Physiotherapy, Exercise, and Rehabilitation Science (Pers) Journal
2026 Jan, Vol. 1, No. 1

The Relationship Between Lung Quality and Anxiety Levels in Patients with Post-Tuberculosis Obstructive Syndrome

Ahmad Farghani Rahman[1*], Salki Sadmita[2], Andi Rizky Arbaim Hasyar[3], Irianto Kadir[4]

[1]Study Program of Physiotherapy, Faculty of Nursing, Hasanuddin University, Makassar, South Sulawesi
**Email corresponding authors farghani08@gmail.com*

Received: December 24, 2025
Revised: December 31, 2025
Accepted: January 2, 2026
Available online: January 22, 2026

Abstract

Aims: This study aims to examine whether there is a relationship between lung quality and anxiety levels in PTOS patients at the Makassar Lung Health Center.

Methods: This research is a quantitative study with a descriptive analytical design using a cross-sectional approach. Subjects were selected using an accidental sampling technique.

Results: The results of this study obtained 60 respondents and obtained categorical distributions lung quality results for spirometry 5.07 and Borg scale 7.85, for anxiety level 4.07, and Spearman test results obtained spirometry results to HARS (0.004) and Borg scale to HARS (0.001).

Conclusion: There is a moderately weak positive significant relationship between lung quality and anxiety levels in PTOS patients at Makassar Lung Health Center.

Keywords: Anxiety Level; Borg Scale; Hammilton Anxiety Rating Scale; Post-Tuberculosis Obstructive Syndrome; Spirometry

Introduction

Tuberculosis (TB) is known as an infectious disease caused by infection with the bacteria Mycobacterium tuberculosis, which most often attacks the lungs and can result in death if not treated properly. This is what makes TB one of the deadliest diseases worldwide. This bacteria can spread through droplets in the air when TB sufferers cough or sneeze so that people around them can be infected with this disease [1]. TB cases in Makassar City currently reach 5,444 cases in 2023, but this figure is very small compared to the estimated 14,000 cases. The majority of TB cases in Indonesia in 2023 occurred in the 45-54 age group with a percentage of 17.5%, followed by the 25-34 age group and 15-24 age group with proportions of 17.1% and 16.9% [2]. According to the World Health Organization (WHO), in 2021, the number of TB sufferers worldwide was

estimated at 10.6 million people [3]. Indonesia will be the country with the second- highest number of TB cases after India and China in 2023, with an estimated 1,060,000 cases and a death rate of up to 134.000 per year.

Treatment for TB patients requires six to nine months of anti-tuberculosis (OTT) medication. OAT treatment can cure TB by eliminating the Mycobacterium tuberculosis bacteria in the body [4]. Some patients, after six to nine months of treatment, are likely to experience residual symptoms due to TB, such as functional impairment, obstructive disorders, and shortness of breath, known as Post-TB Obstructive Syndrome (PTOS) [5]. Humans require oxygen daily to supply the needs of other organs for normal functioning. Lung capacity is a measure of the maximum lung volume the lungs can hold to facilitate oxygen distribution to each organ in the body.

Based on the results of an initial preliminary study of 911 PTOS patients at the Makassar Lung Health Center in 2023, there were 68 inpatients and 843 outpatients. A year later, in 2024, there was an increase in the prevalence of PTOS patients, totalling 1.956 patients, with 157 inpatients and 1,799 outpatients. This increase in cases can be explained by unhealthy lifestyles, which can lead to a decreased immune system, which is a contributing factor to the increase in TB patients. Furthermore, patients sometimes fail to recognize symptoms due to a lack of knowledge about TB symptoms, resulting in delayed consultations at the nearest hospital. Furthermore, the high level of anxiety that occurs in almost all PTOS patients makes it difficult for healthcare workers to intervene with PTOS patients. This phenomenon has led researchers to investigate whether there is a relationship between anxiety levels and lung capacity in PTOS patients.

Methods

This quantitative research is a descriptive analytical design using a cross-sectional approach. The subjects of this study were taken using an accidental sampling technique conducted on May 3 - June 3, 2025 at the Makassar Community Lung Health Center, Jl. A.P. Pettarani No. 43, Masale, Panakkukang District, Makassar City.

This research protects research subjects through measurable instruments and a series of research processes through the application of a code of research ethics that respects individuals, is beneficial, and is fair. This code will be issued by the Faculty of Nursing Ethics Commission No. 374/UN4.18.3/TP.01.02/2025.

