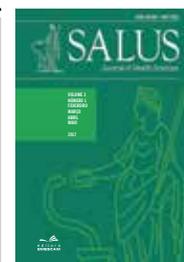




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## ORIGINAL ARTICLE

### **Analysis of cardiopulmonary function and quality of life of patients with bronchiectasis**

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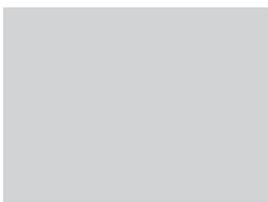
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#### **Keywords**

Bronchiectasis;  
Quality of Life;  
Peak Expiratory  
Flow Rate.

#### **Abstract**

The main objective of this study is to analyze the changes in cardiopulmonary function and the quality of life of patients diagnosed with bronchiectasis. For this purpose, the method used was a cross-sectional, retrospective observational study in which 08 patients were evaluated, of which 07 were female and 1 was male, with a mean age of 57.12 years. The study included patients aged  $\geq 18$  years, diagnosed with bronchiectasis, undergoing treatment at the Physiotherapy Clinic of EMESCAM, who accepted to be part of the study, by signing the informed consent form. Patients who did not respond to the SF-36 questionnaire or who did not have sufficient data in the medical record were excluded. The study consisted of two moments. In the first moment, a bibliographic research was done through the databases: PubMed, Lilacs, MedLine and Cielo. In the second moment, the medical records were selected and analyzed and the SF-36 questionnaire was used to evaluate the quality of life. The results of the research demonstrated that there was no statistically significant difference between pulmonary function variables and quality of life; that the majority of patients had a reduction in maximal inspiratory pressure; had a peak expiratory flow in the six-minute walk test; and that, coincidentally, they were the same who presented a worse quality of life.



Thus, it can be observed that the majority of the patients studied presented alterations in their cardiopulmonary function and, in addition, to observe that these alterations possibly implied in the worsening of the quality of life of the patients evaluated by the SF-36 questionnaire, Functional capacity and pain, in which they presented lower percentage.

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## INTRODUCTION

Bronchiectasis is a chronic lung disease of various etiologies, usually characterized by a vicious cycle of decreased mucociliary transport, infection and bronchial inflammation, culminating in permanent dilation of the bronchi and bronchioles and structural damage of the airways, causing many changes in the respiratory system. The reduction of mucociliary transport results in retention of secretions and predispose patients to other infections<sup>1,2</sup>.

The clinical course is characterized by chronic or recurrent cough with purulent sputum, with a foul odor. The hypersecretion of the airways prevails in the morning or by changes of decubitus, patients may present hemoptysis, emaciation, inappetence, halitosis, lethargy and prostration<sup>3,4</sup>.

Many factors contribute to the onset of bronchiectasis, such as chronic lung infection, foreign airway elements and hereditary diseases such as cystic fibrosis and primary ciliary dyskinesia<sup>5</sup>.

There is no well-defined statistical data on the prevalence of bronchiectasis in Brazil. However, due to high incidence of tuberculosis and the ineffective control of respiratory infections in childhood, it is estimated to be higher than that found in developed countries. In 2012, in the United States the number of people diagnosed with bronchiectasis was estimated at more than 100,000<sup>6,7</sup>.

People are usually in the most productive phase of their lives when they are affected by bronchiectasis. According to literature, the variation is around 28.7 to 48.0 years

old. The predominance increases with age and it is higher in women and Asians<sup>8,9</sup>.

Respiratory physiotherapy aims to aid in the mobilization of airway secretions, augmenting expectoration and, thus, enhancing pulmonary ventilation; reducing bronchial obstruction and airway resistance, favoring gas exchange and improving respiratory effort. When there is impairment of the musculoskeletal system, rehabilitation must act in the physical reconditioning, boosting the tolerance to the exercises<sup>10,11</sup>.

