

Case Report

Is Silicosis Still Underdiagnosed?

Sirawit Stitsmith, MD¹; Narongpon Dumavibhat, MD, PhD²; Charubongse Brohmwitak, MD¹; Sitthiphon Bunman, PhD³; Apinut Jaroonpipatkul, MD²; Thanaporn Panomsak²; Kawintra Khantharot, MD⁴; Arunee Pholngam, RN⁴



Sirawit Stitsmith, MD

Abstract

Silicosis, a long-standing occupational lung disease, is still a worldwide health problem. Although many international organizations lead the effort to eliminate this incurable disease, there are newly reported cases continuously. Primary prevention is crucial. If the best resolution is not perfectly implemented, secondary prevention, including early diagnosis of silicosis is essential. However, there is still the problem of underdiagnosis which results in patients continuing working leading to disease progression. The authors present three underdiagnosed cases of employees working in the same company. It is hoped the present study may lead to the improvement of silicosis prevention in the country.

Keywords: ceramic worker, health check-up, ILO classification of radiographs of pneumoconioses, multidisciplinary team, occupational lung disease, silica, silicosis, underdiagnosis.

Silicosis, one of the most common occupational lung diseases caused by silica exposure, is a worldwide public health problem. International Labor Organization (ILO) and World Health Organization (WHO) have both expressed their concerns with this serious health issue. They set up the ILO/WHO Global Program for the Elimination of Silicosis (GPES) in 1995 to eliminate silicosis from the world by 2030.^{1,2} However, currently there are still many new cases of silicosis being diagnosed.^{2,3} Globally reported prevalence of silicosis in workers exposed to silica in different occupational settings ranges from 14% to 96%.⁴ This incurable disease was first reported in Thailand in 1954.⁵ Even though Thailand has followed the ILO/WHO GPES recommendations by setting up the National Silicosis Elimination Program in 2001, the status quo of silicosis still produces a lot of new cases.⁶ The best way to eliminate silicosis is primary prevention including promoting the application of engineering controls and industrial hygiene methods. If the primary prevention is not effective in some situations, a secondary prevention strategy, including upgrading of skills of physicians to use the ILO 2000 Classification of Radiographs of Pneumoconioses (ICRP) as well as increase physician awareness and strengthening national systems of workers' health surveillance, are necessary.

This study aims to present three undiagnosed silicotic cases among ceramic workers in one company at Lampang, Thailand. A total of 255 workers underwent a chest radiography by private hospital-mobile health services during a periodic health examination in September 2018. A single physician, who worked in the hospital-mobile health services, studied and reported all radiographic results. He reported three cases with abnormal radiographs. Then, an expert, specialized in using the ILO 2000 ICRP, re-evaluated the three aforementioned chest radiographs. The implication of this study was to emphasize the importance of not only the knowledge of ILO 2000 ICRP and physician awareness but also health surveillance programs among private hospital-mobile health services.

Case Report

Case #1

A 54-year-old Thai female worked in a ceramic company for 35 years. The physician, who worked in the hospital-mobile health services, reported her chest

¹ Queen Savang Vadhana Memorial hospital, Chon Buri, Thailand.

² Department of Preventive and Social Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand.

³ Faculty of Medicine, Thammasat University, Pathumthani, Thailand.

⁴ Department of Occupational Health, Lampang Hospital, Lampang, Thailand.

* Address Correspondence to author:

Sirawit Stitsmith, MD

Queen Savang Vadhana Memorial hospital,
290 Chermchomphon Road, Si Racha
Subdistrict, Si Racha District,
Chonburi 20110, Thailand
email: sirawit.mart@gmail.com

Received: May 12, 2021

Revision received: May 14, 2021

Accepted after revision: June 11, 2021

BKK Med J 2020;17(2): 142-145.

