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Health-related quality of life in elderly patients with bronchiectasis

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Abstract:

BACKGROUND: Chronic lung diseases such as bronchiectasis (BR) can adversely affect health-related quality of life (HRQOL), but there are limited studies conducted to investigate HRQOL in elderly BR patients. This study aims to investigate the HRQOL in elderly patients with BR and to assess its relationship with clinical outcomes and radiological findings.

MATERIALS AND METHODS: A total of 74 elderly BR patients involved in the study. BR was diagnosed using high-resolution computed tomography, and all patients were evaluated with the Short Form-36 (SF-36) questionnaire. Symptoms, pulmonary function tests, BR Severity Index (BSI), Reiff's score, and medical treatments were recorded.

RESULTS: The mean age of the patients was 70.1 ± 5.0 (range: 65–89) years, and 41 (55.4%) were men. The mean SF-36 Physical Component Summary (PCS) and Mental Health Component Summary (MCS) scores of the 74 elderly patients with BR were 36.6 ± 11.2 (range: 16.3–70) and 44.8 ± 8.9 (range: 23–59.6), respectively. All of the SF-36 subscale results except physical functioning subscale were lower in elderly patients with BR than in the normal Turkish elderly population. There was a major difference in the pain domain between males and females (57.9 ± 27.7 vs. 43.9 ± 27.6 , respectively; $P = 0.035$), but there was no other significant difference between SF-36 domains by gender. The BSI was strongly correlated with all SF-36 subscales. There were statistically significant correlations between Reiff's score, forced expiratory volume in 1 s percent predicted value, forced vital capacity percent predicted value, and number of admissions to the emergency room in the previous year and some SF-36 subscales ($P < 0.05$). However, there was no correlation between age and PCS, MCS, or SF-36 subscales.

CONCLUSION: Our study demonstrated that elderly patients with BR had poorer HRQOL scores. The BSI, Reiff's score, and pulmonary function tests were correlated with the SF-36 domains.

Keywords:

Bronchiectasis, Bronchiectasis Severity Index, elderly, Reiff's score quality of life

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Introduction

The world's population is getting older.^[1] With increasing age, the rates of numerous chronic diseases are also rising, including heart diseases, stroke, chronic

respiratory diseases, cancer, and dementia.^[1] However, some older people maintain good functional ability and enjoy high levels of well-being despite the presence of one disease or more.^[1] Especially in high-income countries, older people are living longer, but the quality of life (QOL) during those extra years is unclear.^[2]

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Bronchiectasis (BR) is characterized by abnormal irreversible dilatation of the bronchi, with chronic cough, chronic sputum production, and recurrent respiratory infections.^[3] The prevalence of BR is age related, and there is some geographical variation in prevalence.^[4] It is important to confirm accurate assessments and optimal management to reduce morbidity and mortality and to improve QOL among BR patients.^[5] BR was reported to be common in older and elderly patients, and increasing age was defined as an independent risk factor for BR severity.^[6] In a Spanish study, dyspnea, forced expiratory volume in 1 s (FEV1), and daily sputum production were associated with health-related QOL (HRQOL) in clinically stable BR patients.^[7] Although some studies investigated HRQOL in BR patients, there have not been enough studies conducted to evaluate the HRQOL in elderly patients with BR in the stable period. The objective of the present study was to determine the HRQOL in elderly patients with BR and to assess its relationship with clinical outcomes and radiological findings.

Materials and Methods

The present cross-sectional retrospective study was conducted between June 28 and December 28, 2018, with elderly individuals aged 65 years and older with BR. In all cases, BR was diagnosed by high-resolution computed tomography (HRCT) of the chest. Exclusion criteria were age <65, interstitial lung disease, lung cancer, active tuberculosis, nontuberculosis mycobacterial disease, nonstable BR (the use of antibiotics at least 4 weeks prior to the study), mental health (MH) problems, dementia, Alzheimer's disease, major psychiatric disorders, and noncooperation in pulmonary function tests. Demographic parameters, respiratory symptoms, duration of illness, comorbidities, pulmonary function tests, HRCT findings, and complete blood counts were all recorded. The study was reviewed and approved by the Local Ethics Committee of Biruni University (Approval no: 2018/17-03). Each participant signed an informed consent form.