In this context, we aim to analyze the changes in the cardiopulmonary function and the quality of life of the patients with bronchiectasis who are undergoing treatment in the Physiotherapy Clinic of EMESCAM.

## METHOD

This is a cross-sectional observational study with retrospective data collection. The sample included 08 patients who underwent respiratory physiotherapy twice a week. It was approved by the Research Ethics Committee (CEP) in Humans of the Superior School of Science of the Santa Casa de Misericórdia de Vitória (EMESCAM), under the registration number 1,200,115.

We used as an inclusion criteria patients aged  $\geq 18$  years with a diagnosis of bronchiectasis, who underwent treatment twice a week at the Physiotherapy Clinic of EMESCAM, from October to December 2015, and accepted to be part of the research, by signing the free and clarified consent form. The exclusion criteria included

patients who did not respond to the SF-36 questionnaire or who did not have sufficient data on the medical record.

The research was conducted in two different moments. Firstly, a bibliographic search was done through the databases: PubMed, Lilacs, MedLine and Cielo. After that, the medical records were selected and analyzed and the SF-36 questionnaire was applied to evaluate the quality of life. With the intention to trace the patients' profile, information on name, age, sex, weight, height, smoking habit and schooling were collected from medical records. For cardiopulmonary evaluation, the results of manovacuometry, peak expiratory flow and the six-minute walk test were collected. Quality of life was assessed using an SF-36 questionnaire administered by one of the researchers. This questionnaire contains 36 items that measure the mental and physical health components through eight domains: functional capacity, limitation by physical aspects, pain, general health, vitality, social aspects, limitation by emotional aspects and mental health.

For the statistical analysis, the Spearman Correlation Coefficient Test was initially applied in order to correlate the variables of the cardiopulmonary function with the quality of life of each patient, as well as a descriptive analysis of the patients' profile was performed. Significant associations were considered with values of  $p < 0.05$ , the analysis was performed in SPSS version 23.

## RESULTS

After analyzing the sample according to the patients' profile, we observed that the mean age presented was 57.1 and the standard deviation was 17.8 years. With respect to the sex of the patients, we observed that 87.5% were female and 12.5% male. Based on the nutritional diagnosis, 4 (50%) patients were eutrophic, 1 (12.5%) were overweight and 3 (37.5%) were those with grade I obesity. The majority of them were literate 87.5%.

Regarding the race, we observed that 100% were brown. Conforming to smoking, 5 (62.5%) were non-smokers and 3 (37.5%) were passive smokers. The means and standard deviations of all data collected, as well as the percentage, are described in Table 1.

Table 1 – Profile of patients studied

Variables	N=8
<b>Age</b>	57,1 ± 17,8
<b>Sex</b>	
Female	7 (87,5%)
Male	1 (12,5%)
<b>Ethnicity</b>	
Brown	8 (100%)
<b>Tabagism</b>	
Passive smoker	3 (37,5%)
Non-smoking	5 (62,5%)
<b>Nutritional diagnosis</b>	
Eutrophic	4 (50,0%)
Overweight	1 (12,5%)
Obesity grade I	3 (37,5%)
<b>BMI</b>	27,1 ± 5,7
<b>Education</b>	
NA	1 (12,5%)
EFI	1 (12,5%)
EFC	2 (25,0%)
EMI	2 (25,0%)
EMC	2 (25,0%)

Legend: BMI: Body mass index; EFI: incomplete elementary school; EFC: Complete elementary education; EMI: Incomplete high school education; EMC: High school graduate; NA: Not literate.

