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ORIGINAL INVESTIGATION

# Respiratory Disability in The Van Region Based on the Medical Board Reports

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Abstract

**OBJECTIVES:** Respiratory system disorders have an impact on daily living activities of subjects, resulting in disability. Data should be gathered on disability for health services. The present study aimed to review the records of patients with a respiratory disability report from our medical board, and contribute to the national and regional statistics on disability.

**MATERIAL AND METHODS:** We retrospectively reviewed sociodemographic characteristics, respiratory diseases and disability rates of the patients who were examined by the Chest Diseases Department during the Medical Board evaluations in our hospital between January 1st and July 1st, 2014.

**RESULTS:** Among 4285 patients whose applications were submitted to the medical board for evaluation, 401 (9.3%) had a respiratory disease. Of these patients, 163 were male, and 238 were female, with a mean age of 64.2 years. The most common diseases associated with disability were chronic obstructive pulmonary disease, asthma and sequelae tuberculosis.The disability rating for respiratory system was 80% in 24.9% of patients, 40% in 34.7% of patients, and 20% in 40.4% of patients. Patients with a respiratory disability report were also considered disabled by the departments of Physical Therapy and Rehabilitation, Cardiology and Eye diseases. There was a positive correlation between disability rating and age, and a negative correlation between forced expiratory volume in first second ($FEV_1$) and oxigen saturation measured by pulse oximeter ($SpO_2$) values ($p= 0.002$; $p< 0.001$; $p< 0.001$, respectively). Furthermore, smokers had a higher disability rating compared to non-smokers ($p= 0.02$).

**CONCLUSION:** In Turkey, we have limited number of studies about respiratory disability. We believe that the present study will help determination of the etiology of respiratory disability and contribute to any action on prevention of these disorders in our region.

**KEYWORDS:** Lung diseases, disability evaluation, spirometry.

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## INTRODUCTION

Disability is referred to as having difficulty in meeting daily requirements and adapting to the social life, and requiring protection, care or rehabilitation, counseling and support services due to impairment of physical, cognitive, psychological, sensory and social functions at various extents. It may be congenital or acquired [1,2]. It may be temporary or permanent [3].

A disabled person requires a Medical Board report indicating disability rating in order to benefit from protection, care or rehabilitation, counseling and support services within the framework of definition of disability [1] .

However, assessment of disability status presents as an issue with various medical, legal and social aspects. Data on this subject have been added to the agenda with occupational diseases at the beginning of the 20th century worldwide [4]. In Turkey, procedures for assessment of people with disability started in 1946 with evaluations on pneumoconiosis, and the law enacted in 1964 indicated that people would be able to benefit from some rights such as financial aid, disability indemnity and/or early retirement due to work accident and occupational disease, disability, senility andindigence [4]. "The Regulation on the Criteria and Classification of Disability and the Medical Board Reports to Be Issued for Disabled People" published in the official gazette with number 28.173 dated 14.01.2012 represents the most recent legal arrangement made regarding the subject [1] .

The Turkish Thoracic Society has designed a guideline to help chest disease specialists make a decision on any potential problems in determining respiratory disability based on medical data [4]. A protocol for assesment of respiratory disability according to these guidelines has been provided in (Table 1).

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**Table 1.** According to the degree of disability affected the overall respiratory disability

| | **Category 1** No loss of function **Disability rate 0%** | **Category 2** Mild functional loss **Disability rate 10-15%** | **Category 3** Moderate functional loss **Disability rate 30-45%** | **Category 4** Severe functional loss **Disability rate 50-100%** |
|---|---|---|---|---|
| FVC (%) | ≥ 80%** | 60-79% | 51-59% | < 50% |
| $FEV_1$ (%) | ≥ 80%** | 60-79% | 41-51% | < 40% |
| $FEV_1$/FVC | ≥ 75% | 60-74% | 41-59% | < 40% |
| DLCO (%) | ≥ 80%** | 60-79% | 41-59% | < 40% |
| or | or | or | or | or |
| $VO_2$ max (mL/kg/min) | ≥ 25 (mL/kg/min) | 20-25 (mL/kg/min) | 15-20 (mL/kg/min) | > 15 (mL/kg/min) |
| Expected (%) | > 70% | 60-69% | 40-59% | < 40% |
| (METS*) | > 7.1 | 5.7-7.1 | 4.3-5.7 | < 4.3 |

* Metabolic equivalents.
** or ≥ the absolute value as the lower limit of normal.

