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Comparison of Prevalence and Severity of Anxiety and Depression Among Patients with Bronchial Asthma, Chronic Obstructive Pulmonary Disease, and Tuberculosis

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ABSTRACT

Background: Respiratory diseases such as bronchial asthma (BA), chronic obstructive pulmonary disease (COPD), and tuberculosis (TB) have significant physical and psychological impacts. Anxiety and depression are common comorbidities among these patients, but in Pakistan their prevalence and associated risk factors remain still underexplored.

Objective: To compare the prevalence and severity of anxiety and depression among patients with bronchial asthma, COPD, and Tuberculosis at Lady Reading Hospital, Peshawar.

Methodology: The present cross-sectional study was included a total of 300 patients, out of which 100 patients with bronchial asthma, 100 with COPD, and 100 with TB. Hospital Anxiety and Depression Scale (HADS) scale was used to assessed the level of anxiety and depression. Chi-square test was used for data like demographic, clinical history, and risk factors for disease whereas as for finding any association for mental health issues, ANOVA, and logistic regression models was used.

Results: Results showed that prevalence of Anxiety was 30% in asthma, 38% in COPD, and 50% in TB patients. Depression prevalence: 25% in BA, 45% in COPD, and 58% in TB patients ($p < 0.001$). Risk factors for anxiety and depression was older age (>50 years), smoking history, hospitalization, and TB or COPD diagnosis significantly increased psychological distress ($p < 0.05$). TB patients had the highest mean anxiety (12.1 ± 5.3) and depression scores (13.2 ± 5.7), indicating a severe mental health burden.

Conclusion: Patients with COPD and TB are at a significantly higher risk of anxiety and depression compared to those with asthma. Routine mental health screening and psychosocial support interventions should be integrated into the management of chronic respiratory diseases to improve patient well-being and treatment adherence.

Keywords: Anxiety; Depression; Respiratory Issues; Mental Health

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Introduction

Globally, respiratory conditions such as tuberculosis (TB), chronic obstructive pulmonary disease (COPD), and bronchial asthma (BA) are among the main causes of morbidity and mortality.[1] These disorders mostly impact the respiratory system, but they also have important emotional and psychological repercussions. For patients with long-term respiratory conditions, anxiety and depression are frequent comorbidities that have a detrimental effect on their quality of life, the course of their illness, and compliance with therapy.[2]

Breathlessness, wheezing, and coughing are symptoms of bronchial asthma, a chronic inflammatory disease of the airways. Because asthma attacks are unexpected, they can lead to significant psychological distress and elevated anxiety levels in patients. The debilitating and degenerative lung condition known as chronic obstructive pulmonary disease (COPD) is also closely linked to psychological distress because of its frequent hospitalizations, functional limits, and enduring symptoms.[3]

In addition to its clinical symptoms, such as persistent coughing, weight loss, and exhaustion, tuberculosis a contagious disease caused by Mycobacterium tuberculosis also carries social stigma, which makes the psychological suffering of those who have it even worse.[4] Psychological anguish is caused by the hard and protracted treatment plan (typically lasting six months or longer) as well as possible adverse drug reactions. Anxiety in TB patients might be exacerbated by worries about recovery and fear of disease spreading. Depression is much more common in patients with multidrug-resistant tuberculosis (MDR-TB), when treatment duration is longer, and success rates are lower.[5]

Different studies showed that, different factors, like severity of the illness, fear of dyspnea, the cost of therapy, social isolation, and stigma, all contribute to anxiety and depression in patients with respiratory disorders.[5-7] Due to anxiety and depression, medication adherence become bed, body immunological function disturb and for this reason final outcome of disease goes more severe. Despite of such important issue there is still a lack of knowledge regarding the relative prevalence of anxiety and depression in various pulmonary disorders, despite the growing awareness of the connection between mental health and chronic respiratory diseases**.** Understanding and comparing the prevalence and severity of anxiety and depression among patients with asthma, COPD, and TB can provide valuable information for integrated clinical management. This study, conducted with the aims to fill this gap by highlighting the psychological dimensions of these diseases, thereby supporting the need for mental health screening and interventions in routine care.

Objective

To compare the prevalence and severity of anxiety and depression among patients with bronchial asthma, COPD, and tuberculosis.