The radiological severities of HRCT abnormalities were scored by using the modified Reiff score (range: 1–18), which evaluates the number of lobes involved (the lingula was considered as a separate lobe; tubular BR = 1, varicose BR = 2, cystic BR = 3 points).^[8] The BR severity index (BSI) was applied to determine disease severity. The nine BSI parameters include age, body mass index, predicted FEV1%, hospitalization with severe exacerbation in the past 2 years, number of exacerbations in the previous year, the Modified Research Council (MRC) dyspnea scale, *Pseudomonas* colonization, colonization with other organisms, and radiological severity (≥ 3 lobes involved or cystic BR).

The ranges of scores for mild, moderate, and severe BR according to the BSI are defined as 0–4, 5–8, and ≥ 9 points, respectively.^[9]

The Short Form-36 health survey (SF-36) is a self-administered questionnaire containing a total of 36 statements within 8 health domains, namely physical functioning (PF), role physical (RF), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and MH.^[10] Scores for each domain can range from 0 to 100, with a higher score defining a more favorable health state. These eight scales provide two summary scores: the Physical Component Summary (PCS) and the MH component summary (MCS), for which a normal score is 50 and the standard deviation (SD) is 10. The first five subscales (PF, RP, BP, GH, and VT) produce the PCS and the last five subscales (GH, VT, SF, RE, and MH) produce the MCS, with the GH and VT subscales overlapping between the two overall components. Demiral *et al.* conducted the validation of the Turkish version of the SF-36 test in 2006, and the validated values were used for comparison of SF-36 subscales in elderly BR patients.^[11]

Statistical analyses were performed using the SPSS package, version 20 (IBM Corporation, Armonk, NY, USA). Continuous variables were shown as mean \pm SD, and categorical variables were presented as proportions. One-sample *t*-test was used to compare SF-36 parameters between normal elderly population and elderly BR patients. As the SF-36 scores were normally distributed, the Student's *t*-test was used to compare these parameters between gender and *Pseudomonas aeruginosa* colonization. Correlations were determined by using the Pearson's test. $P < 0.05$ was considered to indicate a significant difference.

Results

This is a cross-sectional study and 74 elderly BR patients were enrolled in the study. Their mean age was 70.1 ± 5.0 (range: 65–89) years, and 41 (55.4%) were men. Demographic, clinical, and functional characteristics of the patients are shown in Table 1. Sixty-two (83.6%) of these elderly BR patients had the following comorbidities: hypertension (43, 58.1%), COPD (24, 32.4%), diabetes (14, 18.9%), coronary arterial disease (14, 18.9%), gastroesophageal reflux (13, 17.6%), and asthma (11, 14.9%). The most common symptoms were dyspnea and cough. Twelve patients (16.2%) used long-term oxygen treatment and six (8.1%) patients used noninvasive mechanical ventilation at home.

Pulmonary function test results were available for all patients. The mean FEV1 was 1.13 ± 0.47 L (range: 0.42–2.56), whereas forced vital capacity (FVC) was

1.64 ± 0.67 L (range: 0.46–3.38). FEV1% predicted, FVC% predicted, and FEV1/FVC results are shown in Table 1. A sputum sample was taken for 55 (74.7%) patients, while 19 (25.3%) could not provide sputum in a stable period. Twenty-six patients (34.7%) had negative sputum culture results. The most frequently isolated microorganism was *P. aeruginosa* (18, 24%) in the stable period in elderly BR patients. No significant difference was found between the patients with *P. aeruginosa* colonization in the sputum and all SF-36 domains ($P > 0.05$).

Evaluation of radiological findings by Reiff's score revealed that the mean score was 6.02 ± 2.74 (range: 2–15). The BSI was applied to detect disease severity