The World Health Organization (WHO) indicates that the disabled people represent 10% of the population in developed countries, and 12% of the population in developing countries [3.5].

In 2002 a detailed survey by the Turkish Statistical Institute showed that the ratio of disabled people in Turkish population was 12.29%. Studies conducted in several cities of Turkey have shown a ratio ranging from 4.9% to 12.7% [5-8] . These studies examined general characteristics of disabled people. However, the number of studies examining patients with a disability report from the chest diseases department is very small [9].

The objective of the present study was to determine the extent of respiratory disability in patients who presented to medical board for assessment of disability, identify the incidence with concomittant diseases, contributing to the national health statistics and preventive medicine in order to avoid any disease associated with disability. Furthermore, we believe that the results of the present study will provide statistical information of the patients with a respiratory disability, guiding the planning of healthcare professionals in the field of respiratory system diseases.

## MATERIAL AND METHODS

The present study retrospectively reviewed the reports of patients who presented for assessment of their disability by the Medical Board of the hospital between January 2014 and July 2014. A permission was obtained from the Ethics Committee for the paper. It included 401 patients with a respiratory disability report. We recorded the information on age, gender, residential address, occupational anamnesis, smoking, biomass exposure, respiratory symptoms, physical examination and radiological results of respiratory system, results of the respiratory function test, oxygen saturation results as measured by pulse oximeter and disability rating of patients as determined by the Chest Disease Department and other departments.

The Respiratory Function Test was performed by the same technician at least three times in seated position during a stable period of the patient by a spirometry after teaching forced vital capacity (FVC) maneuover. The reports included data on FVC, forced expiratory volume in 1 second ($FEV_1$), and the ratio of forced expiratory volume in 1 second to forced vital capacity ($FEV_1$/FVC).

Oxygen saturation measured by pulse oximeter (PlusMed Pulse Oximeter Plus-50 DL, Made in P.R.C.), while patients rested and in a sitting position, on index finger.

The disability rating was determined according to the criteria clarified by the "Regulation on the Criteria and Classification of Disability and the Medical Board Reports to Be Issued for Disabled People" which was published in 1998 and updated in 2012 [1] .

The disability rating was recorded in the report as 20% if there was less impairment of respiratory and circulatory function, 40% if there was a moderate impairment of respiratory and circulatory function, and 80% if there was a severe impairment of respiratory and circulatory function or development of chronic cor pulmonale, and chronic type 2 respiratory failure.

### Statistical Analysis

Descriptive statistics for the continuous variables were presented as Mean, Standard deviation, minimum and maximum values while count and percentages for categorical variables. One way ANOVA was used to compare group means. Duncan multiple comparison test was also used to identify different group means fallow ANOVA. For determination linear relationship among variables, Pearson correlation analysis was carried out. In addition, chi-square test was performed to determine the relationship between categorical variables. Statistical significance level was considered as 5% and SPSS ( Statistical Package for Social Science, Chicago, IL, ABD) 19.0 statistical program was used for allstatistical computations.

## RESULTS

A total of 4285 individuals presented to the Medical Board of our hospital during a 6-month period between January 2014 and July 2014, and 401 (9.3%)was identified as disabled at various degrees by the Chest Diseases Department. Of these patients, 49.6% were from the city center, 37.4% from the districts of Van, and neighboring cities including 3.5% from

Ağrı, 3% from Siirt, 2.5% from Hakkari, 2.5% from Bitlis, and 1.5% from Muş.