DOI: 10.31524/bkkmedj.2021.22.001

www.bangkokmedjournal.com

radiograph as “infiltration at both lungs” (Figure 1A). The expert interpreted the radiograph as “diffuse nodular infiltration” consistent with silicosis q/q 3/2 pattern according to the ILO 2000 ICRP. Interestingly, patient had undergone chest radiography 5 years prior to this in one hospital and an abnormality was detected (Figure 1B). However, no physician asked for her working anamnesis. As a result, she was not diagnosed with silicosis q/q 2/2 pattern.

The small round opacity according to the ILO 2000 ICRP is p, q, and r. The “p” is an opacity with a diameter up to about 1.5 mm. The “q” is an opacity with a diameter exceeding about 1.5 mm and up to about 3 mm, while the “r” is an opacity with a diameter exceeding about 3 mm and up to about 10 mm. The classification scheme for the profusion of small opacities utilizes a 4-point major category scale (0, 1, 2, and 3), with each major category divided into three, giving 12 minor categories of increasing profusion (0/-, 0/0, 0/1, 1/0, 1/1, 1/2, 2/1, 2/2, 2/3, 3/2, 3/3 and 3/+).

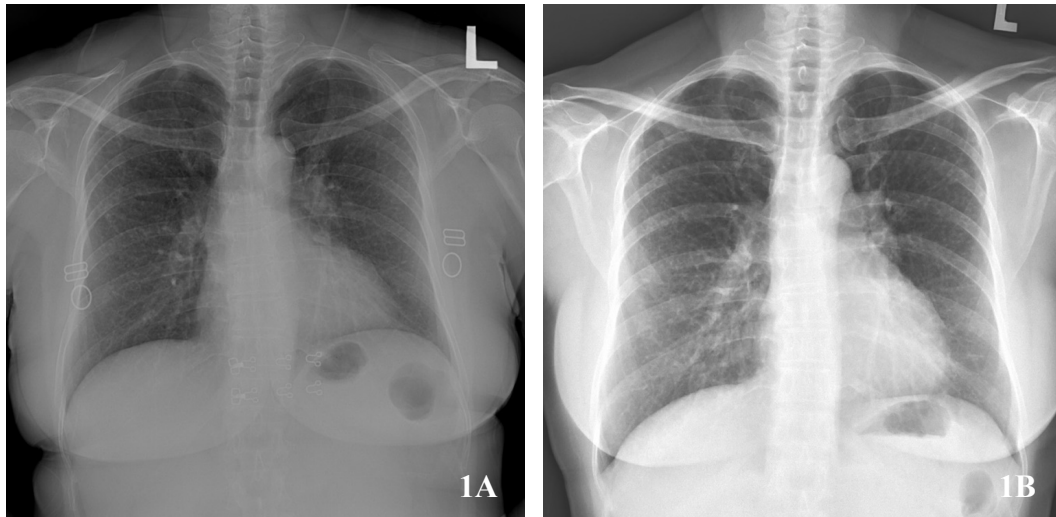


Figure 1A&1B: The PA chest radiographs in 2018 (1A) and 2013(1B) demonstrated diffuse nodular infiltration compatible with silicosis q/q 3/2 and q/q 2/2 pattern, respectively.

Case #2

A 44-year-old female who had worked for more than 10 years in the same company as case #1. The physician reported her chest radiograph as “infiltration at the right upper lobe” (Figure 2A), while the expert interpreted the radiograph as silicosis with q/q 2/2 pattern. She had undergone chest

radiography three years earlier in one hospital and an abnormality was detected (Figure 2B). Nevertheless, no one diagnosed her with silicosis. The expert interpreted the radiograph as consistent with silicosis q/q 1/2 pattern according to the ILO 2000 ICRP.