Table 1: Demographics and clinical characteristics of patients

| Characteristics | Value (n=74) |
|--|-------------------------|
| Age | 70.1±5.0 |
| Female/male | 33/41 (44.6/55.4) |
| Smoking history | |
| Current smoker | 12 (16.2) |
| Ex-smoker | 23 (21.1) |
| Nonsmoker | 39 (52.7) |
| Smoking, packs/year | 36.1±17.9 |
| Duration of disease (years) | 9.2±8.4 (1–50) |
| Dyspnea | 60 (81.1) |
| Cough | 55 (74.3) |
| Sputum | 38 (51.4) |
| Fatigue | 21 (28.4) |
| Hemoptysis | 11 (14.9) |
| Comorbidities | |
| Hypertension | 43 (58.1) |
| COPD | 24 (32.4) |
| Diabetes mellitus | 14 (18.9) |
| CAD | 14 (18.9) |
| GER | 13 (17.6) |
| Asthma | 11 (14.9) |
| Reiff's score (range) | 6.02±2.74 (2–15) |
| BSI* (range) | 8.32±4.3 (3–19) |
| Mild bronchiectasis | 17 (23) |
| Moderate bronchiectasis | 25 (33.8) |
| Severe bronchiectasis | 32 (43.2) |
| FEV1% predicted | 50.0±20.6 |
| FVC % predicted | 55.8±20.1 |
| FEV1/FVC | 65.2±13.1 |
| Laboratory data | |
| Hemoglobin (g/dL) | 13.1±1.6 (9.2–17.7) |
| WBC (μL) | 8690±1940 (2200–14,000) |
| CRP (mg/dL) | |
| Admission to ER in previous year, n (%) | 50 (67.6) |
| Number of admission to ER in previous year | 3.8±2.8 |
| Hospitalization in previous year | 15 (20.3) |

Data shown as mean±SD or n (%). HF: Heart failure, CAD: Coronary arterial disease, GER: Gastroesophageal reflux, BSI: Bronchiectasis Severity Index, FEV1: Forced expiratory volume in 1 s, FVC: Forced vital capacity, ER: Emergency room, SD: Standard deviation, COPD: Chronic obstructive pulmonary disease

and the mean score was 8.32 ± 4.3 (range: 3–18). This score reflected that our study group had moderate BR. The distribution of patients according to BSI scores is shown in Table 1.

The mean SF-36 PCS and MCS scores of the 74 elderly patients with BR were 36.6 ± 11.2 (range: 16.3–70) and 44.8 ± 8.9 (range: 23–59.6), respectively (normal ranges: 50 ± 10, with diminishing scores indicating worsening) [Table 2]. All of the SF-36 subscale results were lower in elderly patients with BR than in the normal Turkish elderly population [Figure 1].^[11] There was a statistically significant difference in the pain domain between males and females (57.9 ± 27.7 vs. 43.9 ± 27.6, respectively; $P = 0.035$), but there was no other difference between SF-36 domains by gender. The relationship between sputum culture positivity and SF-36 parameters was also investigated. Only GH and energy/VT subscales were lower in sputum culture-positive elderly BR patients (39.8 ± 21.2 vs. 28.1 ± 19.1, $P = 0.040$ and 48.1 ± 17.1 vs. 38.3 ± 16.3, $P = 0.038$, respectively). In subgroup analysis, there was no statistical difference between SF-36 subscales and *P. aeruginosa* colonization in our study group. The correlations between the SF-36 and clinical, radiological, and pulmonary function test results are shown in Table 3. The results showed moderate correlation between BSI and all SF-36 subscales. There were statistically significant correlations (some of them were strong, but some of them had weak correlation) between Reiff's score, FEV1% predicted value, FVC% predicted value, and number of admissions to the emergency room in the previous year and some of the SF-36 subscales. However, there was no correlation between age and PCS, MCS, or SF-36 subscales [Table 3].

Discussion

To our knowledge, this is the first study to investigate the

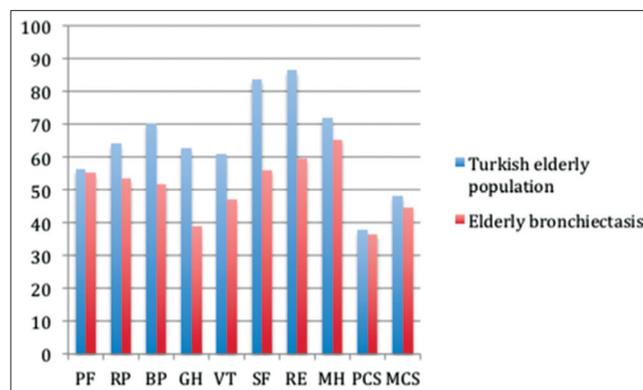


Figure 1: Mean SF-36 domain scores of Turkish elderly population compared to the elderly bronchiectasis patients group. PF: Physical functioning, RP: Role physical, BP: Bodily pain, GH: General health, VT: Vitality, SF: Social functioning, RE: Role emotional, MH: Mental health, PCS: Physical Component Summary, MCS: Mental Health Component Summary, SF: Short Form