Of these patients with a disability report from the Chest Diseases Department, the mean age was 64.2 years. 59.4% were female, and 40.6% were male. The median age was 22, 43, 61, 80 for age groups 10-30, 31,50, 51,70, 71 and above sequentially.

The occupation of 40 (9.9%) patients was recorded as follows: housewife (30%), farmer (25%), industrial worker (17.5%), construction worker (15%), public servant (10%) and hairdresser (2.5%), respectively. Among those patients, 27.4% were smokers, and 29.7% had biomass exposure.

Lung auscultation showed rhonchi in 23.7%, cracles 16.7%, decreased respiratory sounds in 29.7% and prolongation of expirium in 12% of patients.

It was found that 325 (81.2%) patients performed the respiratory function test in accordance with the evaluation criteria.

The chest radiography of 127 (68.3%) patients was considered pathological, with an incidence of 17.7% for reticular/nodular opacities, 17.5% for hyperaeration, 17% for increased cardiothoracic index and 14.7% for fibrotic changes, respectively.

Among all patients, 67.1% was diagnosed with Chronic Obstructive Pulmonary Disease (COPD), 13.2% with ashtma, 6.2% with sequelae tuberculosis, 5% with chest wall deformity, 2.5% with interstitial lung disease/pneumoconious, 2.5% with lung cancer, 2.5% with sleep apnea syndrome, and 1% with bronchiectasis (Table 2). The highest mean age was in the COPD group with 69.5 years while the lowest mean age was in the chest wall deformity group with 32.8 years.

Furthermore, it was found out that 89.1% of patients also presented to other departments for assessment of disability other than the Chest Diseases Department, including 59.8% to the Physical Medicine and Rehabilitation, 58.3% to the Cardiology, 45.8% to the Eye Diseases, 27.9% to the Internal Diseases, 25.4% to the Otorhinolaryngology, 13.4% to the Neurology and 3.4% to the Oncology Departments (Table 3).

The disability rating due to respiratory system was 80% in 24.9% of patients, 40% in 34.7% of patients, and 20% in 40.4% of patients.

The results of our study showed that $FEV_1$ value was 40.2% in those with a 80% disability rating, 52.2% for those with a 40% disability rating, and 72.3% for those with a 20% disability rating.

The oxygen saturation was evaluated by pulse oximeter. The $SpO_2$ percentage was 86.9% in patients with a 80% disability rating, 94.2% in patients with a 40% disability rating, and 95.8% in patients with a 20% disability rating. There was a positive correlation between disability rating and age, and a negative correlation between $FEV_1$ and $SpO_2$ values (p: 0.002; p< 0.001; p< 0.001, respectively) (Table 4). Furthermore, the disability rating was higher in smokers than in non-smokers (p= 0.02).

## DISCUSSION

A review of literature on disability in Turkey showed that disabled people were mainly studied for their general

**Table 2.** Frequency of respiratory disorders in disability

| Diagnosis | Number | Percent |
|---|---|---|
| Chronic obstructive pulmonary disease | 269 | 67.1 |
| Asthma | 53 | 13.2 |
| Sequelae tuberculosis | 25 | 6.2 |
| Chest wall deformity | 20 | 5 |
| Interstitial lung disease/pneumoconious | 10 | 2.5 |
| Lung cancer | 10 | 2.5 |
| Sleep apnea syndrome | 10 | 2.5 |
| Bronchiectasis | 4 | 1 |

**Table 3.** Applications to the other departments

| Departments | Number | Percent |
|---|---|---|
| Physical medicine and rehabilitation | 240 | 59.8 |
| Cardiology | 239 | 59.6 |
| Eye diseases | 184 | 45.9 |
| Internal diseases | 119 | 29.7 |
| Otorhinolaryngology | 111 | 27.7 |
| Neurology | 59 | 14.7 |
| Oncology departments | 16 | 4.0 |

**Table 4.** Respiratory disability rate

| Disability rate (%) | Number (n) | Percent (%) | $FEV_1$ (%) | $SpO_2$ (%) |
|---|---|---|---|---|
| 20% | 162 | 40.4 | 72.3 | 95.8 |
| 40% | 139 | 34.7 | 52.2 | 94.2 |
| 80% | 100 | 24.9 | 40.2 | 86.9 |