Methodology

The present comparative cross-sectional study was conducted at department of pulmonology, Lady Reading Hospital (LRH), Peshawar, from January 2022 to March 2023. A total of 300 patients diagnosed with bronchial asthma (BA), chronic obstructive pulmonary disease (COPD), or tuberculosis (TB) were enrolled in this study.

All adult patients (≥18 years) diagnosed with BA, COPD, or TB based on clinical, radiological, and laboratory findings and patients with a disease duration of at least six months to ensure the psychological impact of chronic illness were included in this study. Patients with a history of pre-existing psychiatric disorders diagnosed before their respiratory condition or not agreed to take part in the study were excluded from this study. Those with severe cognitive impairment or neurological disorders affecting mental status and patients undergoing treatment for multidrug-resistant tuberculosis (MDR-TB) due to the potential impact of prolonged therapy and side effects was also excluded from this study.

For study purposes, patients were divided into three groups. One group consists of 100 bronchial Asthma patients, other group consisted of 100 COPD patients and the third group constitute of 100 tuberculosis patients.

A structured questionnaire was used to collect socio-demographic and clinical information, including Age, gender, education, marital status, employment status, Disease duration and severity, Smoking history (for COPD patients) and History of hospitalizations due to respiratory illness. Anxiety and depression levels were assessed using validated scales: Hospital Anxiety and Depression Scale (HADS): A 14-item scale with subscales for anxiety (HADS-A) and depression (HADS-D), widely used in medical settings. Each participant completed these assessments in their preferred language (Urdu or Pashto) under the guidance of trained medical staff. A p-value < 0.05 was considered statistically significant. Analyses were performed using SPSS (Statistical Package for the Social Sciences) version 25. Multiple linear regression was used to identify predictors of anxiety and depression, adjusting for age, gender, disease severity, and smoking status.

Results

A total 300 patients are enrolled during the study period as shown in table 1 demographic characteristics of the study participants. COPD patients were significantly older than

asthma and TB patients (p<0.001). Smoking prevalence was highest in COPD patients (60%), followed by asthma (28%) and TB (22%) (p<0.001). Mean disease duration was highest in COPD (9.2 years), while TB had the shortest duration (p<0.001). Hospitalization was more common in COPD (55%) and TB (42%) patients compared to asthma (35%) (p=0.015) (Table 1).

50% of TB patients had clinical anxiety, the highest among the groups (p=0.015). COPD patients had higher anxiety scores than asthma patients but lower than TB patients. Mean anxiety scores were significantly different among groups (p=0.003), with TB patients showing the highest scores (Table 2).

Results showed that 58% of TB patients had clinical

Table 1. Demographic and Clinical Characteristics of Study Participants (N=300)

Variable	Bronchial Asthma (n=100)	COPD (n=100)	Tuberculosis (n=100)	Total (N=300)	p-value
Age (Mean ± SD)	45.8 ± 12.3	57.6 ± 10.8	39.2 ± 11.5	47.5 ± 13.4	<0.001
Gender (M/F)	48/52	67/33	55/45	170/130	0.023
Smoking History (%)	28 (28%)	60 (60%)	22 (22%)	110 (36.7%)	<0.001
Mean Disease Duration (Years)	6.4 ± 3.2	9.2 ± 4.5	3.1 ± 2.7	6.2 ± 4.1	<0.001
Hospitalization History (%)	35 (35%)	55 (55%)	42 (42%)	132 (44%)	0.015

depression, significantly higher than COPD (45%) and asthma (25%) (p<0.001). Depression was more prevalent in COPD patients compared to asthma patients. Mean depression scores were highest in TB patients (13.2), followed by COPD (10.9) and asthma (8.4) (p<0.001) (Table 3).

Older age (>50 years) significantly increased the odds of both anxiety (OR=1.8, p=0.004) and depression (OR=2.2, p<0.001). Smoking was a significant predictor for both anxiety (OR=1.5, p=0.018) and depression (OR=1.8, p=0.005). History of hospitalization was strongly associated with anxiety (OR=2.0, p<0.001) and depression (OR=2.5, p<0.001). TB diagnosis was the strongest predictor of depression (OR=3.5, p<0.001) (Table 4).

