
Quality of life, depression and anxiety in young male patients with silicosis due to denim sandblasting

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ÖZET

Kot kumlamaacılığına bağlı silikozis gelişmiş genç erkek hastalarda yaşam kalitesi, depresyon ve anksiyete

Bu çalışma, kot kumlamaacılığına bağlı silikozis gelişen hastalarda yaşam kalitesi, depresyon ve anksiyete durumlarını tespit etmek amacıyla yapıldı. Çalışma popülasyonu 50 genç silikozisli hasta ve 30 kontrolden oluşmaktaydı. Yaşam kalitesi, depresyon ve anksiyetelerini tespit etmek için sosyodemografik bilgi formu, kısa form-36 (SF-36), Beck depresyon ölçeği (BDI) ve Beck anksiyete ölçeği (BAI) kullanıldı. Hastalarda ortalama SF-36, BDI ve BAI skorları, kontrollerden daha yüksekti. Korelasyon analizinde, tüm SF-36 ve BDI skorları arasında güçlü negatif korelasyon saptandı. Ayrıca, SF-36'nın beş skalası ile BAI skorları arasında güçlü negatif korelasyon saptandı. Bulgularımız, silikozis hastalığının kot kumlamaacılığına bağlı silikozisli hastalarda yaşam kalitesi, depresyon ve anksiyetelerini kötüleştirebileceğini düşündürmektedir.

Anahtar Kelimeler: Silikozis, kot kumlama, yaşam kalitesi, depresyon, anksiyete.

SUMMARY

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The aim of this study was to estimate the quality of life, depression and anxiety in patients with silicosis due to denim sandblasting. This study was conducted on 50 young male patients with silicosis and 30 controls. A socio-demographic data form, Short Form-36 (SF-36), the Beck depression inventory (BDI) and the Beck anxiety inventory (BAI) were used to determine quality of life, depression and anxiety. The mean scores of SF-36, BDI and BAI were higher in the patients than in the controls. Correlation analysis revealed a strong negative correlation between all scales of SF-36 and BDI scores. Additionally, there was strong negative correlation between five scales of SF-36 and BAI scores. We suggest that silicosis might be detrimental to the quality of life and increase depression and anxiety in patients with silicosis due to denim sandblasting.

Key Words: Silicosis, denim sandblasting, quality of life, depression, anxiety.

Silicosis is an ancient occupational lung disease caused by the inhalation of free crystalline silica (1). Certain occupations expose the individual to high concentrations of silica, which is fibrogenic to the lungs, resulting in radiological and pathological abnormalities (2). The histopathological changes differ from simple silicosis to progressive massive fibrosis in such patients (2). There is no effective treatment for silicosis and the main aim of treatment for this disease is to extend the survival and improve the quality of life of patients (3). Denim sandblasting is one of the most risky occupations for the development of silicosis (4). Nowadays, crystalline silica sand is used in denim manufacturing in order to obtain a "worn-out" appearance, and the numbers of denim sandblasting factories have increased in Turkey along with interest in this fashion (4,5). Most of these factories are unrestricted and have no worker health insurance or safety provisions (5-7).

Silicosis patients in Turkey are reported to be young and to have low incomes (3,4,8). Thirty five patients with silicosis were reported at the Turkish Thoracic Society symposium three years ago. It was pointed out at the symposium that patients were young and was intensively exposed to silica (9). Recently, Akgun et al. reported 157 male subjects who had worked in denim sandblasting between 1991 and 2006 (4). Of these, 77 (53.1%) subjects were diagnosed with silicosis (4). This report showed that silicosis due to denim sandblasting is likely to increase and be an important occupational lung disease in Turkey. In our recent study, silicosis was diagnosed radiologically in 73.3% of former denim sandblasters (10).

There are several studies exhibiting the relationships between chronic lung diseases and depression, anxiety

and quality of life (11-15). Although there are a number of studies on depression we found no data in the literature focused on anxiety and quality of life among patients with silicosis (3). In addition there were no studies focused on silicosis due to denim sandblasting.

The aim of the present study was to evaluate the quality of life, depression and anxiety in patients with silicosis due to denim sandblasting.