It was performed by ANOVA test. Sig 0.00.

characteristics, but there was only a small number of studies on the basis of disease and branches. Our study showed that 4285 patients presented to the Medical Board of our hospital between January 2014 and July 2014 for assessment of their disability, with 9.3% having a respiratory disability. A study conducted in Sivas for evaluating the respiratory disability rating showed that 1.3% of presenting patients had respiratory disability [9]. The disability rating evaluated by the Chest Diseases Department in our study was higher than the one in the study by Berk et al. [9] Among our patients, 49.6% were from the city center, 37.4% from the districts of Van, and others from neighboring cities, from Ağrı, Siirt, Hakkari, Bitlis, and Muş, respectively. Van is one of the largest cities of Turkey. It has a population of 1.0855.42 people according to the Turkish Statistical Institute results of 2014. The study hospital is the referral center for the whole region for health problems. Our hospital provides health services not only for the city center of Van, but also for both districts of Van and neighboring cities.

The mean age of patients with a disability report from the Chest Diseases Department was 64.2 years. Of these patients, 59.4% were female, and 40.6% were male. The Turkey Disability Survey reported that among the disable population the number of men was 1.37 times higher than women [2,7]. Beşer et al. found that 59.7% of disabled people were men. In the study by Berk et al. reported that 87% of 135 patients were men [5,9]. Unlike those studies, there was a higher rate of female patients in our study.

The occupation of 9.9% patients was recorded as follows: housewife , farmer , industrial worker , construction worker , public servant and hairdresser, respectively. In the study by Berk et al. which examined 136 patients, the occupation of 121 patients (89%) was recorded [9].

Occupational disease was the main cause of disability, and occupational lung diseases rank first place among all occupational diseases in terms of incidence [10]. An analysis of our data showed our failure to record occupational history of all patients in the Medical Board reports. A review of the occupational diseases in Turkey showed that more than 70% of patients worked in sectors such as coal mining, metal and casting industry [11]. Particularly those workers serving for sectors with an exposure to fibrogenic powders such as silica, asbestos, and coal dust have severe impact on their respiratory functions [12].

In some developing countries, especially in rural areas, biomass is very fine particulate pollution arising from domestic fuel and food smoke exposure mostly affects women. [13,14]. A study conducted in Van by Özbay et al. showed that women who don't smoke but exposed to biomass smoke for 37.4 ± 10 years have sign of serious obstruction on Pulmonary Function Tests [15].

Infact, we can suggest that biomass exposure is an occupational risk factor for housewifes in our region, that may explain why females have more respiratory dissability in our study.

The major causes of respiratory disability include environmental and occupational exposures and smoking-related chronic respiratory diseases [16]. Smoking can increase respiratory symptoms, loss of lung function, and the progression of COPD [17].

Among all, 27.4% of patients were smokers, and 29.7% had biomass exposure. None of the reports indicated exposure to asbestos. The disability rating was higher in smokers than in non-smokers ($p= 0.02$).

A reduction can be expected in the disability rating of respiratory diseases with raising awareness and a strict monitoring of potential health problems in the related sectors, particularly providing information to local women about the lung diseases associated with inhalation of biomass smoke. During recent years using the slogan "smokeless zone" a high success for avoiding smoking has been achieved, pozitive impact on respiratory disability ratings will emerge in near future.

Spirometry is the most commonly performed test of measuring respiratory capacity. FVC is considered as the essential parameter in restrictive lung diseases, $FEV_1$ in obstructive lung diseases, and measurement of diffusion capacity in determining respiratory involvement [18]. FVC and $FEV_1$ measurements require good-cooperation of the patients. We found that 325 (81.2%) patients performed the respiratory function test in accordance with the evaluation criteria.

