



## Clinical Note

# Prevalence of Silicosis in a Marble Factory after Exposure to Quartz Conglomerates

Silvia Pascual,\* Isabel Urrutia, Aitor Ballaz, Itziar Arrizubieta, Lander Altube, Carlos Salinas

Servicio de Neumología, Hospital Galdakao, Galdakao, Bizkaia, Spain

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### ABSTRACT

In this note we present the high prevalence of silicosis found in a marble workshop after exposure to an innovative silica product.

A prospective, observational study was conducted with 11 workers who have been exposed to different types of quartz surfaces since 1995. In the shop, the work is divided into two groups: 4 subjects dedicated to the cutting workshop, and the remainder to assembly. At the time of the study, they had not been using any specific respiratory protection apparatus.

Six cases of silicosis have been diagnosed, which means a disease prevalence of 54.5% in this setting. Out of the 6 affected workers, 5 (83.3%) are assemblers.

We highlight the high risk of developing silicosis in the handling of different products within the range of quartz surfaces.

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## Prevalencia de silicosis en una marmolería tras la exposición a conglomerados de cuarzo

### RESUMEN

En esta nota mostramos la elevada prevalencia de silicosis encontrada en una marmolería tras una exposición a una novedosa presentación de sílice.

Se trata de un estudio observacional, prospectivo, en el que se han estudiado 11 trabajadores que se exponen desde 1995 a diversas presentaciones de superficies de cuarzo. Los puestos de trabajo se dividen en dos grupos: por una parte 4 sujetos desarrollan trabajos de corte en el taller; el resto de los trabajadores trabaja en el montaje. Hasta la fecha no han utilizado sistemas de protección respiratoria específicos.

Se han diagnosticado 6 casos de silicosis, lo que supone una prevalencia de enfermedad para este ámbito del 54,5%. De los 6 afectados, 5 (83,33%) son montadores.

Destacamos el elevado riesgo de desarrollo de silicosis en el manejo de los diversos productos que conforman la gama de superficies de cuarzo.

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## Introduction

Silicosis is an interstitial pulmonary disease secondary to the inhalation of crystalline silica, usually in the form of quartz, and less commonly as cristobalite and tridymite. Chronic silicosis is the most frequent clinical form and it is related with exposures of at least 10 years.

The exposure to silica has been described in many occupations with different prevalence indices depending on the degree of exposure. The statistics of the Spanish Instituto Nacional de Silicosis reveal an annual growth in the number of cases,<sup>1</sup> most originating in industries that use relatively new technology. If these technologies are not accompanied by adequate safeguards, the result can be exposure to dust that is even more dangerous than in traditional occupations and industries.<sup>2</sup> Cases have been recently published from industrial sectors that have until now been unknown, such as handlers of artificial quartz conglomerates, which are currently widely used in the manufacturing of kitchen and bathroom counter tops.<sup>3</sup>

\* Corresponding author.

E-mail address: silvia.pascualerquicia@osakidetza.net (S. Pascual).

**Table 1**  
General characteristics of the workers

Patients	Age	Years of exposure	Hours of exposure/day	Occupation	Family-member	Chest radiograph	Respiratory functional exploration	Smoker	Symptoms
1	60	14	10	Workshop, machine	Yes	No	Normal	Yes	No
2	34	12	10	Workshop, machine	Yes	No	Normal	No	No
3	32	14	10	Assembly	Yes	PMF cat A	Mild Restrict. VD, Alt. diffusion	No	Yes
4	34	14	10	Assembly	Yes	Simple silicosis	Normal	No	No
5	42	14	10	Assembly, workshop, polish	Yes	No	Alt. diffusion	Yes	No
6	37	14	10	Workshop, machine	Yes	Simple silicosis	Alt. diffusion	No	No
7	36	10	10	Workshop, polish	No	No	Normal	Yes	No
8	32	7	10	Assembly	No	No	Moderate Restrict. VD, Alt. diffusion	Yes	No
9	42	14	10	Workshop, polish	No	Simple silicosis	Normal	Yes	Yes
10	33	11	10	Assembly	No	Simple silicosis	Normal	Yes	No
11	56	14	10	Assembly	No	Simple silicosis	Moderate Obstruc. VD, Alt. diffusion	Yes	Yes

Alt. diffusion: altered diffusion; Obstruc. VD: obstructive ventilatory disorder; PMF cat A: progressive massive fibrosis, category A; Restrict. VD: restrictive ventilatory disorder. Symptoms: cough, expectoration, dyspnea, chest pain.

