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KLİNİK ÇALIŞMA
RESEARCH ARTICLE

Clinical impact of depression and anxiety in patients with non-cystic fibrosis bronchiectasis

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ABSTRACT

Clinical impact of depression and anxiety in patients with non-cystic fibrosis bronchiectasis

Introduction: Bronchiectasis is a chronic suppurative disease characterized by abnormal bronchial dilatation. The nature of bronchiectasis may have negative impact on psychological status, however it is poorly studied in relation to clinical indices, particularly the severity of disease. Primary aim of this study is to detect depression and anxiety in patients with non-cystic fibrosis bronchiectasis and to evaluate its relationship with disease severity indexes.

Materials and Methods: Ninety (male/female= 37/53; median age 45 years) stable non-cystic fibrosis bronchiectatic adult patients were enrolled into this study. Dyspnea scores, number of exacerbations and hospital admissions within the last year, body-mass index, pulmonary function tests, sputum cultures, bronchiectasis disease severity indexes (BSI and FACED) were assessed. Anxiety and depression were evaluated by using the Turkish version of the hospital anxiety and depression scale questionnaire.

Results: Anxiety was diagnosed in 30% of patients and depression was diagnosed in 41% of the participants. Female participants had significantly higher rates of depression (55% vs. 22%; $p=0.002$). Exacerbation rates within the last year were higher among the subjects with anxiety, moreover, patients with depression had shorter duration of disease. BSI and FACED severity indexes increased with longer duration of disease (5.6 ± 5.0 yrs in mild group vs. 10.1 ± 9.2 yrs in moderate-to-severe group, $p=0.035$ and 5.7 ± 5.4 yrs in mild group vs. 12.1 ± 9.7 yrs in moderate-to-severe group, $p=0.001$, respectively), however, anxiety and depression were not related with BSI and FACED severity indexes.

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Conclusion: Patients with non-cystic fibrosis bronchiectasis have an increased risk for depression and anxiety. Duration of disease and higher exacerbation rate are related with psychological status and indexes increased with longer duration of disease. Early detection and taking the necessary measures to improve the psychological state is necessary for the overall management of these patients.

Key words: Depression; anxiety; bronchiectasis

ÖZ

Depresif ve endişe duygudurumunun kistik fibrozis olmayan bronşektazi hastalarının kliniği üzerindeki etkisi

Giriş: Bronşektazi hastalığı, düzeyi farklı varyasyonlar göstermekle beraber, anormal bronş dilatasyonu ile seyreden bir hastalıktır. Bronşektazi psikoloji üzerine negatif etki yapabilir. Bronşektazi hastalarında klinik ve hastalık derecesiyle psikoloji arasındaki ilişki bugüne kadar çok fazla değerlendirilmemiştir. Bu çalışmadaki temel amacımız, kistik fibrozis olmayan bronşektazi hastalarında depresyon ve endişe duygudurumunun ve bunun BSI ve FACED gibi hastalık derecesini gösteren belirteçlerle olan ilişkisinin değerlendirilmesidir.

Materyal ve Metod: Bu çalışmada stabil dönemdeki toplam 90 (kadın/erkek= 37/53; ortalama yaş 45) bronşektazi hastası değerlendirildi. Dispne skorları, son bir yıl içerisindeki alevlenme ve hastane yatışı, beden kitle indeksi, solunum fonksiyon testleri, balgam kültürleri, BSI ve FACED indeksleri değerlendirildi. Endişe ve depresif duygudurumları Türkçe validasyonu yapılmış "hospital anxiety and depression" ile değerlendirildi.