MATERIALS and METHODS

This study was conducted on 50 young male silicosis patients who applied to Dicle University Medical Faculty Department of Chest Diseases between April 2008 and December 2009. Our study patients consisted of young males living in rural areas of Diyarbakir and Bingol provinces in Turkey, who had worked as seasonal employees in denim sandblasting factories at Istanbul in the period 1999-2004. The first silicosis cases were diagnosed at April 2008 in our clinic. They were admitted to the hospital after learning about the severity of the disease from our previously-diagnosed patients. Subsequently, we went to these small villages. A total of 140 people were invited to the hospital, 123 of whom came. Of these, 73 people who refused to answer the form and scales, or whose thoracic X-ray and Multi-detector Computed Tomography (MDCT) findings were not compatible with silicosis were excluded from the study (15). The control group constituted of 30 healthy male individuals of similar age and education levels. Our criteria for exclusion from the study for both groups were the use of corticosteroid medication in the last four weeks, acute lung infection, chronic lung diseases (COPD, asthma etc.), pulmonary tuberculosis, chronic systemic diseases (cardiovascular, diabetes mellitus, epilepsy, multiple sclerosis etc.), and psychiatric treatment history.

Informed consent forms were obtained from all subjects. This study was conducted in accordance with the recommendations outlined in the Helsinki Declaration.

The diagnosis of silicosis was based on a history of exposure to silica-containing dust and radiological changes consistent with silicosis. Chest radiography and CT imaging were performed on all patients. Radiological evaluation was made in two steps. Firstly, the chest X-rays of patients (CXRs) were evaluated by a radiologist (Dr CAO) and a chest physician (Dr TY). Secondly, CXRs were evaluated by a chest physician (Dr AC), who is an experienced reader using the ILO classification, and a final consensus between the experts was reached (16). Small opacities were classified into four main categories (0 to 3) and 12 subcategories, and the radiographs with 1/0 or higher profusion was considered to indicate silicosis (16). Further analysis (MDCT, spirometry) was also performed by using the radiographs with 1/1 or higher profusion as a criterion of silicosis. Then, MDCT imaging of the thorax were performed on all patients. All CT examinations were performed using a 64-row multidetector CT system (Brilliance CT scanner, Philips Healthcare). All pulmonary function tests were performed with the same spirometer (Zan500, Zan Ferraris, CardioRespiratory, Germany).

Form and scales shown below were used for patients and control groups.

1. Socio-demographic data form: The data form prepared by us was used to record the age, marital status, education level, employment status, exposure duration, smoking history (packs/year), and latency period of the participants. The latency period was defined as the time between initial exposure and radiological imaging. Cigarette consumption and occupational silica exposure were quantified respectively in terms of the number of packs/year and number of months of exposure.

2. Short form-36 (SF-36): SF-36 is a self-evaluation scale designed to evaluate quality of life. It has 36 items that evaluate 8 dimensions (physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health). For each dimension, scores of related items are coded according to responses: zero corresponds to worst quality of physical and mental life, and 100 points corresponds to the best. SF-36 was developed by Ware and Sherbourne and adapted to Turkish by Koc-yigit and colleagues (17,18).

3. The Beck depression inventory (BDI): BDI is a self-report scale with 21 items. The aim of the scale is not to diagnose depression, but to objectively determine

the severity of depressive symptoms. Possible scores range between 0 and 63. BDI was developed by Beck and adapted to Turkish by Hisli (19,20).

4. The Beck anxiety inventory (BAI): BAI is a self-report scale with 21 items. Possible scores range between 0 and 63. Increasing scores indicate increasing intensity of anxiety symptoms. BAI was developed by Beck and colleagues and adapted to Turkish by Ulusoy (21,22).

Statistical Analysis

Statistical analyses were carried out using the statistical packages of SPSS 15.0 for Windows (SPSS, Inc., Chicago, IL, USA). Patients and controls were compared in terms of socio-demographic data by the Chi-square test (if required Fisher's exact test was used), and the Student-t test. In these analyses, the significance level was assumed to be $p < 0.05$. In addition, correlation analysis was performed to determine the relationships between scales of SF-36, BDI and BAI scores of patients.

RESULTS

Silicosis was diagnosed in 50 of 123 persons who had worked in denim sandblasting factories (Figures 1, 2). Of the 6 (12%) patients had progressive massive fibrosis (PMF) indicating complicated silicosis, and the remaining 44 (88%) patients had simple silicosis. Interestingly, spirometric values were decreased only in 2 out of 6 patients who had PMF. All patients had worked as denim sandblasters and had a history of exposure to silica varying from 2-60 months (18.5 ± 18.4 months). The mean latency period was 7.5 ± 1.7 years (range, 5-13 years).