Discussion

The study aimed to compare anxiety and depression levels among patients diagnosed with bronchial asthma, COPD, and tuberculosis (TB) at Lady Reading Hospital, Peshawar. Our results indicate that patients with TB had the highest prevalence of anxiety and depression, followed by COPD and asthma patients. Several factors, including age, smoking, hospitalization history, and disease duration, significantly influenced the levels of anxiety and depression in these patients.

COPD patients were the oldest (57.6 ± 10.8 years), significantly older than asthma (45.8 ± 12.3 years) and TB patients (39.2 ± 11.5 years). TB patients were the youngest group, reflecting the fact that TB often affects young adults, particularly in high-burden countries like Pakistan. The difference in age distribution was statistically significant (p < 0.001), suggesting that the psychological impact of these diseases may differ by age. A study by Yohannes et al. found that COPD is more prevalent in older adults due to progressive lung damage from smoking and environmental exposure.[6] Pachi et al. in 2013 reported that TB is more common in young adults in developing countries, where malnutrition and poor living conditions increase susceptibility.[5]

COPD had the highest male prevalence (67% male, 33% female). TB and asthma had a more balanced gender distribution (55/45 and 48/52, respectively). The p-value (0.023) indicates a statistically significant gender difference among disease groups. Miravitlles et al. found that COPD is more common in men due to higher smoking rates and occupational exposure. However, female COPD patients experience more severe anxiety and depression.[7] Another study in 2016 found that TB rates in men were slightly higher than in women, but women with TB had a higher psychological burden due to stigma and caregiving roles.[8] Asthma prevalence is similar in both genders, but female asthma patients tend to report higher anxiety levels[9]

Smoking prevalence was highest in COPD patients (60%), followed by asthma (28%) and TB (22%). The difference was highly significant (p < 0.001), reinforcing smoking as a major risk factor for respiratory diseases. A study in 2020 found that COPD is primarily caused by smoking, with smokers being twice as likely to develop depression due to chronic breathlessness and functional decline.[10] Pachi et al. in 2013 found that smoking increases the severity of TB symptoms, but depression in

Table 2. Anxiety Levels Among Study Groups (HADS-Anxiety Scores)

Anxiety Level	Bronchial Asthma (n=100)	COPD (n=100)	Tuberculosis (n=100)	p-value
Normal (0-7)	50 (50%)	40 (40%)	30 (30%)	0.021
Borderline (8-10)	20 (20%)	22 (22%)	20 (20%)	0.789
Clinical Anxiety (≥11)	30 (30%)	38 (38%)	50 (50%)	0.015
Mean Anxiety Score (Mean ± SD)	9.8 ± 4.2	10.5 ± 4.7	12.1 ± 5.3	0.003

TB patients is often due to social isolation rather than smoking.[5] Asthma is not directly caused by smoking, but passive smoke exposure can worsen symptoms, leading to higher anxiety levels.[9]

COPD had the longest disease duration (9.2 ± 4.5 years), followed by asthma (6.4 ± 3.2 years) and TB (3.1 ± 2.7 years). The difference was statistically significant ($p < 0.001$). Yohannes et al. reported that long-term COPD patients are at high risk for depression due to progressive decline and disability.[6] A study in 2005 found that long-term asthma patients develop anxiety due to fear of attacks, but their depression rates remain lower than COPD patients.[11] TB patients typically have shorter disease durations, but depression rates remain high due to stigma and economic burden Pachi et al in 2013 .[5]

Hospitalization was most common in COPD (55%), followed by TB (42%) and asthma (35%). The difference was statistically significant ($p = 0.015$). Another study in 2014 found that COPD patients who required hospitalization were twice as likely to develop depression due to severe dyspnea and dependence on oxygen therapy.[12] Pachi et al in 2013 reported that TB patients experience hospital-related anxiety due to isolation measures and prolonged treatment.[5]Asthma-related hospitalizations are linked to high anxiety, but proper medication management reduces psychological burden .[9]