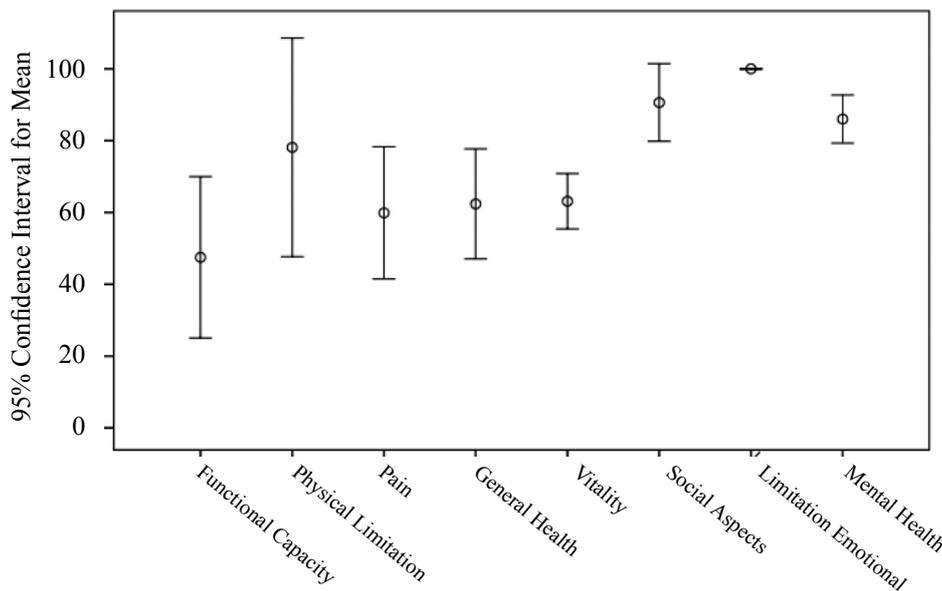
Source: Author.

Once the quality of life form data were collected and analyzed, the scores for each question were calculated, and the scores for each of the SF-36 domains were individually tabulated. Soon after, the mean scores of each domain were calculated and a graphical representation of the same was obtained with a 95% confidence interval for the mean in graph 1. It is possible to note that the domain most affected was domain 1: functional capacity with mean 47.5;

accompanied by pain with 59.9; followed by general health status with a score of 62.4; vitality at 63.1; limitation for physical

aspects with 78.1; mental health at 86.0; social aspects with 90,6 and limitations due to emotional aspects with a score of 100.0.

Graphic 1 – Quality of life assessment



The Pimax, Pemax, PFE and TC6 measurements of each patient were correlated with the assessment of quality of life, according to table 2. Of the 8 patients, in general, 7 presented Pimax below ideal, 6 presented Pemax below ideal, 5 showed a limitation of the six-minute walk test, 8 had a reduction in peak expiratory flow, and 4 had a poor quality of life.

The values predicted in general for Pimax were (-90 to -120cmH<sub>2</sub>O), Pemax of (100 to 150 cmH<sub>2</sub>O), PFE (≥ 350 l / min), TC6 (distance > 400 m). Regarding quality of life, this was quantified from 0 to 100, and the closer to 100, the better the patient's quality of life.

Table 2 – Cardiopulmonary function and quality of life.

Pacients	Pimax	Pemax	PFE	TC6	Quality of life
P1	-80	60	150	0	57,1
P2	-30	30	210	0	75,1
P3	-70	90	315	490	67,2
P4	-60	50	135	199	86,6
P5	-60	60	150	250	66,1
P6	-60	90	210	480	89,3
P7	-80	120	200	290	66,8
P8	-100	100	100	540	79,5

Legend: Pimax: maximal inspiratory pressure; Pemax: maximum expiratory pressure; PFE: peak expiratory flow; TC6: six-minute walk test.

Source: Own author

As reported by Spearman's correlation coefficient statistical test, based on the relationship between the measurements of the cardiopulmonary function and the quality of life of each patient, there was no statistical importance between the variables, considering the correlation coefficient was always small and not significant at the level of 5%.

Table 3 – Correlation between cardiopulmonary function variables and quality of life.