Bulgular: Endişe duygudurumu katılımcıların %30'unda, depresyon %41'inde tespit edilmiştir. Erkelere kıyasla kadınlarda depresyon daha fazla gözlenmiştir (%55 vs. %22, $p= 0.002$). Endişe duygudurumu gözlenenlerde, son bir yıl içerisindeki alevlenme sayısının daha fazla olduğu izlenmiştir (3.7 ± 2.0 vs. 2.5 ± 1.8 , $p= 0.007$). Depresyonu olan hastalarda, hastalık süresinin daha az olduğu gözlenmiştir (5.4 ± 6.0 yıl vs. 9.5 ± 8.3 yıl, $p= 0.004$). Hastalık süresi uzadıkça BSI (hafif hastalarda 5.6 ± 5.0 yıl vs. orta ileri grupta 10.1 ± 9.2 yıl, $p= 0.035$) ve FACED (hafif grupta 5.7 ± 5.4 yıl vs. orta ileri hastalarda 12.1 ± 9.7 yıl, $p= 0.001$) indeks değerlerinin daha yüksek olduğu izlenmiştir, ancak endişe duygudurum ve depresyonla BSI ve FACED arasında anlamlı bir ilişki bulunmamıştır.

Sonuç: Bu çalışmada elde ettiğimiz sonuçlar kistik fibrozis olmayan bronşektazi hastalarında depresyon ve endişe duygudurum riskinin daha fazla olduğunu, özellikle bu riskin kadınlar için daha fazla olduğunu göstermektedir. Hastalık süresi ve alevlenme sayısının psikolojik duruma ilişkili olduğu ve hastalık belirteci indekslerde hastalık süresi uzadıkça artış olduğu sonucuna varılmıştır. Duygudurumdaki bozulmaların erken tespit edilmesi ve bu durumun düzeltilmesinin hastalık yönetiminde önemli olduğu düşünülmektedir.

Anahtar kelimeler: Depresyon; endişe duygudurum; bronşektazi

INTRODUCTION

Bronchiectasis is defined as the pathologically irreversible, abnormal dilatation of the bronchi. The prevalence of non-cystic fibrosis (CF) bronchiectasis and multi-morbid conditions are rising worldwide and is imposing a burden on healthcare systems. This growth demands a best delivery of care for people living with this disease. Psychosocial factors in patients with chronic respiratory symptoms may also contribute to the impairment of their health status. Several studies showed that patients with chronic diseases have increased risk for development of anxiety and depression (1). They may be frequently overlooked in daily practice. There are scant published data on the psychological status of patients with non-CF bronchiectasis, which are unfortunately largely extrapolated from cystic fibrosis and chronic obstructive pulmonary disease (COPD) studies. Psychiatric disorders such as anxiety and depression are more prevalent in subjects in chronic airway diseases such as COPD and asthma. In the literature depression and

anxiety were observed more than the half of the patients with bronchiectasis. It has also been reported that depression and anxiety are associated with worse health outcomes in subject with bronchiectasis regarding dyspnea, low forced expiratory volume (FEV_1), chronic respiratory failure, high morbidity and increased health care utilization (2-4). Meanwhile, bronchiectasis is a highly heterogeneous disease and has a range of severity (5,6). On the other hand there were also studies that did not reported any significant association between disease severity index with anxiety and depression. Nevertheless, there is insufficient evidence to determine whether psychological status have an impact on clinical outcomes in patients with non-CF bronchiectasis. Understanding of factors affecting psychological status in patients with bronchiectasis allows to improve treatment plans. We aimed to detect depression and anxiety in patients with non-CF bronchiectasis and to evaluate its relationship with clinical indices, particularly disease severity indexes such as BSI (bronchiectasis severity index) and FACED.

MATERIALS and METHODS

Study Populations

A total number of 90 adult patients with diagnosis of non-CF bronchiectasis consecutively attending the Adult Pulmonology Clinics of Marmara University Hospital were enrolled into the study. The research project was approved by Marmara University Medical Faculty Clinical Research Ethics Committee and patients who met the criteria defined in this study protocol were enrolled into the study after obtaining written informed consents.