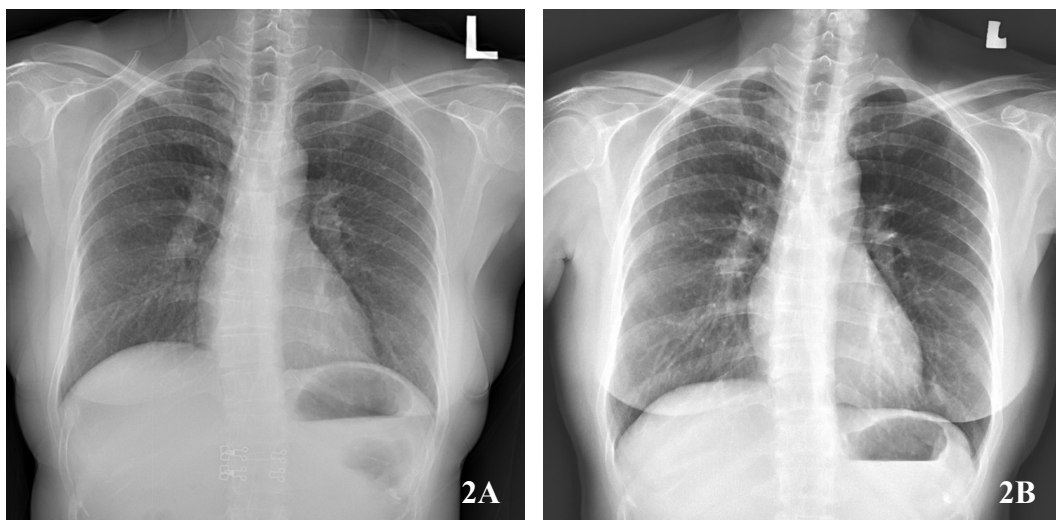


Figure 2A & 2B: The PA chest radiographs in 2018(2A) and 2015(2B) revealed diffuse nodular infiltration compatible with silicosis q/q 2/2 and q/q 1/2 pattern, respectively.

Case # 3

A 42-year-old Thai male had worked for 30 years at the same ceramic company with the two-former reported cases. The physician reported his chest radiograph as “infiltration at the right lung” (Figure 3), while the expert interpreted the radiograph as silicosis with q/q 2/2 pattern according to the ILO 2000 ICRP.

Discussion

Silicosis is an incurable fibrogenic lung disorder that can progress even after silica exposure is discontinued.⁷ Consequently, it may lead to long-term disability or death. Chronic silicosis, the most common form, refers to long-term exposure to crystalline silica dust. Many patients may remain asymptomatic and develop symptoms when the disease progresses. In Thailand, although considerable administrative and preventive controls such as Personal Protective Equipment (PPE) and Health surveillance are put in place to prevent silicosis among exposure groups, reported silicosis is commonly found in employees.⁶

In the present study, we reported three cases of chronic silicosis. Although the physician, who worked in the hospital-mobile health services, reported abnormal findings of all three chest radiographs, the interpretation of case #2 and case #3 were not consistent with silicosis, i.e., infiltration at right upper lung and infiltration at right lung, respectively. Furthermore, case #1 and case #2 had undergone chest radiographs in one hospital before the 2018 surveillance and an abnormality that is consistent with silicosis had already presented in the imaging. Unfortunately, no one recognized the dreadful disease. As a result, the patients continued working and continued to be exposed to silica. Finally, in 2018, their chest radiograph had deteriorated as shown.

To eliminate the incurable but preventable disease, primary prevention is crucial. In the situation that primary prevention is effective, there should be no new silicotic cases, theoretically. If primary prevention fails, secondary prevention should support it. Nowadays, there are still new cases being reported even in developed countries.³ Also, there are underdiagnosed as well as under-reported cases.^{8,9} In our experience, there are many underdiagnosed and under-reported cases in Thailand. To achieve the secondary prevention goal, the knowledge of ILO 2000 ICRP and physician awareness for occupational health risk, to include appropriate occupational history taking, could improve the effectiveness of early detection. In order to implement a holistic approach, individual health risks should be assessed. Health care providers should include occupational risk and other personal risks such as family history, age, and health behavior. In the present study, case #1 and case #2 were underdiagnosed for at least 5 and 3 years respectively. One of the reasons is the lack of awareness among physicians of this incurable disease when interpreting chest radiograph and as a result not taking an occupational