An Informed consent form is provided to respondents who will be participating in the research based on predetermined inclusion and exclusion criteria. Which the inclusion criteria is Outpatients undergoing PTOS at the Makassar Lung Health Center, PTOS patients attending their first physiotherapy clinic visit, Patients of any occupation, age, and gender, and Patients who have completed treatment for 6 months or more. And the exclusion criteria is Patients with a history of hemodialysis, Patients receiving chest physiotherapy management and diaphragmatic breathing exercises at the independent clinic, and Patients with a regular exercise routine. The population in this study was taken based on the total number of PTOS patients in 2024 with outpatient care totaling 1799 patients. The number of samples was 60 patients obtained using the Slovin formula. The primary data collected in this study were the results of spirometry, with measurements, the Borg scale, and HARS. Then the data already analyzed using univariate analysis to determine the distribution of each variable. And bivariate analysis to test the hypothesis has been used with correct results between two variables. First, data normality test is being used to determine whether the data is normally distributed or not. Because the data is not

normal, then we used the Spearman's test. Spearman's correlation analysis found a significant relationship between lung quality and anxiety levels in PTOS patients at Makassar Lung Health Center.

Results

Table 1. Characteristics of respondents

	Category	Frequency	Percentage (%)
Gender	Male	31	51.7
	Female	29	48.3
	Total	60	100
Age	Teenagers	1	1.7
	Adults	34	56.7
	Eldery	25	41.7
	Total	60	100
Occupation	Housewife	16	26.7
	Students	2	3.3
	Retirees	17	28.3
	Self-Employed	6	10.0
	Private Sector	7	11.7
	Civil Servants	3	5.0
	Laborers	9	15.0
	Total	60	100

Source: Primary Data (2025)

The majority of respondents were male (31), followed by female (29). Based on age, the majority of respondents were adults (34), followed by seniors (25), and one teenager. In terms of employment status, the majority of respondents were retired (17), housewives (16), labourers (9), private sector employees (7), self-employed (6), civil servants (3), and students (2) (Table 1).

Table 2. Distribution of Lung Quality in PTOS Patients at Makassar Lung Health Center

	Category	Frequency	Percentage (%)
Spirometry (FVC)	Light	7	11.7
	Moderate	2	3.3
	Moderate-heavy	5	8.3
	Heavy	12	20.0
	Very heavy	34	56.7
	Total	60	100
Borg Scale *CR10 Modified*	Moderate	2	3.3
	Somewhat severe	7	11.7
	Very severe shortness of breath	28	46.7
	Extremely severe shortness of breath	15	25.0
	Maximal shortness of breath	7	13.3
	Total	60	100

Source: Primary Data (2025)

The results of lung quality measurements using a spirometry device with FVC parameters, an average value (mean) of 5.07 was obtained. The majority of respondents were included in the very severe category at 56.7%, followed by the severe category at 20.0%, mild at 11.7%,

moderate-severe at 8.3%, and moderate at only 3.3%. This indicates that the majority of respondents experienced severe to very severe lung function disorders (Table 2).

Meanwhile, based on subjective assessments using the Borg scale, an average value of 7.85 was obtained, which indicates a fairly high level of shortness of breath. The majority of respondents reported experiencing severe shortness of breath (46.7%) and very severe shortness of breath (25.0%), while the remainder were at the moderately severe level (11.7%), severe shortness of breath (13.3%), and moderate (3.3%). Overall, these data illustrate that both objectively (spirometry) and subjectively (Borg scale), the majority of respondents experienced a significant decline in the quality of lung function

Table 3. Distribution of Anxiety Levels in PTOS Patients at Makassar Lung Health Center

	Category	Frequency	Percentage (%)
HARS	No emergency	1	1.7
	Mild emergency	4	6.7
	Moderate emergency	5	8.3
	Severe emergency	30	50.0
	Extreme emergency	20	33.3
	Total	60	100

HARS: Hammilton Anxiety Rating Scale
Source: Primary Data (2025)

The results of anxiety level measurements using the HARS scale, an average value (mean) of 4.07 was obtained, indicating a tendency for anxiety symptoms in the majority of respondents. Of the total sample, 50.0% of respondents were in the severe anxiety category, and 33.3% in the very severe anxiety category, meaning 83.3% of respondents experienced high anxiety. Meanwhile, only a small portion were in the moderate anxiety category (8.3%), mild anxiety (6.7%), and no anxiety at all (1.7%). These data indicate that the majority of respondents experienced quite serious anxiety, which has the potential to affect their physical and psychological conditions, and indicates the need for further attention to the psychological aspects of this group (Table 3).