There was no difference between the patient and control groups according to their education level, employment status, marital status, age and smoking history. The socio-demographic data and pulmonary function

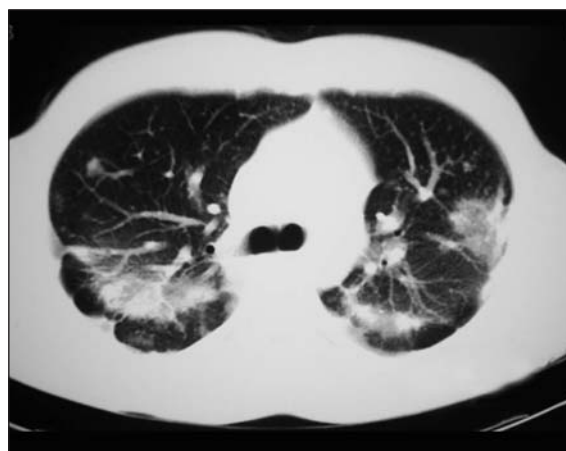


Figure 1. Progressive massive fibrosis on thorax CT.

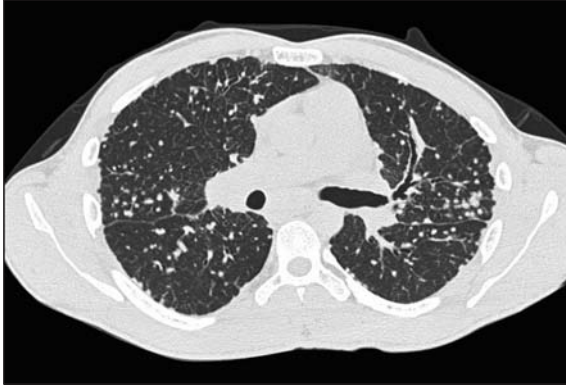


Figure 2. Bilateral subpleural and random scattered diffuse parenchymal silicotic nodules and bronchiectasis in the left main bronchus.

test results of the patients and control groups are shown in Table 1.

There were significant differences between the patient and control groups in terms of mean values on the scale of physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, mental health in SF-36. The comparison of the patient and control groups is shown in Table 2.

BDI values were found to be 19.58 ± 13.83 in patients and 6.93 ± 6.77 in the control group ($p < 0.001$). BAI

values were found to be 20.06 ± 14.59 in patients and 7.56 ± 8.99 in the control group ($p < 0.001$). The BDI and BAI values of the patient and control groups are shown in Table 2.

Correlation analysis between the scales of SF-36 and BDI and BAI scores revealed strong negative correlations between BDI and of all scales of SF-36: physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health. In addition, there were strong negative correlations between BAI and the physical functioning, physical role, general health, social functioning and emotional role scales of SF-36. The correlations of the SF-36, BDI and BAI scores of the patients are shown in Table 3.

DISCUSSION

To the best of our knowledge, this is the first study on quality of life, depression and anxiety in young male patients with silicosis due to denim sandblasting.

There are few data in the literature about occupational silicosis and pneumoconiosis related with depression anxiety and quality of life (3). Moreover, no study was found of the evaluation of psychiatric diseases in patients with silica exposure due to denim sandblasting. Our study results revealed valuable data related to occupational silicosis due to denim sandblasting, quality of life, depression and anxiety.

Table 1. Comparison of the socio-demographic data and spirometric values of the patients and controls.

	Study (n= 50)		Control (n= 30)		χ^2	p
	n	%	n	%		
Education						
Primary	48	96.0	29	96.7		0.686*
Secondary	2	4.0	1	3.3		
Employment						
Employed	48	96.0	30	100.0		0.388*
Unemployed	2	4.0	0	0.0		
Marital status						
Married	29	58.0	18	60.0	0.031	0.860
Single	21	42.0	12	40.0		
	Mean	SD	Mean	SD	t	p
Age	23.68	4.21	24.93	4.56	-1.241	0.218
Smoking history (package/year)	4.08	5.78	5.43	6.63	-0.959	0.341
FVC	98.7	12.7	97.4	12.3		0.96
FEV ₁	99.9	10.6	97.7	11.3		0.90
FEV ₁ /FVC	83.4	10.2	86.7	8.2		0.93
TLC	97.8	15.1	101.3	14.2		0.86

* Fisher's exact test.

SD: Standard deviation, FVC: Forced vital capacity, FEV₁: Forced expiratory volume in 1 second, TLC: Total lung capacity.

Table 2. Comparison of the mean score of SF-36, BDI and BAI measurements between patients and controls.