Table 2: SF-36 scores of study group and Turkish elderly population that previously validated by Demiral et al.^[11]

| SF-36 parameters* | Elderly bronchiectasis | Turkish elderly population | P |
|-------------------|------------------------|----------------------------|--------|
| PF | 55.17±22.3 | 56.3±37.2 | 0.326 |
| RP | 53.46±39.1 | 64±46.4 | 0.031 |
| BP | 51.67±28.3 | 70.3±25.9 | <0.001 |
| GH | 39.09±23.3 | 62.8±20.7 | <0.001 |
| Vitality | 47.09±20.9 | 60.9±15.8 | <0.001 |
| SF | 56.13±25.3 | 83.7±24.4 | <0.001 |
| RE | 59.66±36.9 | 86.5±32.5 | <0.001 |
| MH | 65.38±16.6 | 72.0±14.8 | 0.001 |
| PCS | 36.6±11.2 | 37.7±16.3 | 0.211 |
| MCS | 44.8±8.9 | 48.3±12.3 | 0.001 |

*Data presented as mean±SD. PCS: Physical Component Summary, MCS: Mental Health Component Summary, PF: Physical functioning, RP: Role physical, BP: Bodily pain, GH: General health, SF: Social functioning, RE: Role emotional, MH: Mental health, SD: Standard deviation

HRQOL in elderly patients with BR. We evaluated the effects of clinical and radiological findings on HRQOL as evaluated by the SF-36 questionnaire in elderly BR patients. The elderly patients in our study population had moderate BR, and some clinical and radiological parameters (BSI, Reiff's score, FEV1% predicted, FVC% predicted, and number of admissions to the emergency room in the previous year) were correlated with HRQOL scores as revealed by the SF-36. SF-36 scores were lower in elderly patients with BR than in the general Turkish elderly population.^[11] The BSI, which reflects BR severity, was also correlated with all of the SF-36 subscales. FEV1% predicted value, FVC% predicted value, Reiff's score, and number of admissions to the emergency room in the previous year were correlated with some SF-36 subscales [Table 3].

Some studies have investigated HRQOL and chronic diseases in the elderly. In Rebollo's study, elderly patients with chronic renal failure treated with hemodialysis had lower HRQOL scores.^[12] In 2009, the HRQOL of 1958 individuals aged ≥60 years was evaluated by using SF-36. The lowest scores were detected in the VT, MH, and GH subscales, whereas higher scores were found for the SF, RE, and PF subscales.^[13] In our study group, elderly patients with BR had lesser SF-36 scores than the normal Turkish elderly population, and the lowest scores were detected for GH and VT.

In the present study, the BP, GH, SF, MH, and MCS SF-36 domains correlated with the radiological severity of BR as evaluated by Reiff's score. This result was unlike the findings of a study by Eshed et al., in which the total thoracic computed tomography score for BR patients did not correlate with QOL when using St. George Respiratory Questionnaire (SGRQ) scores.^[14] When the study group was divided into two according to total CT scores, patients with higher total CT scores (≥15) had

Table 3: Correlations between SF-36 domains and clinical parameters of elderly patients with bronchiectasis

| Variables | PF | RP | BP | GH | VT | SF | RE | MH | PCS | MCS |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Age (r, P) | -0.192, 0.102 | -0.046, 0.696 | 0.054, 0.647 | 0.052, 0.660 | -0.131, 0.265 | -0.004, 0.973 | -0.82, 0.485 | 0.026, 0.826 | -0.105, 0.371 | r-0.51, 0.667 |
| Reiff's score (r, P) | -0.166, 0.158 | -0.129, 0.275 | -0.322, 0.005 | -0.331, 0.004 | -0.214, 0.067 | -0.314, 0.006 | -0.108, 0.361 | -0.240, 0.040 | -0.174, 0.137 | -229, 0.05 |
| BSI (r, P) | -0.437, 0.001 | -0.405, 0.001 | -0.327, 0.004 | -0.417, 0.001 | -0.301, 0.009 | -0.461, 0.001 | -0.259, 0.026 | -0.237, 0.042 | -0.493, 0.001 | -0.323, 0.005 |
| FEV1% predicted*** (r, P) | 0.249, 0.033 | 0.296, 0.011 | 0.191, 0.106 | 0.235, 0.045 | 0.172, 0.146 | 0.265, 0.023 | 0.259, 0.027 | 0.276, 0.018 | 0.256, 0.029 | 0.206, 0.080 |
| FVC % predicted** (r, P) | 0.207, 0.079 | 0.269, 0.022 | 0.205, 0.081 | 0.196, 0.097 | 0.169, 0.152 | 0.212, 0.071 | 0.340, 0.003 | 0.255, 0.03 | 0.218, 0.064 | 0.243, 0.038 |
| FEV1/FVC (r, P) | -0.074, 0.532 | 0.093, 0.435 | 0.019, 0.871 | 0.052, 0.660 | -0.022, 0.851 | 0.034, 0.777 | -0.012, 0.919 | -0.031, 0.796 | 0.094, 0.429 | -0.050, 0.672 |
| Number of admission to ER in previous year (r, P) | -0.139, 0.336 | -0.325, 0.021 | -0.211, 0.142 | -0.369, 0.008 | -0.136, 0.345 | -0.277, 0.051 | -0.235, 0.101 | -0.151, 0.296 | -0.268, 0.060 | -0.124, 0.392 |

