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Research Article / Araştırma Makalesi

# *Evaluation of Neck Pain in Patients with Chronic Obstructive Pulmonary Disease*

*Kronik Obstrüktif Akciğer Hastalığı olan Hastalarda Boyun Ağrısının Değerlendirilmesi*

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**Abstract:** In chronic obstructive pulmonary disease(COPD) patients use extensively supplementary respiratory muscles such as trapezium and scalenes muscles in order to facilitate ventilation. These situations cause pain restricting by the upper body mobility and neck movements. This study was conducted to investigate the presence of neck pain in individuals with COPD and to compare it with healthy individuals. The study included sixty-two patients with COPD(COPD group) and sixty-two healthy volunteer subjects(control group). Visual Analog Scale(VAS) to determine pain intensity were used. Severity of neck disability level and the effects of pain on daily life were evaluated by Neck Disability Index and Nordic Musculoskeletal System Questionnaire. Chest mobility was assessed by circumference measurement. VAS of the COPD group was higher than the control group ($p<0.05$). While mild disability was found due to neck pain in the COPD group, there was no impairment in the control group ($p<0.05$). In chest circumference measurements measured from axillary, epigastric and subcostal parts, the COPD group values were found to be statistically lower ($p<0.05$). Individuals with COPD have neck pain. When these patients rehabilitate, musculoskeletal problems, such as neck pain should be considered.

**Keywords:** Chronic obstructive pulmonary disease, Neck pain, Neck disability level.

**Öz:** Kronik obstrüktif akciğer (KOAH) hastaları ventilasyonu kolaylaştırmak için sıklıkla trapezin üst parçası ve skalen gibi yardımcı solunum kaslarını kullanmaktadır. Bu durum üst gövdenin mobilitesini ve boyun hareketlerini kısıtlayarak ağrıya sebep olur. Bu çalışma, KOAH'lı hastalarda boyun ağrısını değerlendirmek ve sağlıklı bireylerle karşılaştırmak amacıyla yapılmıştır. Çalışmaya altmış iki KOAH hastası (KOAH grubu) ve altmış iki sağlıklı gönüllü birey (kontrol grubu) dahil edildi. Ağrı şiddetini belirlemek için Görsel Analog Skala kullanıldı. Boyun özür derecesi ve ağrının günlük yaşama etkileri Boyun Özür Göstergesi ve Nordic Kas-iskelet Sistemi Anketi ile değerlendirildi. Göğüs mobilitesi değerlendirmek için göğüs çevre ölçümü yapıldı. KOAH grubunun ağrı şiddeti kontrol grubuna göre daha yüksekti. KOAH grubunda boyun ağrısına bağlı hafif özürlülük saptanırken, kontrol grubunda yetersizlik yoktu ($p<0,05$). Aksillar, epigastrik ve subkostal bölgelerden ölçülen göğüs çevresi ölçümlerinde KOAH grubu değerleri istatistiksel olarak daha düşük bulundu ($p<0,05$). KOAH'lı bireylerde boyun ağrısı görülmektedir. Bu hastalar rehabilitasyon programına alındığında boyun ağrısı gibi kas-iskelet sistemi sorunları göz önünde bulundurulmalı ve buna yönelik tedaviler rehabilitasyon programına eklenmelidir.

**Anahtar Kelimeler:** Kronik obstrüktif akciğer hastalığı, boyun ağrısı, boyun özür düzeyi.

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## Introduction

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable disease characterized by progressive respiratory symptoms and airflow limitation. In recent years, it has been known that COPD is associated with systemic effects and comorbidities leading to anomalies in the lung besides other organs. Weight loss, nutritional disorders, musculoskeletal dysfunction, exercise intolerance, cardiovascular diseases, lung cancer, depression and anxiety, osteoporosis, diabetes, obstructive sleep apnea syndrome, and



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anemia are the most common systemic effects of COPD (Maltais et al., 2014). Patients with respiratory diseases like chronic obstructive pulmonary disease (COPD) and asthma have been found to have postural disorders due to hyperinflation and overuse of accessory muscles of respiration, such as increased forward tilt of the head, protraction, and retraction of the scapula, increased cervical lordosis, chest wall enlargement, decreased mobility of the thoracic spine, and increased lumbar lordosis (Lee et al., 2018; Lunardi et al., 2011). In the presence of the kypholordotic posture in which the head tilts forward and the swayback posture in which the hip is pushed forward of the trunk, weakness is observed in the external oblique muscle, one of the expiratory muscles (Kendall 2005).

