addition, a graphic, descriptive report showing the results of the test was issued. The analysis was based on the table devised by Johnson and the scoring system developed by DeMeester.[14,15] Tests in which the DeMeester score was higher than 14.7 were considered abnormal. Only data provided by the distal electrode were used in the

**Table 1 -** Demographic data and pulmonary function test results in the two study groups, by esophageal pH-metry findings.

| Parameter | General (n = 28) | GERD+ group (n = 10) | GERD− group (n = 18) | p |
|---|---|---|---|---|
| Mean age, years | 65.1 ± 10.0 | 63.4 ± 7.0 | 66 ± 8.2 | 0.423 |
| Male gender, n (%) | 15 (53.6) | 6 (60.0) | 9 (50.0) | 0.910 |
| Duration of symptoms, years | 3.0 ± 2.0 | 2.8 ± 2.7 | 3.2 ± 2.8 | 0.716 |
| BMI, kg/m$^2$ | 28.6 ± 5.0 | 29.9 ± 4.2 | 27.7 ± 4.3 | 0.204 |
| Former smokers, n (%) | 16 (57.1) | 4 (40.0) | 12 (66.6) | 0.411 |
| Nonsmokers, n (%) | 12 (42.9) | 6 (60.0) | 6 (33.3) | 0.333 |
| Diagnosis without biopsy, n (%) | 11 (39.3) | 3 (30.0) | 8 (44.4) | 0.333 |
| Biopsy-based diagnosis, n (%) | 17 (60.7) | 7 (70.0) | 10 (55.5) | 0.729 |
| $FEV_1$, % of predicted | 70.7 ± 16.0 | 70.9 ± 13.6 | 70.6 ± 17.0 | 0.956 |
| FVC, % of predicted | 66.6 ± 16.0 | 66.3 ± 14.9 | 66.8 ± 16.0 | 0.938 |
| TLC, % of predicted | 64.9 ± 16.0 | 61.1 ± 12.9 | 66.4 ± 17.4 | 0.404 |
| RV, % of predicted | 66.2 ± 29.0 | 70.4 ± 30.7 | 57.9 ± 13.6 | 0.230 |
| DLCO, % of predicted | 44.5 ± 22.0 | 43.3 ± 16.9 | 44.8 ± 24.0 | 0.860 |

GERD: gastroesophageal reflux disease; and BMI: body mass index. Values expressed as mean ± SD, unless otherwise indicated.

analysis, since only two patients were submitted to dual-electrode pH-metry.

The statistical analysis included the comparison of data related to the patients with GERD (abnormal pH-metry) and those without GERD (normal pH-metry). The chi-square test and the Student's t-test were used. The level of significance was set at 5%.

## Results

Of the 28 adult patients included in the study (aged between 49 and 80 years; mean, 64.3 years), 15 (53.6%) were male and 13 (46.4%) were female. The mean duration of symptoms attributed to IPF was 3.2 years, and the most common symptoms were dyspnea on exertion and cough. The mean body mass index of the group as a whole was 28.6 kg/m$^2$. Most of the patients (57.1%) were smokers or former smokers. In 10 patients (35.7%), the 24-h esophageal pH-metry detected the presence of abnormal acid reflux. The clinical characteristics of the 28 patients studied can be seen in Table 1. The patients were divided into two groups, according to the esophageal pH-metry results: pathological acid reflux group (GERD+; n = 10) and normal pH-metry group (DRGE–; n = 18).

In the GERD+ group, there was a predominance of males, the mean age was over 60 years, the duration of symptoms was longer than 2 years, and 40.0% of the patients were former smokers. Most patients (70.0%) already received some type of treatment for IPF, especially corticosteroids, and 40.0% already used proton pump inhibitors. The mean corrected DLCO was 43.3% of predicted. Most (77.7%) presented at least one typical GERD symptom, and 66.6% reported cough. The results of the GERD-QoL indicated that the quality of life in this group was moderately impaired by the presence of GER.

In the GERD– group, approximately half of the patients were male, the duration of symptoms was longer than 3 years, and most patients were former smokers who received some type of treatment, usually prednisone alone or in combination with an immunosuppressant. In this group, only 4 patients (22.2%) used proton pump inhibitors. The mean corrected DLCO was similar to that found in the GERD+ group. Even with normal pH-metry results, 6 patients (33.3%) presented at least one typical GERD symptom.