	Quality of life	
	Correlation coefficient	p-value
<b>Pemax</b>	0,012	0,977
<b>PFE</b>	0,000	1,000
<b>TC6</b>	0,359	0,382
<b>Pimax</b>	0,295	0,479

Legend: Pemax: Maximum expiratory pressure; Pimax: Maximum inspiratory pressure; PFE: Peak expiratory flow; TC6: Six-minute walk test;

Source: Own author

## DISCUSSION

This study noticed a mean age of 57.12 ± 17.83 years with a higher prevalence of bronchiectasis in the female sex (87.5%), and more frequently in low education subjects, characteristic of developing countries, according to what has been described by Zanchet et al. The BMI found (27.12 ± 5.27 kg) reveals that these patients are out of normal weight. Most volunteers never smoked (62.5%).

Based on the responses of the 8 patients to the questions contained in the SF36 form, the following results were obtained for quality of life assessment: it was possible to observe that the lowest mean score reached of 47.5 refers to domain 1: functional capacity, demonstrating the impact of the disease on the daily activities of these patients. A study has emphasized that the main objective of the physiotherapeutic intervention is the maintenance or improvement of functional independence through global action, in order

to break the cycle of physical weakness-inactivity<sup>11</sup>.

There is not enough research on the subject in the literature. Few studies have evaluated the impact of bronchiectasis on quality of life. Nonetheless, Lee et al<sup>13</sup>. stated that bronchiectasis may negatively affect patients' lives, confirming, thus, our study, in which a moderate reduction in scores was observed for almost all SF-36 domains. This shows that the patients with bronchiectasis evaluated in our research had a reduction in the quality of life in general.

The values of respiratory muscle strength (Pimax and Pemax) and peak expiratory flow (PEF) were reduced when compared to the predicted for the Brazilian population, indicating a reduction in ventilatory muscle strength and a limitation of expiratory airflow in patients of bronchiectasis evaluated by this study. Koulouris et al<sup>14</sup>. demonstrated the presence of expiratory flow limitation in patients with bronchiectasis, reducing exercise tolerance and increased dyspnea, as well as dynamic hyperinflation. This study also corroborates our research.

Newall et al<sup>15</sup>. established that pulmonary rehabilitation is effective in improving exercise tolerance in patients with bronchiectasis, showing that there are significant improvements in respiratory muscle strength, through an increase in Pimax values.

This study also noticed that even though no significant statistic was found among the correlated variables, quite possibly due to the reduced sample, most of the patients studied presented a reduction in Pimax, PEF and the six-minute walk test, as well as a reduction in their life quality.

The research of Zaniniet et al.<sup>16</sup> evaluated 135 adult patients with bronchiectasis, handling the TC6 before and after pulmonary rehabilitation. The results of the study revealed that 108 patients had a very short

distance. Nevertheless, they were able to walk a greater distance after the treatment, showing, this way, the importance of using this instrument as an evaluation measure in patients with bronchiectasis. It is important to emphasize that exercise performance is a factor that contributes to the quality of life of these patients.

Muller et al<sup>17</sup>. carried out a study in which 6 patients with bronchiectasis were evaluated for exercise tolerance through the TC6. Of these, 4 presented a distance in the test, smaller than the predicted. The conclusion of the authors is that bronchiectasis may lead to a reduction in exercise tolerance, as assessed by the TC6.

## CONCLUSION

It was possible to noticed in this study that the majority of the patients studied had a decrease in their cardiopulmonary function, mainly in Pimax, PEF and TC6, suggesting that these factors imply in the worsening of the quality of life, mainly in the functional capacity and pain domains, evaluated by the questionnaire SF-36.

In view of the limited sample of patients in this study, it is crucial to continue this research, in order to collect new data, in an attempt to substantiate the significance in the correlations and the correctness in the results found.