The diagnosis of bronchiectasis was made on the basis of clinical history of mucopurulent sputum and radiological confirmation of high resolution computed tomography scanning (HRCT). A radiologist blind to the study interpreted the HRCT scans and assessed the severity of radiologic presentation with evaluation of each lobe. None of the patients had not had any exacerbation for at least four weeks. Exacerbation was defined as a person with bronchiectasis with a deterioration in three or more of the following key symptoms for at least 48 h: cough; sputum volume and/or consistency; sputum purulence; breathlessness and/or exercise tolerance; fatigue and/or malaise; hemoptysis and a clinician determines that a change in bronchiectasis treatment is required (7). Sweat test for exclusion of cystic fibrosis was performed for all participants. Alpha 1-Antitrypsin deficiency was also evaluated. Patients with cystic fibrosis, malignancy, pregnancy and already known (CVID) were excluded from the study. Medical records were reviewed and a follow-up form for each patient questioning patients' medical history, symptoms, smoking history, education and work status, marital status, concomitant medications and comorbidities using Charlson comorbidity index, past history, the duration of disease, the number of disease exacerbations and hospitalizations within the last year, and medical treatment were filled out (8). All patients underwent pulmonary function tests and carbon monoxide diffusion tests according to ATS criteria (9,10), their height and body weight were measured, and Modified Medical Research Council (mMRC) dyspnea score was recorded. The results of investigated respiratory bacteria including *Pseudomonas aeruginosa* in the sputum were obtained. Radiographic extension was assessed based on the number of bronchiectatic lobes as local (one lobe) or expanded.

Disease Severity Indexes

The severity of bronchiectasis was calculated using indexes such as Bronchiectasis Severity Index (BSI) based on age, body mass index (BMI), forced expiratory volume 1 second (FEV₁) % predicted, the number of hospital admission and exacerbation, mMRC, bacterial colonization, the number of involved lobe and FACED score based on age, *Pseudomonas aeruginosa* colonization, mMRC, FEV₁ % predicted, and the number of involved lobe. Patients were classified into mild (0-4), and moderate-to-severe (≥ 5) for BSI; into mild (0-2) and (≥ 3) moderate-to-severe for FACED (11).

Assessment of Psychological Status

Participants were asked to fill in the self-reported hospital anxiety and depression scale (HADS) questionnaire validated for Turkish language. The questionnaire consists of 14 questions, in which the overall severity of anxiety and depression is rated on 4-point scale. Seven questions are related to anxiety and 7 to depression (12). The scores are interpreted as following; 0-7 as normal, ≥ 10 as anxiety risk and ≥ 7 as depression risk.

Statistics

All statistical analyses were performed using SPSS 20.0 program. Descriptive statistics for normally distributed continuous data were shown as means \pm standard deviations. Median (minimum-maximum) values were used to assess non-normally distributed data. Categorical variables were compared by Chi-square test and Fisher's Exact test was used if the number of expected values was lower than 5 in four-cell tables. To compare the mean values of continuous variables between two groups, t-test was used for normally distributed and Mann-Whitney U test was used for non-normally distributed data. Correlations between normally distributed data were tested by Pearson correlation analysis and Spearman correlation test was used for non-normally distributed data. A multi-variant logistic regression analysis was performed to test the parameters that had significant correlations with the psychological state. For all analyses, p values < 0.05 were considered statistically significant.

RESULTS

In this cross-sectional study, a total of 90 patients (F/M: 48/32) aged 18 years and above, who were

referred to the Pulmonary Medicine outpatient clinic and were diagnosed with non-CF stable bronchiectasis, were included in the final analysis. Among the 118 patients with bronchiectasis who had been referred to the outpatient clinic, 3 patients with a previously diagnosed common variable immunodeficiency disease and 10 patients with cystic fibrosis were excluded from the study. Five patients did not provide consent for participation and thus were also excluded from the study.