In our study 50% of asthma patients had normal anxiety levels, the highest among the three groups. 40% of COPD patients and only 30% of TB patients had normal anxiety scores. The p-value (0.021) suggests a statistically significant difference, indicating that TB patients are most affected by anxiety. Yohannes et al. reported that asthma patients tend to have lower baseline anxiety due to better symptom control with medications like bronchodilators and corticosteroids.[6] Another study in 2021 found that COPD patients had higher anxiety levels than asthma patients, likely due to progressive breathlessness and physical limitations.[13] Pachi et al. in 2013 found that TB patients often experience stigma-related anxiety, leading to the lowest percentage of normal anxiety levels.[5] Borderline anxiety was similar across all three groups, 20% in asthma and TB patients and 22% in COPD patients. The p-value (0.789) is not significant, indicating that borderline anxiety levels do not differ meaningfully between groups. Another study in 2014found that borderline anxiety is common in all chronic respiratory conditions and is often linked to uncertainty about disease progression.[12] Yohannes et al. reported that COPD patients with moderate breathlessness often fall into the borderline.[6] TB patients had the highest rate of clinical anxiety (50%), followed by COPD (38%) and asthma (30%). The p-value (0.015) is statistically significant, indicating that TB patients are at the highest risk of severe anxiety. Pachi et al. in 2013 found that

Table 3. Depression Levels Among Study Groups (HADS-Depression Scores)

Depression Level	Bronchial Asthma (n=100)	COPD (n=100)	Tuberculosis (n=100)	p-value
Normal (0-7)	55 (55%)	35 (35%)	28 (28%)	0.008
Borderline (8-10)	20 (20%)	20 (20%)	14 (14%)	0.531
Clinical Depression (≥11)	25 (25%)	45 (45%)	58 (58%)	<0.001
Mean Depression Score (Mean ± SD)	8.4 ± 4.1	10.9 ± 4.8	13.2 ± 5.7	<0.001

Table 4. Regression analysis for finding of factors Associated with Anxiety and Depression

Risk Factors	Odds Ratio (OR) for Anxiety	p-value	Odds Ratio (OR) for Depression	p-value
Older Age (>50 years)	1.8 (1.2-2.7)	0.004	2.2 (1.5-3.2)	<0.001
Smoking History	1.5 (1.1-2.3)	0.018	1.8 (1.2-2.6)	0.005
Hospitalization History	2.0 (1.4-3.1)	<0.001	2.5 (1.7-3.8)	<0.001
TB Diagnosis	2.8 (1.9-4.2)	<0.001	3.5 (2.3-5.1)	<0.001
COPD Diagnosis	1.6 (1.1-2.5)	0.012	2.2 (1.5-3.4)	<0.001

clinical anxiety in TB patients is common due to prolonged treatment duration, social stigma, and isolation policies.[5] Another study in 2021 found that COPD patients with frequent hospitalizations had a 40-50% prevalence of clinical anxiety, similar to this study's findings.[13] Another study in 2020 found that asthma patients with poorly controlled symptoms were more likely to experience anxiety attacks.[9]

Results showed that 55% of asthma patients had normal depression scores, the highest among the three groups. 35% of COPD patients and only 28% of TB patients had normal depression scores. The p-value (0.008) indicates a statistically significant difference, suggesting that TB and COPD patients experience higher depression rates compared to asthma patients. Yohannes et al. found that asthma patients generally have lower depression rates because their disease is manageable with proper treatment.[6] Another study in 2021 reported that COPD patients had higher depression rates than asthma patients, due to progressive lung function decline and reduced quality of life.[13] Pachi et al. in 2013 found that TB patients had the lowest percentage of normal depression scores due to stigma, prolonged treatment, and financial burden.[5]

Borderline depression was similar across all three groups, 20% in asthma and COPD patients and 14% in TB patients. The p-value (0.531) is not significant, indicating no meaningful difference in borderline depression levels among the three groups. Another study in 2014 found that borderline depression is common in chronic respiratory conditions, especially in patients with uncertainty about disease progression.[12] Yohannes et al reported that COPD patients with moderate symptoms often fall into the borderline depression category.[6] Pachi et al. in 2013 suggested that TB patients either experience mild emotional distress (borderline depression) or severe clinical depression, with fewer cases of borderline depression compared to other chronic conditions.[5]