Recent studies have shown an apparent correlation between impaired cervical motor control and respiratory dysfunction (Kapreli et al., 2005; Wirth et al., 2014). During breathing, stabilization of the cervical and thoracic spine is needed for muscle activation to allow the upward and downward movements of ribs. In COPD patients, the increased activity of accessory muscles of respiration such as sternocleidomastoid (SCM) and scalene causes fatigue in involved muscles. Spasms and pain occur in the cervical region due to hyperinflation and excessive use of accessory muscles for respiration and postural changes (Lunardi et al., 2011; Kapreli et al., 2009). However, individuals with chronic neck pain have also been found to have impaired pulmonary functions (Dimitriadis et al., 2013) and reduced strength of respiratory muscles (Kapreli et al., 2009; Dimitriadis et al., 2014). The anatomic proximity of cervical and thoracic regions and the increased activity of the accessory muscles of respiration changes the kinetic control of the thoracic and costal joints in individuals with neck pain, increasing the respiratory workload. Therefore, it impairs respiratory parameters indicating respiratory functions and respiratory muscle strength (Kapreli et al., 2009).

Studies have shown that the quality of life of COPD patients is adversely affected by the disease (Wirth et al., 2014, Tsiligianni et al., 2011). Although it is mainly associated with shortness of breath (Habraken et al., 2011), some studies associate the reduction in the quality of life in COPD patients with pain (Borge et al., 2011, Bentsen et al., 2011, Lee et al., 2015). It was reported that 70% of patients with COPD presented with complaints of pain (Borge et al., 2011). A study investigating symptom distress and quality of life in advanced COPD reported that 37% of patients had chest pain and 41% had pain in other parts of the body (Blindermann et al., 2009). Patients with severe COPD had moderate to severe pain complaints, most commonly in the chest, neck, arms, back, or hips (Lohne et al., 2010). Due to the excessive use of accessory muscles in COPD, there is a high risk of developing neck pain as a result of the stress on the musculoskeletal structures around the neck (Heneghan et al., 2015).

There are no studies in the literature examining neck pain and its consequences on activities of daily living in COPD patients. Therefore, we conducted our study to investigate the presence of neck pain in patients with COPD and to compare it with healthy individuals.

## Materials and Methods

This study included 124 volunteers, consisting of 62 healthy individuals and 62 patients diagnosed with COPD, who were followed up in the Pamukkale University Chest Diseases Outpatient Clinic.

### Participants

The study included 62 COPD patients, who were 18 years old or older, who were treated with the diagnosis of COPD in Pamukkale University Hospital Chest Diseases Outpatient Clinic, who met the inclusion criteria, and who voluntarily agreed to participate in the study. The study also included 62 healthy individuals from the same age group, who had no known comorbidities.



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**Inclusion Criteria**

For COPD patients: Individuals, who had no respiratory diseases other than COPD, who were literate, who had no history of a whiplash injury, who had no malignancies, who did not have diabetes mellitus, and individuals, who had no cardiac, neuromuscular, neurological, mental, or metabolic disorders of significant severity, were included in the study.

For the control group: Individuals, who had no known comorbidities, who were literate, who had no history of a whiplash injury, who had no malignancies, and those who did not have diabetes mellitus were included in the study.

**Exclusion Criteria**

For COPD patients: Individuals, who did not meet the inclusion criteria, and those who suffered from acute or chronic neuromusculoskeletal pain in any part of the body were excluded.

For the control group: Individuals, who did not meet the inclusion criteria, who had any acute or chronic neuromusculoskeletal pain in any part of the body, and those who had cardiac, pulmonary, neuromuscular, neurological, mental, or metabolic disorders were excluded from the study.

**Study design**

Socio-demographics of participants, who met the inclusion criteria, were collected through interviews, recorded, and then, their chest circumferences were measured. Neck pain severity was assessed using the Visual Analog Scale. It was questioned whether there was painkiller use related to neck pain in the last week. Musculoskeletal problems related to the neck and upper extremities were collected using the Nordic Musculoskeletal Questionnaire. The Neck Disability Index was used to determine the impact of neck pain on activities of daily living. Pulmonary functions of only COPD patients were tested. The GOLD classification was used for COPD diagnosis and staging (Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2006).