Overall, 24 (27%) patients had normal, 36 (40%) patients had mixed, 20 (22%) had obstructive, and 10 (11%) had restrictive lung function tests. Twenty-two (24%) patients had *Pseudomonas aeruginosa* growth in sputum culture. Demographic data; clinical, functional, and radiological status, microbiology, and disease severity of the entire study population are depicted in Table 1. Among the study population, 90 patients were classified as having mild 46 (51%)

and 44 (49%) as having moderate-to-severe according to BSI severity index, 60 (67%) patients as having mild and 30 (33%) patients as having moderate-to-severe based on FACED severity index. Differences among these groups in terms of demographics, clinical, functional, and radiological status, and microbiology are depicted in Table 1. As illustrated in Table 2 BSI and FACED severity indexes increased with longer duration of disease (5.6 ± 5.0 yrs in mild group vs. 10.1 ± 9.2 yrs in moderate-severe group, $p= 0.035$ and 5.7 ± 5.4 yrs in mild group vs. 12.1 ± 9.7 yrs in moderate-severe group, $p= 0.001$, respectively).

Anxiety was diagnosed in 27 (30%) of patients and depression was diagnosed in 37 (41%) of 90 non-CF patients with bronchiectasis. Female patients had increased risk for depression (55% vs. 22%, $p= 0.002$). Anxiety was related with high exacerbation rate within the last year ($p= 0.007$) and depression

Table 1. Baseline characteristics of the patients with bronchiectasis (n= 90)

	Depression (n= 37)	No-depression (n= 53)	p	Anxiety (n= 27)	No-anxiety (n= 63)	p
Age, years	45.9 ± 14.7	44.6 ± 18.2	0.640	41.2 ± 14.3	46.9 ± 17.6	0.181
Female gender, %	78.4	45.3	0.002	74.1	52.4	0.055
BMI, kg/m ²	26.9 ± 5.8	24.8 ± 5.5	0.095	24.9 ± 6.2	26.0 ± 5.6	0.400
Current smoker, %	83.8	83.0	0.924	81.5	84.1	0.758
Tuberculosis, %	18.9	13.2	0.462	11.1	17.5	0.446
<i>Pseudomonas</i> , %	75.7	75.5	0.982	70.4	77.8	0.454
Oxygen usage, %	8.1	7.5	0.922	3.7	9.5	0.345
NIMV usage, %	2.7	5.7	0.503	3.7	4.8	0.823
Bronchodilator usage, %	67.6	76.5	0.355	70.4	73.8	0.741
Steroid usage, %	8.1	5.7	0.647	11.1	4.8	0.268
Localized disease, %	16.2	11.3	0.501	7.4	15.9	0.279
Duration, years	5.4 ± 6.0	9.5 ± 8.3	0.004	6.8 ± 6.8	8.3 ± 8.0	0.452
Exacerbation, n	3.0 ± 2.0	2.7 ± 1.9	0.497	3.7 ± 2.0	2.5 ± 1.8	0.007
FEV ₁ %	65.2 ± 31.0	66.7 ± 28.2	0.566	66.6 ± 35.8	65.8 ± 26.2	0.625
FVC %	76.8 ± 28.7	79.6 ± 23.4	0.303	78.8 ± 32.1	78.3 ± 22.6	0.576
FEV ₁ /FVC %	70.4 ± 13.1	67.7 ± 14.7	0.486	69.5 ± 12.9	68.4 ± 14.6	0.741
MMEF %	40.7 ± 32.6	45.3 ± 36.6	0.974	42.0 ± 37.3	44.0 ± 34.2	0.725
MMRC score	1.7 ± 1.0	1.5 ± 0.9	0.277	1.6 ± 1.1	1.6 ± 0.9	0.978
Charlson score	1.6 ± 1.0	1.3 ± 0.6	0.152	1.6 ± 1.1	1.4 ± 0.7	0.733
Moderate-to-severe MMRC, %	51.4	41.5	0.356	44.4	46.0	0.890
Moderate-to-severe BSI, %	48.6	49.1	0.970	51.9	47.6	0.713
Moderate-to-severe FACED, %	29.7	35.8	0.545	33.3	33.3	1.000