	Study (mean \pm SD)	Control (mean \pm SD)	t	p
SF-36				
Physical functioning	23.26 \pm 4.54	28.53 \pm 1.47	-7.559	< 0.001
Physical role	5.34 \pm 1.70	7.23 \pm 1.13	-5.946	< 0.001
Bodily pain	7.14 \pm 2.50	9.51 \pm 2.45	-4.125	< 0.001
General health	14.83 \pm 5.71	21.17 \pm 3.82	-5.937	< 0.001
Vitality	13.64 \pm 4.34	17.83 \pm 4.26	-4.206	< 0.001
Social functioning	7.48 \pm 2.12	8.63 \pm 2.02	-2.384	0.020
Emotional role	4.44 \pm 1.34	5.36 \pm 1.03	-3.462	0.001
Mental health	19.02 \pm 5.46	21.96 \pm 4.77	-2.446	0.017
BDI	19.58 \pm 13.83	6.93 \pm 6.77	5.466	< 0.001
BAI	20.06 \pm 14.59	7.56 \pm 8.99	4.737	< 0.001

SD: Standard deviation, SF-36: Short form-36, BDI: Beck depression inventory, BAI: Beck anxiety inventory.

Table 3. Correlation of SF-36, BDI and BAI scores of patients.

	BDI	BAI
	r	r
SF-36		
Physical functioning	-0.606	-0.639
Physical role	-0.589	-0.590
Bodily pain	-0.697	-0.488
General health	-0.715	-0.658
Vitality	-0.557	-0.437
Social functioning	-0.524	-0.532
Emotional role	-0.623	-0.639
Mental health	-0.611	-0.495

SF-36: Short form-36, BDI: Beck depression inventory, BAI: Beck anxiety inventory.

There was a significant difference between patients and controls according to the findings of SF-36. These results suggest that the quality of life and physical and mental health were lower in the silicosis patients than in the controls. Previous studies in patients with pneumoconiosis and other chronic respiratory diseases revealed that these diseases had affected the quality of life of patients. Our results accord with these findings (3,14,23,24).

BDI scores obtained were higher in silicosis patients than in the controls. These results indicate that silicosis patients have more severe depressive symptoms than the controls. Psychiatric disorders were found to be more frequent in patients with pneumoconiosis than in the normal population in a study which focused on the relationship between silicosis and depres-

sion (23). It has been established that elderly silicosis patients have high rates of depression co-morbidity (3,25). In our study, we compared young male silicosis patients and healthy controls, and the results obtained were similar to previous reports.

With regard to the BAI score, the patients' values were higher than those of the controls. This result indicates that the sandblaster silicosis patients had a more severe anxiety level. It is well known that high rates of anxiety symptoms are observed in patients with chronic lung diseases with dyspnea (13). Although some chronic respiratory diseases such as pneumoconiosis and the other chronic respiratory diseases affect the quality of life of patients, the knowledge of patients about the mortality and the untreatable nature of the disease may have additional effects on the severity of anxiety and depression (3,23,14,24).

The correlation analysis revealed a strong negative correlation between all scales of SF-36 and BDI scores. Additionally, there was strong negative correlation between the five scales of SF-36-physical functioning, physical role, general health, social functioning and emotional role-and BAI scores. These results revealed that quality of life deteriorated with the increase of depressive symptoms and anxiety levels.

Lowered FEV₁ and FVC values are important predictors for short survival in elderly pneumoconiosis and COPD patients and the development of depressive symptoms in elderly chronic silicosis patients (3,23). Akgun et al reported that silicosis patients had lower values of FEV₁ and FVC, but a similar FEV₁/FVC ratio than those without silicosis. However, the spirometric data of our patients was within normal limits. We did not find any difference between silicosis pati-

ents and controls according to the spirometric values. There may be several reasons for this. The fact that they were young may mean that their pulmonary function had not yet been affected by age. Also their cigarette consumption in packs/year was relatively low, so that their lungs might not have been affected yet. Another factor may be that the number of patients with radiologically advanced fibrosis was low (6 patients). But even though the patients' pulmonary function tests were found to be within normal limits, worsening quality of life and depressive symptoms were observed. This discrepancy between the spirometric values and quality of life, depression and anxiety in sandblaster silicosis patients is very interesting. The high rate of depression and anxiety in patients compared to healthy controls may be the disturbing factor in the quality of life. Also, we feel that hearing in the media about deaths from sandblaster's silicosis and realizing that there is no treatment for the disease may have contributed to this deterioration in the quality of life. It can be postulated that severity of the disease may have an effect on the tests which have been used. But we have evaluated 50 silicosis patients and we diagnosed only 6 patients had severe silicosis (PMF).

In conclusion, our results indicate that sandblasters' silicosis decreases quality of life, causes depressive symptoms and increases anxiety levels. Even when spirometric values are within normal limits, psychiatric symptoms may contribute to the worsening quality of life of silicosis patients.

CONFLICT of INTEREST

None declared.

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