**Evaluation methods**

Chest circumference measurement: To determine the chest mobility and respiration type, chest circumferences were measured using a tape measure in the upright sitting position over the axillary (4th coastal level), epigastric (xiphoid process level), and subcostal (9th coastal level) regions. Chest circumference was measured during deep inspiration and deep expiration, and the difference was recorded in centimeters (Viitanen et al., 1992; Reddy et al., 2019).

Visual Analog Scale (VAS): Pain severity was assessed using VAS. "0" denoted no pain, and "10" denoted the most severe pain level perceived. Patients marked the pain severity on a 10 cm horizontal line, and then the measurements were recorded. Patients were inquired to find out whether they suffered from neck pain currently (Heneghan et al., 2015).

Nordic Musculoskeletal Questionnaire (NMQ): Using NMQ, tested for validity and reliability in Turkish by Kahraman et al., the patients were questioned for the presence of symptoms (pain, discomfort, numbness) in the last 12 months in nine different anatomic regions (neck, shoulder, elbow, wrist/hand, upper body, lower body, hip/thigh, knee, ankle/foot) (Kuorinka et al., 1987; Kahraman et al., 2015). In our study, we focused only on regions related to the neck and upper extremities.

Neck Disability Index (NDI): NDI was used in the study to determine the impact of neck pain on activities of daily living. This index consists of 10 questions on the severity of pain, personal care, load lifting, reading, headaches, the ability to concentrate, work life, the ability to drive, sleep characteristics, and leisure activities. Each question is given a value in the range of 0-5 points. When there are unanswered questions, they are removed from the calculation of the total score. The neck disability rate is calculated by dividing



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the participant's score by the highest possible score and multiplying it by 100. A high score and a high rate indicate a high degree of disability related to the neck. A disability rate of 0-20 percent means no disability, 21-40 means mild, 41-60 Moderate, 61-80 severe, and 81-100 complete disability (Kesiktas et al., 2012; Aslan et al., 2008).

Pulmonary Function Test (PFT): PFT was performed with the COSMED Pony Fx portable oral pressure measuring device. Pulmonary function parameters were measured while patients were sitting in a comfortable position with the nose clip attached. The test was repeated three times. Forced Expiratory Volume in the first second (FEV1), Forced Vital Capacity (FVC), FEV1/FVC ratio, Peak Expiratory Flow (PEF), and Maximal Mid-Expiratory Flow Rate (FEF25-75) values were recorded (Neder et al., 1999; Neder et al., 2020). Pulmonary function tests were performed to determine the stages of COPD.

**Statistical Analysis**

The effect size obtained in the reference study was large (d=1.01) (Heneghan et al., 2015). Based on the results of the reference study, we performed a power analysis assuming that we could obtain a lower effect size (d=0.8). We calculated that the inclusion of at least 84 subjects (at least 42 subjects for each group) would provide 95% power at a 95% confidence level. The data were analyzed using the SPSS package software. Continuous variables were presented as mean ± standard deviation. Categorical variables were presented as numbers and percentages. When the parametric test assumptions were met, the Test of Significance of Difference between Two Means was used to compare independent group differences. In addition, the relations between continuous variables were analyzed with Spearman's correlation analysis, and the differences between categorical variables were analyzed with the Chi-square analysis.

**Ethical consideration**

Before starting the study, all participants were informed about the aim and scope of the study, and written consent was obtained from each participant. This study was approved by decision no.23 dated 08.12.2020 of the Pamukkale University Medical Ethics Committee of Non-Interventional Clinical Research.

**Table 1.** Demographic and clinical characteristics of groups.

| Variables | COPD group Mean±SD | Control group Mean±SD | p-value |
|---|---|---|---|
| **Age (years)** | 66.77±11.66 | 64.83±12.06 | 0.366[a] |
| **BMI (kg/m²)** | 26.31±5.16 | 27.71±4.96 | 0.125[a] |
| | **n (%)** | **n (%)** | |
| **Gender** | | | |
| Female | 11 (17.7) | 19 (30.6) | 0.141[b] |
| Male | 51 (82.3) | 43 (69.4) | |
| **COPD stage** | | | |
| Stage 1 | 8 (12.9) | | |
| Stage 2 | 27 (43.5) | | |
| Stage 3 | 18 (29.0) | | |
| Stage 4 | 9 (14.5) | | |

BMI: Body mass index, COPD: Chronic obstructive pulmonary disease, SD: Standard deviation, [a]: Test of Significance of Difference Between Two Means, [b]: Chi-square analysis



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## Results

The study included a total of 124 subjects consisting of 62 patients followed up with a diagnosis of COPD (COPD group; 11 females, 51 males) and 62 healthy subjects (control group; 19 females, 43 males). All participants met the inclusion criteria.