Table 2. Comparison of mild BSI with moderate-to-severe BSI as well as mild FACED with moderate-to-severe FACED in patients with bronchiectasis (n= 90)

	Mild BSI (n= 46)	Moderate-to-severe BSI (n= 44)	p	Mild FACED (n= 60)	Moderate-to-severe FACED (n= 30)	p
Age, years	43.7 ± 13.6	46.6 ± 19.6	0.487	44.9 ± 14.0	45.5 ± 21.6	0.997
Female gender, %	43.4	46.1	0.875	47.4	49.2	0.896
BMI, kg/m ²	27.1 ± 5.7	24.2 ± 5.4	0.020	26.9 ± 5.6	23.1 ± 5.2	0.903
Current smoker, %	82.6	84.1	0.850	85.0	80.0	0.549
Tuberculosis, %	17.4	13.6	0.623	15.0	16.7	0.837
Pseudomonas, %	95.7	54.5	< 0.001	85.0	56.7	0.003
Oxygen usage, %	4.3	11.4	0.214	3.3	16.7	0.026
NIMV usage, %	2.2	6.8	0.285	1.7	10.0	0.071
Bronchodilator usage, %	60.0	86.0	0.006	64.4	89.7	0.012
Steroid usage, %	8.7	4.5	0.430	6.7	6.7	1.000
Localized disease, %	19.6	6.8	0.075	16.7	6.7	0.188
Duration, years	5.6 ± 5.0	10.1 ± 9.3	0.035	5.7 ± 5.4	12.1 ± 9.6	0.001
Exacerbation, n	2.2 ± 1.6	3.6 ± 2.1	< 0.001	2.6 ± 1.7	3.5 ± 2.7	0.071
FEV ₁ %	75.4 ± 25.8	56.4 ± 29.7	< 0.001	75.8 ± 27.9	46.7 ± 21.3	< 0.001
FVC %	85.7 ± 24.1	70.9 ± 25.3	0.001	87.0 ± 25.0	61.4 ± 16.9	< 0.001
FEV1/FVC %	73.5 ± 12.4	63.8 ± 14.1	0.001	72.4 ± 12.1	61.5 ± 15.0	0.001
MMEF %	52.8 ± 32.5	33.6 ± 34.9	< 0.001	51.0 ± 35.1	28.2 ± 29.5	< 0.001
MMRC score	1.1 ± 0.8	2.0 ± 0.9	<0.001	1.3 ± 0.8	2.2 ± 1.0	< 0.001
Charlson score	1.3 ± 0.6	1.6 ± 1.0	0.332	1.3 ± 0.6	1.7 ± 1.2	0.129
Anxiety positive, %	28.3	31.8	0.713	30	30	1.000
Depression positive, %	41.3	40.9	0.970	43.3	36.7	0.545
Moderate-to-severe MMRC, %	28.3	63.6	0.001	35.0	66.7	0.004

with shorter duration of the disease ($p= 0.004$) (Table 3, Figure 1). As shown in Table 2 work status is related with depression but not with anxiety, housewives had an increased risk for depression with the 65% of all depressives were housewives ($p= 0.006$). The depression scores negatively correlated with the duration of disease ($p= 0.003$) and anxiety scores correlated with the exacerbation rate within last year ($p= 0.008$) (Figure 1). In the study population, BSI and FACED severity indexes increased with longer duration of disease ($p= 0.035$ and $p= 0.001$, respectively), however, anxiety and depression were not related with BSI and FACED severity indexes (Table 3). For identifying risk factors for depression and anxiety, we included the age, BMI, gender, frequency of exacerbations and hospitalizations, mMRC score, FEV₁ % pred, severity indexes as independent vari-

ables in multivariate logistic regression. As illustrated in Table 3, when the patients are grouped based on gender, female patients had statistically higher rates of depression than male patients (OR= 0.196, CI= 0.073-0.528).