r<0.30 means weak correlation. BSI: Bronchiectasis Severity Index, FEV1: Forced expiratory volume in 1 s, FVC: Forced vital capacity, PF: Physical functioning, RP: Role physical, BP: Bodily Pain, GH: General health, VT: Vitality, SF: Social functioning, RE: Role emotional, MH: Mental health, PCS: Physical Component Score, MCS: Mental Component Score

lower QOL scores than those with lower CT scores.^[14] Due to the nature of the disease, BR patients with higher BSI scores, which signify more severe disease, feel much more limit in daily and social activities.

Limited studies have assessed QOL in relation to chronic respiratory diseases in elderly patients.^[15-17] A study from Portugal reported that the median scores of QOL were lower in elderly nursing home people who reported respiratory complaints or diseases.^[17] The authors found that the presence of wheezing in the past 12 months and asthma was associated with low QOL, especially for the physical domain. Chronic bronchitis and emphysema were also associated with low scores in the environmental domain.^[17] In our study, both physical and mental component scores were lower than in the normal Turkish elderly people.

Some studies reported that there were significant gender differences in QOL in elderly patients.^[18,19] In Guilemany's study, males had higher QOL scores for PF and SF than females among BR patients.^[20] In our study group, however, there was no difference between HRQOL scores and gender in elderly BR patients, except for the BP domain.

In Bulcun's study, the Seattle Obstructive Lung Disease Questionnaire (SOLQ) and the SF-36 were used to determine QOL in patients with BR.^[21] That study showed that BR patients had poorer HRQOL than a control group, and FEV1 was linked by all SOLQ component scores. The FEV1% predicted value also correlated with emotional functioning and coping skills.^[21] However, in another study, no correlation was found between QOL scores and FEV1, FVC, or FEV1/FVC ratio in BR patients.^[14] In the present study, FEV1% predicted values correlated with PF, RP, RE, GH, SF, MH, and PCS. FVC% predicted values also correlated with RP, RE, MH, and MCS.

BR patients with chronic bacteriological colonization, especially *P. aeruginosa* colonization in sputum, is associated with extensive lung disease, worse pulmonary function tests, and low HRQOL.^[22] Hence, we also investigated chronic colonization and SF-36 relationship. GH and VT scores were lower in chronic colonization group, but there was no correlation between *P. aeruginosa* colonization and SF-36 subscales.

Guan *et al.* evaluated the association with BR exacerbation on QOL and demonstrated a decrement in QOL scores during exacerbation.^[23] Xiang *et al.* investigated QOL in older patients with COPD using the SF-12 and the SGRQ. They showed that older patients with COPD had significantly lesser PCS scores and severe/more severe COPD independently related to higher SGRQ total

scores. Multivariate analysis further indicate that more hospitalizations in the past year significantly related to higher PCS scores.^[16] This finding is similar to our study results; in our study population, admission to the emergency room in the last year was correlated with the RP and GH domains of the SF-36.

Limitations

The present study has a few potential limitations. It was conducted in a single center and our sample size was relatively small. Future studies are needed to examine the QOL in elderly BR patients and the relationship between clinical/radiological findings and QOL in this patient group.

Conclusion

We found that elderly patients with BR had lower HRQOL scores using the SF-36 questionnaire. A strong correlation was registered between the BSI and all SF-36 domains. There were also statistically significant correlations between Reiff's score, FEV1% predicted value, FVC% predicted value, and number of admissions to the emergency room in the previous year and some of the SF-36 subscales. However, there was no correlation between age and PCS, MCS, or SF-36 subscales.

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Conflicts of interest

There are no conflicts of interest.

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