### Descriptive findings

The mean age of the COPD group was 66.77±11.66 years and the mean age of the control group was 64.83±12.06 years. The mean body mass index was 26.31±5.16 kg/m2 in the COPD group and 27.71±4.96 kg/m2 in the control group. The demographic and clinical characteristics of participants are detailed in Table 1. The descriptive characteristics of participants were similar between the groups (p>0.05). According to GOLD classification, patients with FEV1 values of >80% and FEV1/FVC values of <0.7 were classified as Gold 1 (Mild); 50%< to <80% as Gold 2 (moderate); 30%< to <50% as Gold 3 (severe); and <30% as Gold 4 (Very Severe).

### Comparison of neck pain and disability conditions

As for the neck pain severity of the groups, the mean VAS was 2.13 ±2.53 in the COPD group and 1.21 ±2.35 in the control group (p=0.038). The duration of pain was 21.43 ± 75.53 weeks in the COPD group and 31.30 ± 108.90 weeks in the control group (p=0.600). The COPD group scores were higher in terms of disability level. The NDI score was 11.91±9.78 in the COPD group and 7.12±8.74 in the control group. As for the disability rate, the mean percentage of neck disability was 25.28±20.36 in the COPD group and 13.68±14.59 in the control group. Mild disability due to neck pain was found in the COPD group, while the control group had no disability (p=0.001).

Based on the neck and shoulder pain assessment with NMQ, 34 patients (54.8%) had neck pain and 31 patients (50.0%) had shoulder pain in the COPD group.

When the use of painkillers for neck pain in the last week was compared, 45 (%72.5) patients in the COPD group and 14 (%22.5) patients in the control group reported that they used drugs. In the control group, 18 (29.0%) participants had neck pain and 25 (40.3%) had shoulder pain. There was no difference between the groups in terms of NMQ shoulder pain subscale scores (p=0.280), while the prevalence of neck pain was higher in the COPD group than in the control group (p=0.006). The comparison of pain and disability conditions of the groups is given in Table 2.

### Comparison of chest mobility

As for the chest circumference measurements of the groups, axillary region mobility was 3.41±2.37 cm in the COPD group and 5.18±2.18 cm in the control group. Epigastric region mobility was 3.14±1.96 cm in the COPD group, and 5.35±2.42 cm in the control group. Subcostal region mobility was 3.47±1.96 cm in the COPD group and 6.00±3.34 cm in the control group. Measurement of chest circumference over the axillary, epigastric, and subcostal regions showed that the values of the COPD group were statistically lower (p=0.001) (Table 3).

### Assessment of respiratory parameters

Mean respiratory parameters of the COPD group were recorded as follows: FEV1(%) 54.76±19.56; FVC(%) 69.49±21.57; FEV1/FVC ratio 60.11±10.94; PEF(%) 53.38±19.58; and FEF25-75(%) 31.89±18.01 (Table 3).

### The relationship of neck pain with chest mobility and respiratory parameters in patients with COPD

The relationship between neck pain severity and disability level with chest mobility and respiratory parameters in patients with COPD was not statistically significant (p>0.05) (Table 4).

## Discussion

Aiming to investigate the presence of neck pain in COPD patients and to compare them with healthy individuals, this study found that neck pain was common in patients with COPD and that the


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severity of pain and disability due to neck pain were higher than the control group. It has been reported in the literature that upper body mobility and neck movements become restricted due to the frequent use of accessory muscles of respiration for facilitation of ventilation, resulting in pain in respiratory system diseases (Lunardi et al., 2011; Kapreli et al., 2009; Vardar-Yagli et al., 2019).