Patients with pseudomonas colonization was 24% in our study population; we observed worse lung function and radiological severity when compared to uninfected patients. Moreover, *Pseudomonas* colonization is associated with consistent and significant increases in all markers of disease severity including exacerbation and hospitalization within last year. However, there were no differences in pathogenic microorganisms such as pseudomonas and other colonized microorganisms between patients with psychological problems or not.

Table 3. Variables associated with depression and anxiety in patients with bronchiectasis

	Depression			Anxiety		
	OR	95% CI	p	OR	95% CI	p
Univariate						
Age	0.99	0.97-1.02	0.723	1.02	0.99-1.05	0.141
Female gender	4.38	1.69-11.34	0.002	2.59	0.96-7.01	0.059
Current smoker	1.06	0.34-3.27	0.924	0.83	0.25-2.71	0.830
BMI	0.94	0.87-1.01	0.095	1.04	0.96-1.12	0.396
Tuberculosis	1.53	0.49-4.81	0.464	0.59	0.15-2.31	0.450
Duration	1.09	1.02-1.18	0.017	1.03	0.96-1.09	0.411
Exacerbation	0.93	0.75-1.15	0.490	0.73	0.57-0.93	0.011
Pseudomonas	1.01	0.38-2.69	0.982	0.68	0.25-1.88	0.455
Charlson score	0.66	0.39-1.11	0.118	0.66	0.39-1.11	0.118
Oxygen usage	1.08	0.23-5.14	0.922	1.08	0.23-5.14	0.922
NIMV usage	0.46	0.05-4.63	0.512	0.77	0.08-7.75	0.824
Bronchodilator usage	0.64	0.25-1.65	0.356	0.84	0.31-2.30	0.741
Steroid usage	1.47	0.28-7.72	0.649	2.50	0.47-13.27	0.282
Localized disease	1.52	0.45-5.13	0.503	0.42	0.09-2.08	0.290
MMRC score	0.79	0.52-1.21	0.279	0.96	0.61-1.52	0.817
Mod-to-severe MMRC	0.67	0.29-1.56	0.357	1.07	0.43-2.64	0.890
Mod-to-severe BSI	1.02	0.44-2.36	0.970	0.84	0.34-2.08	0.713
Mod-to-severe FACED	1.32	0.54-3.25	0.545	1.00	0.38-2.60	1.000
FEV ₁ %	1.00	0.99-1.02	0.816	0.99	0.98-1.02	0.908
FVC %	1.00	0.99-1.02	0.609	0.99	0.98-1.02	0.921
FEV1/FVC %	0.99	0.96-1.02	0.384	0.99	0.96-1.03	0.733
MMEF %	1.00	0.99-1.02	0.532	1.00	0.99-1.02	0.809
Multivariate						
Age	1.01	0.98-1.04	0.497	1.02	0.99-1.05	0.238
Female gender	5.15	1.88-14.01	0.001	2.83	0.98-8.12	0.054
Duration	1.11	1.03-1.21	0.009	0.74	0.57-0.96	0.024

DISCUSSION

In the current study we observed that anxiety and depression are common comorbidities with particularly an increased depression risk for female patients, particularly for housewives. Anxiety was related with high exacerbation rate within the last year and depression was inversely associated with shorter duration of the disease. Interestingly, no clinically important differences in psychological status were present across different levels of disease severity, exception of increased bronchiectasis disease severity indexes with longer duration of disease.