Occupation: Workshop= works in the workshop; Assembly= assembly/home installation; Machine= waterjet cutting machine in the workshop; Polish: polish pieces without waterjet.

This note reports the high prevalence of silicosis found in a marble workshop after exposure to this innovative presentation of silica.

### Clinical Observation

We have studied 11 workers from a marble workshop after radiological alterations suggestive of silicosis were found during routine medical examinations ordered by the company. The workshop is a family-run business, in which 6 of the 11 exposed workers are members of the same family. Since 1995, they have mainly been exposed to the different presentations of a product that is currently one of the world-wide leaders in quartz surfaces, composed of at least 90% inorganic fillers, fundamentally natural quartz (crystallized silicon dioxide [SiO<sub>2</sub>]) and silica. They work with natural stone less frequently.

The subjects perform their jobs in a 500 m<sup>2</sup> workspace equipped with several dust extraction systems and sliding exterior doors that are nearly permanently open. Up until the time of the first diagnosis (the end of 2008), no specific respiratory protection apparatuses were used. The work is divided into two groups: 4 subjects in the cutting workshop using machinery equipped with a waterjet cutting system, while the remaining workers carry out the assembly, which often requires some cutting and polishing during home installation without any protection and without waterjet cutting system machines. Excluded from the study are the members of the company that had no direct contact with the material (office workers).

The number of cases studied was 6, implying disease prevalence in this setting of 54.5%. Five workers (83.33%) presented radiographic patterns of simple silicosis, and in 1 (16.66%) we observed a pattern of progressive massive fibrosis. Out of the 6 patients, 5 (83.33%) are assemblers, one of whom also polished the product in the workshop. Only one patient works in the workshop with a waterjet cutting machine. Mean age was 39.81 (32-56). Mean exposure was 10 hours/day for 12.54 years (7-14).

Other data are given in table 1.

### Discussion

The results of this study show a prevalence of 54.5% of silicosis in the workers of a marble workshop exposed to a new product with high concentrations of silica.

The relevance of these data lie in the lack of available information related to new types of silica exposure, which are apparently still

unknown and can have negative repercussions on the workers of the sector without adequate respiratory protection.

This type of silica exposure does not seem to shorten the exposure time before disease onset in comparison with exposure to silica in other occupations, as the patients have been diagnosed after more than 10 years of contact.

Risk is significantly higher in those subjects who polish the pieces, as this generates the greatest amount of dust. Therefore, the handlers who are most affected are those dedicated to home installations: in addition to polishing, installers also work with machines without waterjet cutting systems. There is only one case of a worker from the cutting workshop, perhaps related to the polishing that is also done there.

The majority of the radiologic forms observed were simple silicosis.

Although histocompatibility antigen studies were not done,<sup>4,5</sup> there is no evident difference in prevalence between the members of a same family and the rest of the workers (50% are family members, 50% are not). Unlike publications relating tobacco habit as a risk factor for developing silicosis in exposed subjects,<sup>6</sup> we have found no differences between the cases with regards to smoking (50% smokers, 50% non-smokers). Nor are there differences regarding respiratory functional exploration or symptoms.

In conclusion, silicosis is not only produced by the classic occupations discussed in the literature; there are also other little-known occupations with high levels of silica exposure. We therefore emphasize the high risk of developing silicosis in the handling of different products that are frequently used to produce quartz surfaces. It is essential to take extreme care in using adequate respiratory protection measures when handling such materials, especially in the fitting of the products during home installation.

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