**Table 2.** Comparison of the neck pain and disability conditions of groups

| Variables | COPD group Mean±SD | Control group Mean±SD | p-value |
|---|---|---|---|
| **VAS (score)** | 2.13±2.53 | 1.21±2.35 | **0.038**[a] |
| **Pain duration (weeks)** | 21.43±75.53 | 31.30±108.90 | 0.600[a] |
| **NDI (score)** | 11.91±9.78 | 7.12±8.74 | **0.005**[a] |
| **NDI (disability rate)** | 25.28±20.36 | 13.68±14.59 | **0.001**[a] |
| | **n (%)** | **n (%)** | |
| **Use painkiller** | 45(72.5) | 14 (22.5) | **0.000** [b] |
| **NDI category** | | | |
| No disability | 17 (27.4) | 34 (54.8) | |
| Mild disability | 22 (35.5) | 17 (27.4) | |
| Moderate disability | 16 (25.8) | 8 (12.9) | **0.020**[b] |
| Severe disability | 5 (8.1) | 1 (1.6) | |
| Complete disability | 2 (3.2) | 2 (3.2) | |
| **NMQ - Neck Subscale** | | | |
| **Presence of pain** | 34 (54.8) | 18 (29.0) | **0.006**[b] |
| **Number of days with pain** | | | |
| 1-30 days | 18 (52.9) | 16 (88.8) | **0.026**[b] |
| More than 30 days | 16 (47.1) | 2 (11.2) | |
| **Limitation of activity** | | | |
| Limitation of work | 8 (12.9) | 8 (12.9) | 0.200[b] |
| Limitation of leisure activities | 15 (24.2) | 10 (16.1) | 0.769[b] |
| **Number of days with limitation of the work life** | 27 (43.5) | 17 (27.4) | 0.282[b] |
| 1-30 days | 4 (6.5) | 1 (1.6) | |
| More than 30 days | | | |
| **NMQ - Shoulder Subscale** | | | |
| **Presence of pain** | 31 (50.0) | 25 (40.3) | 0.280[b] |
| **Number of days with pain** | | | |
| 1-30 days | 21 (67.7) | 18 (98.4) | **0.012**[b] |
| More than 30 days | 10 (32.3) | 1 (1.6) | |
| **Limitation of activity** | | | |
| Limitation of work | 5 (8.1) | 8 (12.9) | 0.177[b] |
| Limitation of leisure activities | 2 (3.2) | 12 (19.4) | **0.001**[b] |
| **Number of days with limitation of the work life** | 24 (38.7) | 17 (27.4) | 0.595[b] |
| 1-30 days | | | |

VAS: Visual analog scale, NDI: Neck Disability Index, NMQ: Nordic Musculoskeletal Questionnaire, COPD: Chronic obstructive pulmonary disease, SD: Standard deviation, [a]: Test of Significance of Difference Between Two Means, [b]: Chi-square analysis



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**Table 3.** Comparison of chest mobility and respiratory parameters of the groups

| Variables | COPD group Mean±SD | Control group Mean±SD | p-value[a] |
|---|---|---|---|
| **Chest circumference measurement** | | | |
| Axillary region | 3.41±2.37 | 5.18±2.18 | **0.001** |
| Epigastric region | 3.14±1.96 | 5.35±2.42 | **0.001** |
| Subcostal region | 3.47±1.96 | 6.00±3.34 | **0.001** |
| **Respiratory parameters** | | | |
| FEV1 (%) | 54.76±19.56 | | |
| FVC (%) | 69.49±21.57 | | |
| FEV1/FVC | 61.97±12.99 | | |
| PEF (%) | 53.38±19.58 | | |
| FEF25-75 (%) | 31.89±18.01 | | |

COPD: Chronic obstructive pulmonary disease, SD: Standard deviation, [a]: Test of Significance of Difference Between Two Means

In our study, the pain severity of the COPD group was higher than that of the control group. A study questioned elderly COPD patients about their pain complaints and their severity and found that they had more pain complaints compared to the healthy group. The study reported that patients frequently used pain relief methods such as acupuncture, TENS, and medication for the relief of pain complaints. However, although the presence of pain was high in patients with COPD, there was not a significant difference between the groups in that study. This was because the subjects with certain comorbidities including rheumatological diseases, asthma, or fibromyalgia were not excluded from the control group of the study. Unlike this study, we did not include individuals with comorbidities. In addition, in the present study, patients mostly complained of the chest, shoulder, neck, and back pain (Bentsen et al., 2011). In our study, we specifically questioned the presence of neck pain and found that the severity of pain in the COPD group was higher compared to the control group. However, the pain level of COPD patients was below 5. We think that the reason for this is related to the high use of painkillers. In addition, the duration of pain may be shortened due to the intake of painkillers. Mild to moderate COPD patients may also have been affected by this situation. We think that the level of pain will be higher in patients with severe levels.