**Table 2 -** Results of the general questionnaire on symptoms in the two groups studied.

| Symptom | GERD+ group (n = 9) | GERD– group (n = 18) | p |
|---|---|---|---|
| Heartburn | 5 (55.5) | 3 (16.6) | 0.101 |
| Nocturnal heartburn | 2 (22.2) | 2 (11.1) | 0.848 |
| Regurgitation | 5 (55.5) | 6 (33.3) | 0.488 |
| Nocturnal regurgitation | 2 (22.2) | 3 (16.6) | 0.861 |
| Epigastric pain | 1 (11.1) | 4 (22.2) | 0.860 |
| Dysphagia | 2 (22.2) | 1 (5.5) | 0.516 |
| Typical GERD symptom | 7 (77.7) | 6 (33.3) | 0.077 |
| Cough | 6 (66.6) | 15 (83.3) | 0.623 |
| Nocturnal cough | 2 (22.2) | 8 (44.4) | 0.481 |
| Dysphonia | 2 (22.2) | 1 (5.5) | 0.516 |
| Chest pain | 6 (66.6) | 1 (5.5) | 0.003 |

GERD: gastroesophageal reflux disease. Results expressed as n (%).

Cough was the most common symptom (in 15 patients; 83.3%). The comparison of the demographic and spirometric characteristics, as well as of the symptom questionnaire results, revealed no significant differences between the groups, with the exception of chest pain, which was more common in the GERD+ group patients (Tables 1 and 2). The mean GERD-QoL score in the GERD+ and GERD– groups was, respectively, 17.2 and 7.8, this difference being of borderline significance (p = 0.058; Figure 1).

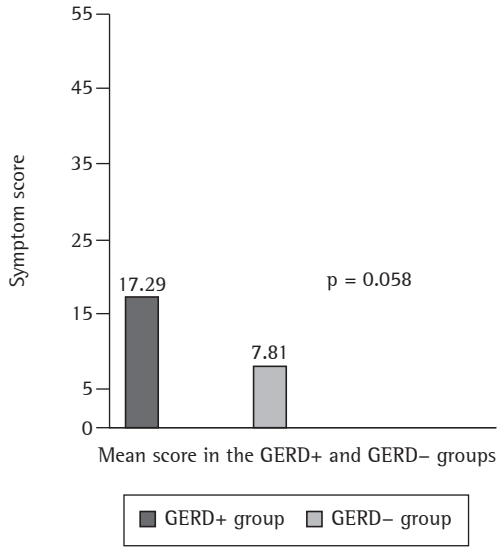


**Figure 1 -** Symptom score on the Quality of Life Scale for Gastroesophageal Reflux Disease in the GERD+ group (abnormal pH-metry; n = 10) and GERD– group (normal pH-metry; n = 18). GERD: gastroesophageal reflux disease.

**Table 3 -** Esophageal manometry and esophageal pH-metry findings in the two groups studied.

| Parameter | Reference values for normal individuals | GERD+ group (n = 10) | GERD– group (n = 18) | p |
|---|---|---|---|---|
| Esophageal manometry | | | | |
| LES hypotonia, n (%) | - | 5 (50.0) | 7 (38.8) | 0.860 |
| Esophageal hypomotility, n (%) | - | 7 (70.0) | 10 (55.5) | 0.729 |
| UES hypotonia, n (%) | - | 2 (20.0) | 5 (27.7) | 1.000 |
| LES tone, mmHg | 14-40 | 14.7 ± 6.0 | 17.2 ± 7.3 | 0.360 |
| UES tone, mmHg | 50-150 | 77.8 ± 35.2 | 63.4 ± 32.3 | 0.281 |
| 24-h pH-metry | | | | |
| Overall time at pH < 4.0, % | < 4.2 | 11.3 ± 6.3 | 1.19 ± 1.2 | 0.051 |
| Upright time at pH < 4.0, % | < 6.3 | 10.6 ± 4.7 | 2.02 ± 2.0 | 0.041 |
| Supine time at pH < 4.0, % | < 1.5 | 14.7 ± 18.7 | 0.11 ± 0.3 | 0.150 |
| Number of episodes of reflux | < 50 | 126.3 ± 57.7 | 30.2 ± 26.7 | 0.047 |
| Number of episodes longer than 5 min | < 3 | 5.6 ± 3.2 | 0.3 ± 0.6 | 0.049 |
| Longest episode, min | < 9.2 | 18.2 ± 12.9 | 2.6 ± 4.3 | 0.067 |
| DeMeester score | <15 | 46.7 ± 30.3 | 5.2 ± 4.3 | 0.083 |

GERD: gastroesophageal reflux disease; LES: lower esophageal sphincter; and UES: upper esophageal sphincter. Values expressed as mean ± SD, unless otherwise indicated.

In the esophageal manometry of the GERD+ patients, esophageal hypomotility was the most common finding (in 70.0%), followed by LES hypotonia. In the GERD– group, esophageal hypomotility occurred in 50.0% of the patients, whereas LES hypotonia occurred in 38.3%.