To date, there have been few studies investigating mental health state of non-CF patients with bronchiectasis. The anxiety and depression are common comorbidities among patients with bronchiectasis, and the rate of depression risk was 41% in the present study with particularly high risk for females. Our results are in agreement with previous bronchiectasis studies assessing risk factors for depression and anxiety. In a Korean study that assessed depression and anxiety in patients with COPD, asthma, and bronchiectasis, they found depression in 55% of patients with COPD and 55% of patients with bronchiectasis however only patients with bronchiectasis demon-

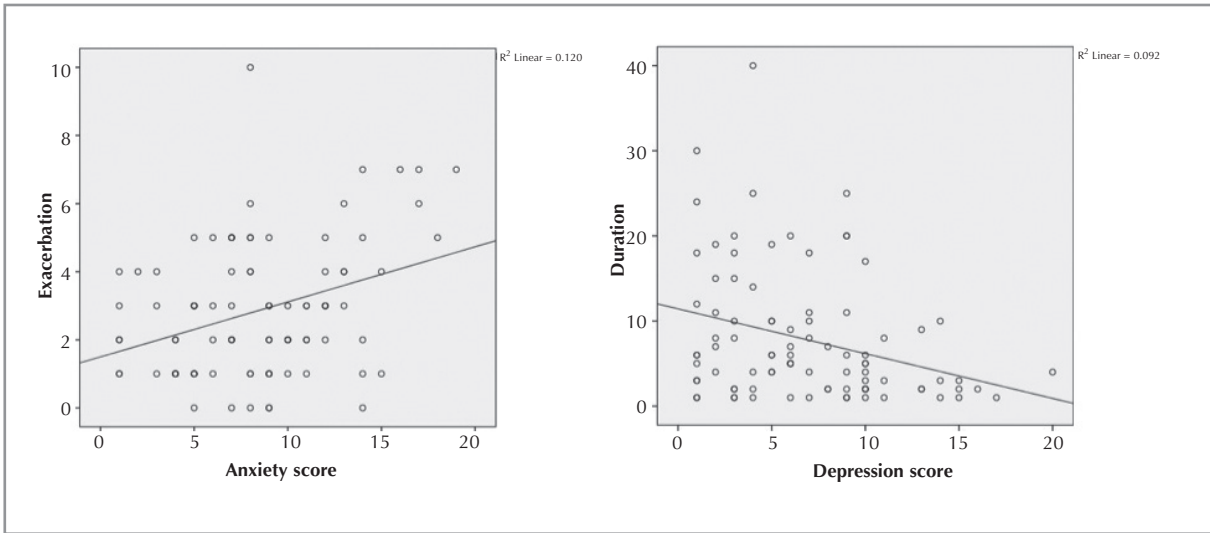


Figure 1. Correlation between anxiety score and exacerbation as well as depression score and disease duration.

strated anxiety not COPD patients. Decreased lung function and a history of smoking were independent risk factors for depression for all groups (2). Moreno et al found that 34% of patients with bronchiectasis had depression and 55% of patients with bronchiectasis had anxiety and depression was higher in female patients when compared with male patients using STAI and BDI questionnaires (13). The Spanish historical registry of bronchiectasis studied 2099 non-CF bronchiectasis patients and reported the diagnostic delay for women 2.1 years more than for men (14). The females' delayed diagnosed symptoms might be a factor for worse disease control and depression or vice versa. The sex was the sole factor associated with depression in multivariate regression analysis in our study. In general population, two or three times higher prevalence of depression in female patients is a fact (15). Moreover, we found that work status was related with depression but not with anxiety and housewives had increased risk for depression. Our data seem to be in line with recent study by Oliveira et al demonstrating that women who were unemployed had higher depression scores than women who were employed (16). These findings call for appropriate approach to improve the mental health of non-CF patients with, particularly females. Interestingly, depression was related with shorter duration of disease which led us to speculate that this group might have immature coping skills to accept the disease and to adhere to treatment with increasing years it may be easy to cope with disease. To the best of our knowledge, this is the first report in term

of effect of duration of disease on depression risk. This may allow novel insight into our understanding of possible factors related to depression and to screen early the bronchiectatic patients for depression.