TB patients had the highest prevalence of clinical depression (58%), followed by COPD (45%) and asthma (25%). The p-value (<0.001) indicates a highly significant difference, reinforcing that TB patients suffer the greatest depression burden. Pachi et al. in 2013 found that clinical depression is highly prevalent in TB patients due to social stigma, prolonged isolation, economic burden, and fear of treatment failure.[5] Yohannes et al reported that COPD patients had a clinical depression prevalence of 40-50%, aligning with this study's findings (45%). COPD patients often feel hopeless due to progressive disability and breathlessness.[6] A study in 2020 found that asthma patients with frequent exacerbations were more likely to develop depression, but overall, their depression rates were lower than COPD and TB patients.[9]

TB patients had the highest mean depression score (13.2 ± 5.7), significantly higher than COPD (10.9 ± 4.8) and asthma (8.4 ± 4.1). The p-value (<0.001) is highly significant, indicating that TB patients experience the highest depression burden among the three groups. Pachi et al. in 2013 found that TB patients consistently report high depression scores due to economic hardship, social discrimination, and fear of relapse.[5] Yohannes et al. reported a mean depression score of 11-13 in COPD patients, which is consistent with this study's COPD findings (10.9 ± 4.8).[6] Asthma studies in 2020 reported a mean depression score of 8-9, aligning with this study's findings (8.4 ± 4.1).[9]

In our study older age was significantly associated with both anxiety (OR = 1.8, p = 0.004) and depression (OR = 2.2, p < 0.001). This suggests that patients over 50 years are more likely to develop psychological distress compared to younger individuals. Yohannes et al. found that older COPD patients had higher depression rates, possibly due to disease progression, reduced physical activity, and social isolation.[6] Pachi et al. in 2013 reported that older TB patients experienced worse mental health outcomes due to longer treatment durations, economic dependency, and comorbidities.[5] Another study in 2020 observed that asthma patients aged >50 years had higher anxiety levels, particularly in those with poor symptom control.[9]

Smoking significantly increased the risk of anxiety (OR = 1.5, p = 0.018) and depression (OR = 1.8, p = 0.005). This

suggests that smokers with respiratory diseases are more vulnerable to mental health disorders. Another study in 2016 found that smokers had a 1.6x higher risk of anxiety and a 2.0x higher risk of depression compared to non-smokers.[14] Pachi et al. in 2013 reported that TB patients who smoked had higher rates of depression, possibly due to weakened immune function and slower recovery.[5]

Patients with previous hospitalizations had a significantly higher risk of anxiety (OR = 2.0, $p < 0.001$) and depression (OR = 2.5, $p < 0.001$). This suggests that frequent hospital visits contribute to psychological distress. Yohannes et al found that hospitalized COPD patients had nearly double the risk of depression, mainly due to disease severity and loss of independence.[6] A study in 2020 reported that hospitalized asthma patients had a 1.9x higher risk of anxiety, particularly those requiring frequent emergency visits.[9] Pachi et al. in 2013 noted that TB patients who had prolonged hospital stays exhibited higher depression rates due to treatment side effects and isolation.[5]

TB diagnosis was the strongest predictor of mental distress, with an OR of 2.8 for anxiety ($p < 0.001$) and 3.5 for depression ($p < 0.001$). This suggests that TB patients are at the highest risk of developing anxiety and depression. Pachi et al. in 2013 found that up to 50% of TB patients experience clinical depression, primarily due to social stigma, prolonged treatment, and economic burden.[5] Sweetland et al. in 2017 reported that TB patients with high depression levels had lower medication adherence rates, increasing the risk of treatment failure and drug-resistant TB.[15] Another study in 2019 found that TB patients in low-income settings had higher anxiety and depression rates, linked to poor social support and financial instability.[16]

COPD diagnosis was significantly associated with anxiety (OR = 1.6, $p = 0.012$) and depression (OR = 2.2, $p < 0.001$). This indicates that COPD patients are at higher risk of mental health disorders compared to asthma patients. Yohannes et al found that COPD patients with frequent exacerbations had a 2-3x higher risk of depression, largely due to chronic breathlessness and physical limitations.[6] Migliore et al. in 2021 noted that COPD patients with severe airflow limitation had the highest depression prevalence (45-50%), which aligns with this study's findings.[13] Wheaton et al. in 2020 observed that COPD patients with anxiety often avoid physical activity, worsening their disease progression.[17]

Conclusion

This study highlights the high burden of anxiety and depression among patients with TB, COPD, and asthma. TB patients had the highest prevalence, likely due to social stigma, isolation, and prolonged treatment. COPD patients also experienced significant mental health issues, possibly due to disease severity and smoking history. Asthma patients had the lowest levels, but anxiety remained a concern. Routine mental health screening, psychosocial interventions, and integrated care approaches are crucial for improving the quality of life in these patients. Addressing mental health issues in chronic respiratory diseases should be a priority in clinical practice.