## REFERENCES

1. Rademacher J, Welte T. Bronchiectasis-Diagnosis and Treatment, *Dtsch Arztebl Int.* 2011; 108 (48); 809-815.
2. Ringshausen FC, Roux A, Pletz MW, Hämäläinen N, Welte T, Rademacher J. Bronchiectasis-Associated Hospitalizations in Germany, 2005–2011: A Population-Based Study of Disease Burden and Trends, *Plos One.* 2013;8(8): e71109.
3. Lamari NM, Martins ALQ, Oliveira JV, Marino LC, Valério N. Bronchiectasis and clearance physiotherapy: emphasis in postural drainage and percussion. *Rev Bras Cir Cardiovasc.*2006;21(2):206-210.
4. Fuschillo S, Felice A, Balzano G. Mucosal inflammation in idiopathic bronchiectasis: cellular and molecular mechanisms. *Eur Respir J.* 2008; 31 (2): 396-406.
5. SeitzAE, Olivier KN, Steiner CA, Montes de Oca R , Holland SM , Prevots DR. Trends and Burden of Bronchiectasis-Associated Hospitalizations in the United States, 1993-2006. *Chest.* 2010; 138(4): 944-949.
6. CasteloBrancoBP,RasoTCM,Vasconcelos TC, Araújo FV. Bronquiectasia: uma abordagem de conjunto. *RBCS.*2010; 14(3):77-82.
7. Moreira JS, Porto NS, Camargo JJP, Felicetti JC, Cardoso PFG, Moreira ALS, et al. Bronchiectasis: diagnostic and therapeutic features: A study of 170 patients. *J Pneumologia.* 2003;29(5):258-263.
8. Gomes Neto A, Medeiros ML, Gifoni JMM. Bronquiectasia localizada e multissegmentar: perfil clínico-epidemiológico e resultado do tratamento cirúrgico em 67 casos. *J Pneumologia.* 2001;27(1):1-6.
9. Cardoso AP, Polisseni N, Loivos LPP. Bronquiectasia, uma doença órfã? *Pulmão RJ.* 2014;23 (3):3-7.
10. Britto MCA, Duarte MCMB, Silvestre SMMC. Respiratory therapy in pleural empyema. A systematic review of the literature. *J. Bras. Pneumol.* 2005;31(6):551-554.
11. Pio MG, Pio JE, Filho AJN. Reabilitação Respiratória nas Bronquiectasias não FC. *Pulmão RJ* 2014; 23(3):42-45.
12. Zanchet RC, Magalhães AC, Correia AF, Feijó G. A influência de bactérias patogênicas na transportabilidade do escarro e na qualidade de vida de portadores de bronquiectasia. *Rev Bras Fisioter.* 2006;10(4):457-463.

13. Lee AL, Button BM, Elis S, Stirling R, Wilson JW, Holland AE et al. Clinical determinants of the 6-Minute Walk Test in bronchiectasis. *Respiratory Medicine* 2009; (103): 780-785.
14. Koulouris NG, Retsou S, Kosmas E, Dimakou K, Malagari K, Mantzikopoulos G, et al. Tidal expiratory flow limitation, dyspnoea and exercise capacity in patients with bilateral bronchiectasis. *Eur Respir J.* 2003;21(5):743-748.
15. Newall C, Stockley RA, Hill SL. Exercise training and inspiratory muscle training in patients with bronchiectasis. *Thorax.* 2005;(60):943-948.
16. Zanini A, Aiello M, Adamo D, Cherubino F, Zampogna E, Sotgiu G, et al. Effects of Pulmonary Rehabilitation in Patients with Non-Cystic Fibrosis Bronchiectasis: a retrospective analysis of clinical and functional predictors of efficacy. *Respiration.* 2015;89(6):525-533.
17. Müller N, Fraser R, Colman N, Paré P. Doenças das vias respiratórias. In: Müller N, Fraser R, Colman N, Paré P, editors. *Diagnóstico Radiológico das Doenças do Tórax.* Rio de Janeiro: Editora Guanabara Koogan S.A.; 2003: 443-510.