We found the anxiety risk in 30% of patients, this result is consistent with prior studies in which higher rates of anxiety have been reported such as 38% and 39.8% (3,16). The finding of a high prevalence of anxiety was found to be related with high exacerbation rate within the last year in the patients with non-CF bronchiectasis in our study. Similarly, anxiety was related with frequent exacerbations in these previous studies (3,16). In a Chinese study, anxiety was related by sleep disturbances, daytime cough, younger age and lower education level in patients with bronchiectasis (17). Our study found that pseudomonas colonisation was present in 24% of patients which is similar to previous reports. Living with a partner and bacterial colonization especially pseudomonas was related to anxiety in previous studies (3,16). Wang H et al. reported worse scores for anxiety and depression on HADS scale in patients with *Pseudomonas* colonization (18). However, we did not find these risk factors for anxiety in our study. This discordance might reflect the differences in patient characteristics, comorbidities, different treatment modalities, different microbial distribution between different countries which could result in these disparities. On the other hand, the present study only assessed the associations, we could not infer the causality. The worse disease control and consequently several exacerbations

tions might cause to frequent anxiety symptoms. Anxiety may lead a patient to report worse aspects of symptoms, and vice versa.

In the study population, no significant differences in the rate of anxiety and depression were found according to the severity of disease. Notably, FACED and BSI scores are more skewed towards mild bronchiectasis and both severity scores showed a large disparity, suggesting the distinction of both scoring systems. In European cohort (n= 1612), the BSI predicted hospitalizations, exacerbations, quality of life, respiratory symptoms, across all risk categories. FACED had poor discrimination for hospital admissions and did not predict future risk of exacerbations and quality of life (19). Similar to our results, neither anxiety nor depression correlated with bronchiectasis severity assessed with both BSI and FACED score in a Chinese study (17). Similarly, in a study assessing 117 patients with bronchiectasis, neither anxiety nor depression was associated with the extent of bronchiectasis on CT scan that is a determinant of severity scores (20). Moreover, in the present study, both BSI and FACED severity indexes increased with longer duration of disease, a significant higher prevalence of patients with moderate-to-severe disease with longer duration of disease in comparison to those with mild disease. It might be suggested that patients with bronchiectasis will appear to have more severe disease with long lasting disease. This association has not been reported previously.

This study also has some limitations that should be taken into consideration. Our study was conducted at a single center. This study design is cross-sectional and the estimation of the long term impact of psychological status on functional decline and disease progression and adverse outcomes including exacerbations, hospitalization were not evaluated prospectively. The different questionnaires except HADS such as STAI and BDI questionnaires might result in discordance in the rates of psychological status when comparing with other studies. The other limitation is that all patients are not consulted by a professional psychiatrist and only assessed by questionnaires.

There are scant data regarding clinical implications of psychological status in patients with non-CF bronchiectasis patients. This study demonstrates that the prevalence of depression is higher in female patients than male patients with non-CF bronchiectasis. Anxiety was related with high exacerbation rate with-

in the last year and depression with longer duration of the disease. Additionally, our results indicate that the disease severity might not be an adequate marker for physicians to suspect psychological problems. According to these findings, we suggest that all symptomatic patients with bronchiectasis, regardless of severity, should undergo detailed testing to detect psychological problems. Although many advances have been made in the treatment against respiratory systems in bronchiectatic patients, they can not receive the care for potential complex mental health problems and social care needs. There is also a lack of collaboration in the design and coordination of different health services. Early treatment of depression and anxiety in this population could prevent worsening of life quality, even in patients with low-severity disease. Our study will be followed by further studies to clearly define the specific nature of mental health and clinically important outcomes in patients with non-CF bronchiectasis.

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CONFLICT of INTEREST

The authors declare that there are no conflicts of interest.

AUTHORSHIP CONTRIBUTIONS

Concept/Design: MB, BC

Analysis/Interpretation: BB

Data Acquisition: ŞOY, DK, EE

Writing: BC, BB

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Final Approval: BC

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