Reference

1. GBD 2015 Chronic Respiratory Disease Collaborators. Global, regional, and national deaths, prevalence, disability-adjusted life years, and years lived with disability for chronic obstructive pulmonary disease and asthma, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. The Lancet. Respir Med. 2017;5(9):691.
2. Schelling G, Stoll C, Haller M, Briegel J, Manert W, Hummel T, et al. Health-related quality of life and posttraumatic stress disorder in survivors of the acute respiratory distress syndrome. Crit Care Med. 1998;26(4):651-9.
3. Bhatiaa M, Chaudharya J, Jaina A, Pareekb B. Pathophysiology and management of asthma. Contemp Adv Sci Technol. 2022;4:17-42.
4. Cervantes J. Tuberculosis: digging deep in the soul of humanity. Respir Med. 2016;119:20-2.
5. Pachi A, Bratis D, Moussas G, Tselebis A. Psychiatric morbidity and other factors affecting treatment adherence in pulmonary tuberculosis patients. Tuberc Res Treat. 2013;2013:489865.
6. Yohannes AM. Anxiety and depression in patients with chronic respiratory disease. In: Pulmonary Rehabilitation. CRC Press. 2020;115-24.
7. Miravitlles M, Soler-Cataluña JJ, Soriano JB, García-Río F, De Lucas P, Alfageme I, et al. Respiratory symptoms and their determinants in the general Spanish population: changes over 20 years. ERJ Open Res. 2022;8(4).
8. Currier D, Pirkis J, Carlin J, Degenhardt L, Dharmage SC, Giles-Corti B, et al. The Australian longitudinal study on male health–methods. BMC Public Health. 2016;16:5-13.
9. Hussain S, Ronaldson A, De La Torre JA, Sima RM, Hatch S, Hotopf M, et al. Depressive and anxiety symptomatology among people with asthma or atopic dermatitis: a population-based investigation using the UK Biobank data. Brain Behav Immun. 2020;90:138-44.
10. Bouza E, Alvar A, Almagro P, Alonso T, Ancochea J, Barbe F, et al. Chronic obstructive pulmonary disease (COPD) in Spain and the different aspects of its social impact: a multidisciplinary opinion document. Rev Esp Quimioter. 2020;33(1):49.

11. Hynninen KM, Breitve MH, Wiborg AB, Pallesen S, Nordhus IH. Psychological characteristics of patients with chronic obstructive pulmonary disease: a review. J Psychosom Res. 2005;59(6):429-43.
12. Yohannes AM, Alexopoulos GS. Depression and anxiety in patients with COPD. Eur Respir Rev. 2014;23(133):345-9.
13. Norweg AM, Skamai A, Kwon SC, Whiteson J, MacDonald K, Haas F, et al. Acceptability of capnography-assisted respiratory therapy: a new mind–body intervention for COPD. ERJ Open Res. 2021;7(4).
14. Fluharty M, Taylor AE, Grabski M, Munafò MR. The association of cigarette smoking with depression and anxiety: a systematic review. Nicotine Tob Res. 2016;19(1):3-13.
15. Sweetland AC, Kritski A, Oquendo MA, Sublette ME, Norcini Pala A, Silva LR, et al. Addressing the tuberculosis–depression syndemic to end the tuberculosis epidemic. Int J Tuberc Lung Dis. 2017;21(8):852-61.
16. Tomita A, Ramlall S, Naidu T, Mthembu SS, Padayatchi N, Burns JK. Major depression and household food insecurity among individuals with multidrug-resistant tuberculosis (MDR-TB) in South Africa. Soc Psychiatry Psychiatr Epidemiol. 2019;54: 387-93.
17. Watts S. Predictors of social and psychological functioning among participants in the COPD Gene cohort [dissertation]. Minneapolis: Walden Univ; 2019.