94.6% of patients performed the test in accordance with the evaluation criteria in Berks study [9]. The difference may be attributed to lack of Turkish literacy particularly of the elderly population in the region and following the directions for respiratory function as translated by a relative. In our study there was a negative correlation between $FEV_1$ value and disability ($p< 0.001$).

Since the relationship between Thoracic Computed Tomography and functional measurements was unclear, it is not routinely recommended for use in the assessment of disability [19]. Posteroanterior chest radiography is a commonly used method [20]. Radiologically the chest radiography of 68.3% patients was considered pathological, with reticular/nodular opacities, hyperaeration, increased

cardiothoracic index, and fibrotic changes being the most frequently reported pathologies.

The disability rating due to respiratory system was 80% in 24.9% of patients, 40% in 34.7% of patients, and 20% in 40.4% of patients.

Among all patients, 67.1% was diagnosed with Chronic Obstructive Pulmonary Disease (COPD), 13.2% with ashtma, 6.2% with sequelae tuberculosis, 5% with chest wall deformity, 2.5% with interstitial lung disease/pneumoconious, 2.5% with lung cancer, 2.5% with sleep apnea syndrome, and 1% with bronchiectasis.

The ILO (International Labour Organization) noticed that, the work-related illnesses and accidents cost direct and indirect damage to the economy of countries in the World, and the global cost is supposed to be at least 2.8 trillion dollars [21].

In recent years, Disability Adjusted Life Years (DALY) used by WHO (World Health Organisation) for assesment morbidity and burden of desease.

DALY is defined as early death and the sum of years lost due to disability [22]. COPD is an important morbidity reason for DALY [23,24].

The severity of asthma determines the cost of the disease. Direct costs of patients with moderate or severe persistent asthma were 2.5-2.8 times more than those with mild intermittent asthma [25,26].

The highest mean age was in the COPD group with 69.5 years while the lowest mean age was in the chest wall deformity group with 32.8 years. There was a positive correlation between disability rating and age.

Furthermore, it was found out that 89.1% of patients also presented to other departments for assessment of disability other than the Chest Diseases Department, including Physical Medicine and Rehabilitation, Cardiology, Eye Diseases, Internal Diseases, Otorhinolaryngology, Neurology and Oncology Departments. Since the patients were in a similar age group, hypertension and cardiac diseases can be considered as concomittant diseases due to presence of similar risk factors such as gonarthros, cataract and smoking.

The $SpO_2$ percentage was 86.9% in patients with 80% disability rating, 94.2% in patients with 40% disability rating, and 95.8% in patients with 20% disability rating. As a result, there was a positive relationship between a lower saturation and higher disability rating ($p< 001$).

In the study by Berk et al., arterial blood gas was tested in more than half of the patients, and a positive correlation was found between $pCO_2$ and respiratory involvement [9]. However, recent studies have reported that arterial blood gas test did not have any additional contribution to the respiratory function tests in assessing disability [27].

Electromagnetic energy from motion artifact, low perfusion, skin pigmentation and dark nail polish, tachycardia, cellular phones and electrocautery devices results in limitation in use of pulse oxymeter [28-30].

Many oximeter producer defines the 95% confidence interval as 4 ± for $SpO_2$ when $SaO_2$ (Oxigen saturation) is over 80%. The accuracy of pulse oximeter is reduced when $SaO_2$ is below 80% [18,19].

However, since patient evaluation for medical board reports is made at the setting of outpatient clinics in daily practice, measurement of saturation by pulse oximeter rather than arterial blood gas testing might be much more practical like we did.

## CONCLUSION

In conclusion, the number of patients presenting for assessment of their disability in order to enjoy several rights is consistently increasing. The present study is one of the rare studies examining the respiratory disability in Turkey. Definition of diseases associated with respiratory disability is important in identifying priorities for preventive health services. Our results may provide statistical information on patients with respiratory disability in our region and determine the requirements of these patients and enhance data with a focus on resources for these requirements. Any comparative studies by provinces may provide information on the prevalence and rate of health problems, generating data for social and legal arrangements in the future, and thus contribute to a better management of the disability assessment process.

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