In the 24-h esophageal pH-metry, 80.0% of the GERD+ patients presented reflux in the supine position, and 30.0% of those patients presented reflux exclusively in that position. There were significant differences between the GERD+ and GERD– groups regarding the percent of upright time at pH < 4, number of episodes of GER and number of GER episodes longer than 5 min. The pH-metry findings are shown in Table 3.

## Discussion

The prevalence of GERD has been shown to be high, according to population-based studies, ranging from 10% to 20% in western countries and reaching 5% in eastern countries.[17] Approximately 18% of healthy individuals in the United States have heartburn at least once a week.[18] In Brazil, a study conducted in 22 cities detected the presence of heartburn one or more times a week in 11.3% of a sample of 13,000 individuals.[19] In the city of Pelotas, located in the state of Rio Grande do Sul, Brazil, the prevalence of heartburn at least once a week was 18.2%.[20]

Studies have shown that GER is implicated in the pathogenesis of many lung diseases, including asthma, chronic cough, pneumonia and obstructive sleep apnea.[21-24] In addition, GER has been studied as a possible etiologic or complicating factor of interstitial lung diseases, such as systemic sclerosis and IPF.[21] Furthermore, there is a proposal to include a new histological pattern associated with GER, the so-called centrilobular fibrosis (CLF) pattern, in the group of interstitial pneumonias.[25] The CLF pattern was identified alone or in combination with the pattern of nonspecific pneumonia in 21.0% and 84.0%, respectively, of a case series of 28 patients with systemic sclerosis. In patients with CLF alone and treated exclusively with intensive antireflux therapy, the lung disease remained stable for a period of 1 year.[26]

In the present study, the prevalence of GERD was 35.7%, and 77.7% of the patients presented at least one typical GERD symptom. Although this prevalence rate is high in relation to that observed in the general population, most studies using esophageal pH-metry in IPF have demonstrated even higher prevalence rates. This can be explained by the variability among the selection criteria of each study, as well as by the epidemiological characteristics of GERD. The performance of the pH-metry test can also be a source of variations, especially if the sphincters are not located via esophageal manometry. In addition,

the number of patients in the present study is small, greatly limiting the scope of the conclusions regarding the true prevalence of GERD in this population.

The gold standard for the diagnosis of GERD is pH-metry, which has sensitivity and specificity of 96.0%.[27] In one study,[5] 16 (94%) of the 17 patients with IPF presented abnormal pH-metry, of whom 11 had acid reflux at the distal and proximal electrodes, 4 had acid reflux exclusively at the distal electrode and 1 had acid reflux exclusively at the proximal electrode. In the control group, consisting of 8 patients with other interstitial lung diseases, 50% presented acid reflux. Most patients, however, did not report any GERD symptoms. It is of note that, in the present study, with only 17 patients with IPF, the technique used do perform pH-metry did not include previously locating the lower esophageal sphincter via manometry. More recently, one group of authors, studying 65 patients with IPF, found the prevalence of abnormal acid reflux to be 76% at the distal electrode and 63% at the proximal electrode.[6] Although only 47% of the patients evaluated in that study had classical GERD symptoms, 78% presented at least one symptom suggestive of GERD, and the authors found no correlation between IPF severity and GERD. In the analysis of the pH-metry results in the present study, due to the reduced number of patients submitted to dual-electrode pH-metry, we chose to use only data obtained from the distal electrode. It is desirable that dual-electrode pH-metry be performed in patients with extraesophageal manifestations of GERD. However, due to the positioning of the proximal electrode, it is a procedure that is susceptible to errors, and there is no consensus on the standard of normality for acid reflux at the proximal electrode. In addition, the combination of pH-metry and impedance monitoring seems to be the most appropriate diagnostic resource to study this type of patient in the future, since it provides data on non-acid reflux.

A diagnosis of IPF can be safely established by the finding of a usual interstitial pneumonia pattern in the anatomopathological examination of material obtained through open lung biopsy. However, not all of the case series described present the histological analysis. In the present study, 60.3% of the patients were submitted to open lung biopsy, whereas the remaining patients were definitely diagnosed with IPF based on the ATS/ERS criteria for making a diagnosis of IPF in the absence of open lung biopsy, those criteria having a specificity of up to 96.0%.[3] However, the fact that biopsy was not performed in all cases might have been an unfavorable factor for the analysis of the results as a whole. In most studies of IPF, the clinical manifestations presented by the patients were not sufficient to distinguish patients with pathological GER from those without it, since approximately half of the patients do not report typical symptoms, such as heartburn or regurgitation.[5-7,9,28,29] In the present study, 77.7% of the patients with pathological GER presented at least one typical symptom. Cough, the most common extraesophageal respiratory symptom of GERD,[19] is present in most patients, regardless of the presence of GERD. Within the context of IPF, it is practically impossible to determine whether cough is due to the lung disease or whether it is caused or exacerbated by GER. In addition, cough itself can cause GER, due to increased intra-abdominal pressure, leading to a cough-reflux-cough cycle.[24] Although some GERD– group patients presented GERD symptoms, the impact was small, according the quality of life scale. However, no investigation aimed at clarifying the diagnosis of the causal agent of those symptoms was performed. The differential diagnosis of GERD can include peptic disease, functional dyspepsia, cholelithiasis, ischemic cardiomyopathy and achalasia.[27]