Table 4. The Relationship between Lung Quality and Anxiety Levels in PTOS Patients at Makassar Lung Health Center

Variable	Measuring Instrument	Median (Min – Max)	Correlation Coefficient	P-Value
Lung Quality	Spirometri (FVC)	33.38 (0.82 – 77.92)	-0.272	0.036
Anxiety	HARS	37.00 (5.00 – 51.00)	0.412	

Source: Primary Data (2025)

Table 5. The Relationship between Lung Quality and Anxiety Levels in PTOS Patients at Makassar Lung Health Center

Variable	Measuring Instrument	Median (Min – Max)	Correlation Coefficient	P-Value
Lung Quality	Borg Scale	5.00 (3.00 – 5.00)	0.412	0.001
Anxiety	HARS	37.00 (5.00 – 51.00)	0.412	

Source: Primary Data (2025)

Based on table 4 and table 5, this study analyzed the relationship between lung quality and anxiety levels in PTOS patients using spirometry and the Borg scale for lung quality, and HARS (Hamilton Anxiety Rating Scale) for anxiety. The data showed that the median value for lung quality based on spirometry was 33.38 with a range of 0.82 to 77.92. The results of the correlation

test showed that there was a significant negative relationship between lung quality for spirometry and anxiety levels, with a correlation coefficient of -0.272 and a p-value of 0.036. There was a negative correlation coefficient value indicating that the lower the FVC value in spirometry, the higher the HARS value for anxiety. Meanwhile, for the Borg scale measuring tool, the median was 5.00 (range 3.00 - 5.00) and showed a significant positive relationship with lung quality, with a correlation coefficient of 0.412 and a p-value of 0.001. This means that the higher the level of shortness of breath felt, the higher the patient's anxiety level. The level of anxiety based on HARS showed a median of 37.00 with a range of 5.00 to 51.00.

Discussion

Based on the results of the Spearman correlation test, a significant relationship was found between lung quality and anxiety levels in PTOS patients at BBKPM. The results of the correlation test between spirometry values (FVC) and HARS scores showed a weak but significant positive correlation, which was strengthened by the analysis test between the Borg scale and HARS, which indicated a moderate and significant positive relationship. The results of this correlation test indicate an impact of decreased lung quality on increasing anxiety levels. The correlation test values indicate that FVC and values increase HARS scores. To date, research specifically examining the relationship between lung quality, FVC, and shortness of breath with anxiety levels in PTOS patients is still very limited. Most previous studies have focused more on the relationship between active tuberculosis and anxiety, or between PTOS and quality of life and then linked to anxiety. Few studies have directly examined the relationship between lung quality dysfunction and anxiety in the PTOS population. This study attempts to examine the relationship between decreased lung function based on FVC and shortness of breath with anxiety levels in PTOS patients. Patients with PTOS experience lung disorders that cannot function normally to exchange oxygen and carbon dioxide. This can be caused by disorders of the lung parenchyma that result in problematic sputum production conditions that cause the lung's ability to expand and contract to decrease. Impaired lung function will inhibit the patient's ability to inspire, resulting in limitations in patients with PTOS. Therefore, this will be the main factor in the emergence of shortness of breath and coughing up phlegm [6].

This change, changes the perspective of respondents in the field who assume that they are in a serious condition, so that the body will respond by activating the sympathetic nervous system and releasing Corticotropin-releasing Hormone (CRH) to provoke the release of adrenocorticotropic hormone (ACTH) and the hormone cortisol, causing the person to experience anxiety. Respiratory muscle tension occurs and the accessory muscles of respiration are involved, which ends in anxiety due to the lack of oxygen that the body can manage due to the symptoms of PTOS and the patient's quality of life will decrease [7]. Observations and interviews conducted in the field indicate that most patients with low lung quality have high levels of anxiety. A study of PTOS accompanied by other diseases, such as bronchiectasis, and focused on improving functional capacity in patients with bronchiectasis, showed that increased shortness of breath occurs due to inflammation of the airways, resulting in airway obstruction, which in turn reduces inspiratory capacity [8]. This study demonstrates a significant relationship between the degree of shortness of breath and the level of airway obstruction in COPD patients. The more severe the obstruction, as indicated by a decrease in FEV_1/FVC values on spirometry, the higher the degree of shortness of breath experienced by the patient, as measured using the Borg scale. It is possible that PTOS coexists with COPD, as obstructive diseases are highly likely to coexist. This study can serve as

a further reference for how PTOS accompanied by comorbidities can affect patient anxiety. Although there are differences between anxiety measurement tools and different variables, this can serve as a reference for the presence of comorbidities in PTOS patients. The presence of comorbidities can be a consideration because their impact on shortness of breath indicates differences in anxiety levels for each different comorbidity [9].

