

# Silicosis Appears Inevitable Among Former Denim Sandblasters

## A 4-Year Follow-up Study

Metin Akgun, MD, FCCP; Omer Araz, MD; Elif Yilmazel Ucar, MD; Adem Karaman, MD; Fatih Alper, MD, PhD; Metin Gorguner, MD; and Kathleen Kreiss, MD

**BACKGROUND:** The course of denim sandblasting silicosis is unknown. We aimed to reevaluate former sandblasters studied in 2007 for incident silicosis, radiographic progression, pulmonary function loss, and mortality and to examine any associations between these outcomes and previously demonstrated risk factors for silicosis.

**METHODS:** We defined silicosis on chest radiograph as category 1/0 small opacity profusion using the International Labor Organization classification. We defined radiographic progression as a profusion increase of two or more subcategories, development of a new large opacity, or an increase in large opacity category. We defined pulmonary function loss as a  $\geq 12\%$  decrease in FVC.

**RESULTS:** Among the 145 former sandblasters studied in 2007, 83 were reassessed in 2011. In the 4-year follow-up period, nine (6.2%) had died at a mean age of 24 years. Of the 74 living sandblasters available for reexamination, the prevalence of silicosis increased from 55.4% to 95.9%. Radiographic progression, observed in 82%, was associated with younger age, never smoking, foreman work, and sleeping at the workplace. Pulmonary function loss, seen in 66%, was positively associated with never smoking and higher initial FVC % predicted. Death was associated with never smoking, foreman work, number of different denim-sandblasting places of work, sleeping at the workplace, and lower pulmonary function, of which only the number of different places worked remained in multivariate analyses.

**CONCLUSIONS:** This 4-year follow-up suggests that almost all former denim sandblasters may develop silicosis, despite short exposures and latency. CHEST 2015; 148(3):647-654

Manuscript received November 14, 2014; revision accepted January 15, 2015; originally published Online First February 5, 2015.

**ABBREVIATIONS:** ILO = International Labor Organization

**AFFILIATIONS:** Department of Pulmonary Medicine (Drs Akgun, Araz, Ucar, and Gorguner) and Department of Radiology (Drs Karaman and Alper), Atatürk University, Faculty of Medicine, Erzurum, Turkey; and Division of Respiratory Disease Studies (Dr Kreiss), National Institute for Occupational Safety and Health, Morgantown, WV.

This study was presented in abstract form (Akgun M, Araz O, Ucar EY, Karaman A, Alper F, Gorguner M. *Am J Respir Crit Care Med*. 2014;189:A3171).

**FUNDING/SUPPORT:** The authors have reported to CHEST that no funding was received for this study.

**CORRESPONDENCE TO:** Metin Akgun, MD, FCCP, Department of Pulmonary Medicine, Atatürk University, 25240 Erzurum, Turkey; e-mail: akgunm@gmail.com

© 2015 AMERICAN COLLEGE OF CHEST PHYSICIANS. Reproduction of this article is prohibited without written permission from the American College of Chest Physicians. See online for more details.

**DOI:** 10.1378/chest.14-2848

Denim-jean sandblasting is a recognized cause of silicosis, and many cases, some with fatal outcomes, have been reported from different centers in Turkey.<sup>1-7</sup> Our previous work demonstrated that among former denim sandblasters who were exposed to silica for at least 1 month and who had a latency period of at least 10 months, 77 of 145 subjects (53%) had silicosis in 2007,<sup>6</sup> based on the International Labor Organization (ILO) classification of radiographs of pneumoconioses.<sup>8</sup>

In the current study, our primary aim was to reevaluate these former sandblasters who had terminated occupational exposure to silica dust prior to 2007, to determine whether the number of cases meeting diagnostic criteria

for silicosis had increased in the absence of continued exposure. Second, we aimed to investigate other health outcomes (radiographic progression, pulmonary function loss, and mortality) among the subjects and to examine

#### FOR EDITORIAL COMMENT SEE PAGE 574

associations between these health outcomes and risk factors that had been individually associated with silicosis in the earlier cross-sectional study,<sup>6</sup> including exposure duration, foreman status at work (a marker of higher exposure than apprentices), and number of denim-sandblasting workplaces in which they worked.