The more common occurrence of pain in people with COPD may be a result of shortness of breath and coughing, which increase the use of accessory muscles and cause fatigue in the chest and back. A study reported that 72% of moderate-to-severe COPD patients had pain symptoms (Borge et al., 2011). In our study, we found a 54.8% frequency of neck pain. This rate is quite high despite COPD of mild to moderate severity in our patients. We think that the frequency was high because of the high average age of our COPD patients. Another study, similar to ours, reported that the rate of pain was 34% in men and 55% in women with COPD. It has been reported that pain complaints increased in advanced age, especially above 70 years of age (Fuentes-Alonso et al., 2017).

There are articles in the literature reporting that respiratory muscle weakness is associated with chronic neck pain (Lunardi et al., 2011; Dimitriadis et al., 2014; Heneghan et al., 2015; Gupta. et al., 2019) In a study, chronic pain was reported to be more common in patients with COPD compared to healthy individuals of the same age and gender (Lee et al., 2018). In addition, a strong relationship



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was found between increased neck flexion and head protraction and decreased respiratory muscle strength (Kapreli et al., 2009). In our study, we did not find a relationship between pain and chest mobility. However, we think that postural disorders of patients should be evaluated in terms of disease duration and severity since the effects on posture develop slowly.

HajGhanbari et al. (2012) in their study, which included 47 patients with COPD and 47 healthy subjects, found that patients with COPD had approximately 2.5 times more pain complaints compared to the control group and that their activities of daily living were affected 3.7 times more compared to healthy subjects because of pain. Borge et al. (2011) reported that the complaint of pain in patients with COPD negatively affected daily life and reduced the quality of life . In our study, mild disability due to neck pain was found in the COPD group in terms of the disability conditions that we assessed using NDI but there were no disabilities in the control group.

**Table 4.** The relationship of neck pain with chest mobility and respiratory parameters in patients with COPD

| **Variables** | **p-value** | **r-value** |
|---|---|---|
| VAS- Axillary CCM | 0.677 | -0.054 |
| VAS- Epigastric CCM | 0.192 | -0.168 |
| VAS- Subcostal CCM | 0.901 | -0.016 |
| NDI disability rate- Axillary CCM | 0.847 | -0.025 |
| NDI disability rate- Epigastric CCM | 0.343 | -0.122 |
| NDI disability rate- Subcostal CCM | 0.205 | -0.163 |
| VAS- FEV1 (%) | 0.337 | -0.124 |
| VAS- FVC (%) | 0.525 | 0.082 |
| VAS- FEV1/FVC | 0.371 | -0.116 |
| VAS- PEF (%) | 0.130 | -0.195 |
| VAS- FEF25-75 (%) | 0.814 | -0.030 |
| NDI disability rate- FEV1 (%) | 0.345 | 0.122 |
| NDI disability rate- FVC (%) | 0.224 | 0.157 |
| NDI disability rate- FEV1/FVC | 0.707 | 0.049 |
| NDI disability rate- PEF (%) | 0.506 | 0.086 |
| NDI disability rate- FEF25-75 (%) | 0.938 | 0.010 |

VAS: Visual analog scale, CCM: Chest circumference measurement, NDI: Neck Disability Index, *Pearson correlation analysis

When we evaluated the presence of shoulder pain as a sub-parameter of the Nordic Musculoskeletal Questionnaire, we found that COPD patients had a higher rate of pain. Although the prevalence of pain was not significant, there was a significant difference in pain duration and activity limitation. This suggests that COPD patients may experience shoulder pain along with neck pain and it may be related to overuse of upper body muscles. We think that the insignificant difference is related to



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the mild-to-moderate disease severity of our COPD patients and that the complaints should increase with advancing age.

Bentsen et al. (2011) reported more comorbidities in COPD patients suffering from pain compared to those without pain. We did not assess the comorbidities of patients and this is one of the limitations of our study. Systemic consequences and comorbidities may occur also in the early stages of the disease and may adversely affect the severity and prognosis of COPD. For this reason, we think that it would be prudent to evaluate systemic effects in future studies. In addition, the male predominance in our study may affect the generalization of our study results to larger groups.

The presence of pain in COPD negatively affects daily life. We think that research on this subject should be increased. We think that should evaluate pain complaints in COPD should focus more on neck pain and the following should be evaluated including the acute or chronic nature of pain, the type of pain, the time of occurrence of pain during the day, aggravations by movements, and pain complaints by the stage of COPD. Evaluating the effect of neck pain on daily life and having a control group are our strengths.

## Conclusion

We think that pain should be included in assessment parameters in COPD patients. It would be beneficial to add pain-relieving practices and exercises to rehabilitation programs to relax the accessory muscles of respiration.

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