Limitations

The number of spirometry tests is insufficient compared to the average number of PTOS patients seen per day. And the number of patients with characteristics that significantly impact lung quality and anxiety levels is insufficient. Add multiply hospital or clinic to study.

Conclusion

There is a moderately weak and significant relationship between lung quality and anxiety levels in PTOS patients at BBKPM. The distribution of lung quality values in PTOS patients for the spirometry measuring instrument (FVC) shows that the majority of patients have very severe lung quality and the modified Borg cr 10 scale shows that the majority of patients experience moderate to severe shortness of breath.

Author Contribution

All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Conflict of interest

Authors state no conflict of interest.

Acknowledgment

We would like to express our gratitude to the author's parents, as well as all physiotherapy and staff at the Makassar Lung Health Center who assisted in this research.

Reference

1. Andreana D, Damanik SR, Huda N. Tingkat kecemasan pasien tb paru berdasarkan karakteristik demografi. Journal of Social Science Research. 2024 Jul 14;4(4):2209-18. Doi: https://doi.org/10.31004/innovative.v4i4.12759
2. Dalimunthe MS, Susanti N, Aidha Z, Batubara AK. The determinants of drug-resistant tuberculosis incidence at the special lung hospital, health department of the provincial government of North Sumatera, 2021-2024. MEDFARM: Jurnal Farmasi dan Kesehatan. 2025 Jul 3;14(1):254-67. Doi: https://doi.org/10.48191/medfarm.v14i1.539
3. Domínguez J, Boeree MJ, Cambau E, Chesov D, Conradie F, Cox V, Dheda K, Dudnyk A, Farhat MR, Gagneux S, Grobusch MP. Clinical implications of molecular drug resistance testing for mycobacterium tuberculosis: a 2023 TBnet/RESIST-TB consensus statement. The Lancet Infectious Diseases. 2023 Apr 1;23(4):e122-37. Doi: https://doi.org/10.5588/ijtld.15.0221.
4. Fortuna TA, Rachmawati H, Hasmono D, Karuniawati H. Studi penggunaan obat anti tuberkulosis (oat) tahap lanjutan pada pasien baru bta positif. Pharmacon: Jurnal Farmasi Indonesia. 2022 Jun;19(1):62-71. Doi: https://doi.org/10.23917/pharmacon.v19i1.17907
5. Nahliyyah AI, Hermawan A, Eliyanti L. Manajemen fisioterapi pada kondisi sindrome

obstruktive pasca tuberculosisi (SOPT) dengan intervensi infra-red, chest physiotherapy dan breathing exercise. Jurnal Omicron Adpertisi. 2023 Jan 31;2(1):9-19. From: https://jurnal.adpertisi.or.id/index.php/joa/article/view/360

6. Wicaksono U, Sadu B, Prayogo D, Gunawati F. Latihan napas diafragma pada penderita paska tb di puskesmas Pekauman Banjarmasin. SWARNA: Jurnal Pengabdian Kepada Masyarakat. 2023 Sep 30;2(9):979-83. Doi: https://doi.org/10.55681/swarna.v2i9.901
7. Handriani L. Pengaruh bimbingan rohani terhadap kecemasan keluarga pasien yang mendapat perawatan intensif di ruang Icu RSUD Sultan Imanuddin Pangkalan Bun Kalimantan Tengah (Doctoral dissertation, Sekolah Tinggi Ilmu Kesehatan Borneo Cendekia Medika Pangkalan Bun). 2023. From: https://repository.stikesbcm.ac.id/id/eprint/405/
8. Pratama AD. Efektivitas active cycle of breathing technique (acbt) terhadap peningkatan kapasitas fungsional pada pasien bronkiektasis post tuberkulosis paru. Jurnal Vokasi Indonesia. 2021 Jan 1;9(1):7. Doi: https://doi.org/10.7454/jvi.v9i1.247
9. Khairani R, Qalbiyah S. Korelasi sesak napas dengan obstruksi saluran napas pada pasien penyakit paru obstruktif kronik. Jurnal Penelitian Dan Karya Ilmiah Lembaga Penelitian Universitas Trisakti. 2022 Jan 31;7(1):154-63. Doi: https://doi.org/10.25105/pdk.v7i1.12928