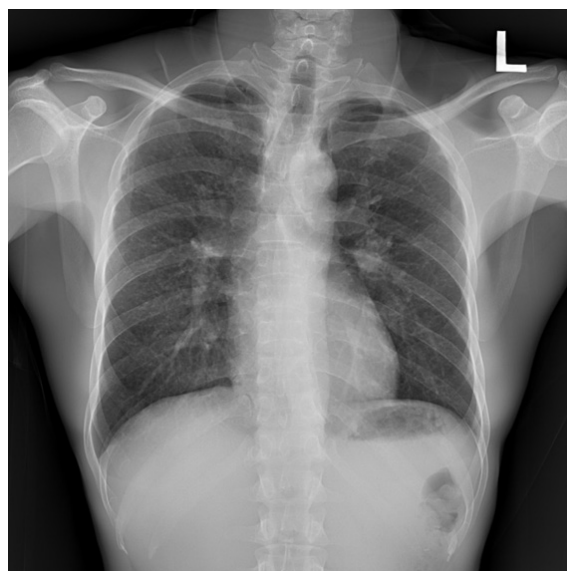


Figure 3: The PA chest radiograph in 2018 demonstrated diffuse nodular infiltration consistent with silicosis q/q 2/2 pattern.

history. One of the best solutions is the collaboration of a multidisciplinary team. The team includes an occupational physician as well as a chest physician, radiologist, and pathologist, depending on the availability of specialists in the area. The multidisciplinary team will reduce the challenge of underdiagnosis of silicosis and other occupational lung diseases.

The other concern in secondary prevention is health surveillance programs, or periodic health examination programs that are mainly performed by private hospital-mobile health services. In Thailand, many health check-up companies report results of chest radiographs without being concerned with the workers' occupation, which may lead to underdiagnosis of silicosis and other pneumoconioses. Another issue is that of employee health surveillance data. It is recorded in a personnel health book, followed by Thai law and regulations, and reports only a chest radiographic result, but there is no demonstrated chest radiograph. Development of big data management is in urgently needed in order to compare both present and previous check-up data. This would play a major role in holistic health prevention, no matter where the workers turn to for health providers.

Conclusion

The present study demonstrated three underdiagnosed patients with silicosis in the same company. These numbers represent the tip of the iceberg that reflects the problem of secondary prevention. To achieve the goal of ILO/WHO GPES, Thailand needs to strengthen both primary and secondary prevention in order to eliminate silicosis by 2030.

References

1. World Health Organization. Elimination of silicosis. The Global Health Occupational Health Network: GOHNET NEWSLETTER, 2007. (Accessed May 13, 2021, at https://www.who.int/occupational_health/publications/newsletter/gohnet12e.pdf?ua=1)
2. The Lancet Respiratory Medicine. The world is falling on silicosis. *Lancet Respir Med* 2019;7:283.
3. Trends in global, regional and national incidence of pneumoconiosis caused by different aetiologies: an analysis from the Global Burden of Disease Study 2017. *Occup Environ Med* 2020;77:407-14.
4. Souza TP, Watte G, Gusso AM, et al. Silicosis prevalence and risk factors in semi-precious stone mining in Brazil. *Am J Ind Med* 2017;60:529-36.
5. Ramakul K. Epidemiological review of silicosis in Thailand. *Disease Control Journal* 2008;34:109-17.
6. Chanklom P, Punyaratabandhu M, Patcharatanasan N, et al. Incidence of silicosis among quarry workers in Chonburi Province. *Disease Control Journal* 2020;46:162-72.
7. Dumavibhat N, Matsui T, Hoshino E, et al. Radiographic progression of silicosis among Japanese tunnel workers in Kochi. *J Occup Health* 2013;55:142-8.
8. Susan S. Goodwin, Stanbury M, Wang M-L, et al. Previously Undetected Silicosis in New Jersey Decedents. *Am J Ind Med* 2003;44:304-11.
9. Mazzei MA, Sartorelli P, Bagnacci G, et al. Occupational Lung Diseases: Underreported Diagnosis in Radiological Practice. *Semin Ultrasound CT MR* 2018;40:36-50.