The most common esophageal manometry finding was esophageal hypomotility, followed by LES hypotonia. Even the GERD– group patients presented hypomotility (55.5%) and LES hypotonia (38.8%). These findings are recognized as the most common abnormalities associated with respiratory symptoms and inefficacious esophageal motility in GERD, constituting some of the factors that make acid clearance difficult, and this favors GER.[19] In a study of patients with mixed connective tissue disease,[28] the occurrence of HRCT findings of interstitial lung disease was significantly greater among the patients with esophageal dilation and among those with severe esophageal motor dysfunction. One group of authors,[29] evaluating lung transplant candidates with advanced lung disease, found that the prevalence of abnormal manometry results was high (76%) and that

35% of the patients with fibrosis presented LES hypotonia. In another study,[6] however, esophageal motility and LES tone were normal in most of the 65 patients with IPF evaluated.

Some authors have suggested that patients with more severe disease, or delayed diagnosis, have a higher prevalence of GERD due to greater changes in respiratory mechanics associated with advanced fibrosis. The decrease in lung compliance results in an increase in negative intrapleural pressure during inhalation, and this increased negative intrapleural pressure, transmitted directly to the esophagus, could contribute to dysfunction of this organ as a whole or of the LES.[6] In the present study, the patients were evaluated at different times in the natural history of the disease, and the mean time since diagnosis was 3 years. However, the degree of lung function impairment was not significantly greater in the GERD+ group patients.

Of the 10 patients with pathological GER, 8 presented reflux in the supine position, a finding that had also been previously reported by others.[5,9] In nocturnal reflux, the gastric content that refluxes is cleared more slowly by the distal esophagus, since there is no contribution of the force of gravity, as well as since swallowing is less frequent and saliva production is low. In addition, the basal tone of the UES and the defensive cough reflex are reduced, making it possible for the gastric acid to reflux freely, which suggests that, based on the combination of these factors, GER is a possible pathophysiological mechanism for the onset of pulmonary fibrosis.[5] In a recent case report of 4 patients with IPF treated exclusively with antireflux therapy, pulmonary function test results stabilized or improved after the patients received the appropriate treatment for GERD and none of them presented exacerbations during the follow-up period.[30]

We concluded that, despite not reaching the high rates reported in other studies, the prevalence of GERD (pathological acid reflux) was higher in patients with IPF than in the general population. This fact can be attributed to the reduced number of patients studied, and, for this analysis, a multicenter study of a larger number of patients is necessary. Regarding the clinical and functional characteristics, chest pain and reflux in the upright position were more common in the patients with GERD and IPF. In addition, acid clearance in the distal esophagus was more impaired due to esophageal hypomotility, which is more common is these patients.

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## About the authors

*Cristiane Dupont Bandeira*
Masters Student in Pulmonology. Postgraduate Program in Pulmonology, *Universidade Federal do Rio Grande do Sul* – UFRGS, Federal University of Rio Grande do Sul – Porto Alegre, Brazil.

*Adalberto Sperb Rubin*
Professor. Postgraduate Program in Pulmonology, *Universidade Federal do Rio Grande do Sul* – UFRGS, Federal University of Rio Grande do Sul – Porto Alegre, Brazil.

*Paulo Francisco Guerreiro Cardoso*
Associate Professor of Thoracic Surgery. Department of Surgery, *Fundação Faculdade Federal de Ciências Médicas de Porto Alegre* – FFFCMPA, Federal Foundation School of Medical Sciences of Porto Alegre, Porto Alegre, Brazil.

*José da Silva Moreira*
Adjunct Professor of Pulmonology. *Universidade Federal do Rio Grande do Sul* – UFRGS, Federal University of Rio Grande do Sul – Porto Alegre, Brazil.

*Mirna da Mota Machado*
Attending Physician. Laboratory of Digestive Motility, Pereira Filho Ward, Santa Casa Hospital in Porto Alegre, Porto Alegre, Brazil.