## Materials and Methods

### Study Population

The source population of this study consisted of the 145 former denim sandblasters who had interpretable chest radiographs and spirometry tests when studied in 2007.<sup>6</sup> In 2011, a temporary national law in Turkey gave a right to compensation to all uninsured patients with silicosis. Thus, we invited all the denim sandblasters in our source population, regardless of a prior silicosis diagnosis, to our tertiary-care university hospital to participate in our follow-up study. We offered assistance in preparing an official application for compensation. For the nonrespondents to our follow-up, we ascertained vital status with our hospital records and the online Death Declaration System of the Turkish Health Ministry. We included those who died between 2007 and 2011 in this study. All living participants gave their written informed consent, and the local ethics committee approved the study protocol (registration number 2011/37).

### Study Procedures

For baseline evaluation, we used the findings of the 2007 study.<sup>6</sup> In a 2011 medical interview, we confirmed that all participants being reevaluated had no further exposure to silica dust. The same technician conducted pulmonary function tests in 2007 and 2011 using the same computerized spirometer (Vmax22; SensorMedics Corp),<sup>6</sup> recording the best FEV<sub>1</sub>, FVC, and FEV<sub>1</sub>/FVC ratio among three acceptable efforts. We calculated FEV<sub>1</sub> % predicted and FVC for age, sex, and height.<sup>9</sup>

Standard posteroanterior chest radiographs of all living participants were taken at maximal inspiration and evaluated according to the ILO classification.<sup>8</sup> Three experts independently evaluated 2011 chest radiographs, blinded to the 2007 ILO reading and clinical data of the participants. Any disagreement was resolved by consensus. Small-opacity profusion was classified into four main categories (0 to 3) and 12 subcategories, and the ILO categories and subcategories were used as indices of disease severity.

We defined silicosis on chest radiograph as a profusion of small pneumoconiotic opacities of ILO category 1/0 or higher.<sup>8</sup> We defined radiographic progression as (1) an increase in small-opacity profusion of two or more subcategories (ie, from 0/0 to 1/0 or from 1/2 to 2/2), or (2) the appearance of one or more new large opacities (A, B, C), or (3) an increase in large-opacity category (from A to B or from B to C).<sup>8</sup> Pulmonary function loss was defined as a  $\geq 12\%$  decrease in FVC, with guidance from longitudinal interstitial lung disease research,<sup>10,11</sup> between 2007 and 2011. All deaths were attributed to silicosis or related complications.

### Statistical Analysis

We used SPSS Statistics software, version 20 for Mac (IBM Corporation), for statistical analyses. The Pearson  $\chi^2$  test and the Mann-Whitney *U* test were used to compare categorical and numeric values, respectively. We used binary logistic regression to test for associations with predetermined risk factors. A *P* value  $< .05$  was considered statistically significant.

## Results

Of the 145 denim sandblasters studied in 2007, the follow-up study included 83 men (57.2%), of whom 74 had both interpretable chest radiographs and valid spirometry in 2011 and nine (6.2%) had died (Fig 1). In comparison with the nonparticipants in 2011, the study group had less history of working as a foreman, history of sleeping at the sandblasting work places, and smoking pack-years (Table 1). Nonparticipants and participants had similar pulmonary function in 2007, but living participants tended to have more small and large pneumoconiotic opacities on their 2007 chest radiograph (Table 2). The mean age ( $\pm$  SD) of living participants was  $27 \pm 6$  years in 2011. The mean age at

death of the nine who had died during the follow-up period was 24 years (range, 18-29 years).

The proportion of living participants with silicosis increased from 55.4% to 95.9%. Radiographic progression and 12% pulmonary function loss were observed in 82% ( $n = 61$ ) and 66% ( $n = 49$ ) of participants, respectively. Between 2007 and 2011, both the small-opacity profusion and the presence of large opacities increased significantly. Three examples of radiographic progression are shown in Figure 2. ILO classifications in 2007 and 2011 are shown in Figure 3 for each participant. Table 2 presents the 2007 classification results for nonparticipants, those who had died, and living participants, along with 2011 classification results for living participants. Eight of nine

Download English Version:

<https://daneshyari.com/en/article/5953969>

Download Persian Version:

<https://daneshyari.com/article/5953969>

[Daneshyari.com](https://daneshyari.com)