

Evaluation of Silicosis Health Literacy among Silica Exposed Workers

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Abstract

OBJECTIVES: This study aims to evaluate silicosis health literacy among silica exposed workers.

MATERIAL AND METHODS: We developed a 10-item silicosis health literacy questionnaire in 2018. We designed the test to evaluate the health literacy of silica exposed workers. All silica exposed workers working in 9 factories in Lampang province were enrolled in the study from October 2018 - January 2019.

RESULT: A total of 435 silica exposed workers from 9 factories were included in this study. The workers were aged 20 - 70 years, and the mean age was 40.11 ± 9.10 years. 54% were female, while 43.2% worked for over ten years. The silicosis health literacy level improved significantly after a 15-minute lecture in all age groups except for those in the age group range of 60-69 years. There was no statistical difference in the levels of silicosis health literacy between males and females.

CONCLUSION: The study showed that silica exposed workers improved their silicosis health literacy level significantly after intervention. Silicosis health literacy may prevent workers from the risk of silicosis exposure in Thailand in the near future.

Keywords: health literacy test, silica exposed workers, silicosis, silicosis health literacy

Silicosis is one of the most common occupational lung diseases and is a major occupational health problem. This disease is also the most prevalent occupational lung disease in Thailand.¹ The disease is caused by inhalation of free crystalline silica, and long-term exposure to silica particles leads to pulmonary inflammation and fibrosis. The workers at risk are those employed by mining, stone mill, ceramic, glass, and sandblasting industries.^{2,3} Most patients with simple silicosis have no symptoms at the early stage. This incurable disease causes high morbidity and mortality.⁴ The best way to eradicate the disease is to prevent workers from exposure. If this, the most crucial intervention fails, the next step is early detection of silicosis. To achieve these two important goals, workers need to improve silicosis health literacy.

Health literacy refers to the ability of individuals to access and understand medical information, and apply it to improve their health.⁵ In 1998, the World Health Organization ran a campaign to build a network of collaborating countries to develop and promote health knowledge to citizens. As a result, health literacy has been accepted and promoted as a matter of public health policy.

In the present day, there are only a few research studies on silicosis health literacy or instruments to evaluate the knowledge of silica exposed workers.^{6,7} Moreover, the tool to test silicosis health literacy has not yet been developed in Thai. We were interested in evaluating silicosis health literacy in silica exposed workers. This retrospective study aimed to compare the silicosis health literacy scores before and after providing a 15-minute class to workers.

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Materials and Methods

Silica exposed workers were recruited from 9 factories in Lampang province, Thailand, from October 2018 - January 2019. Protocol No. 386/2563 (IRB1) was approved by the Human Research Protection Unit, Faculty of Medicine Siriraj Hospital. The participants needed to meet all the inclusion and exclusion criteria listed below.

Inclusion criteria:

1. Silica exposed worker
2. Age between 20 - 80 years old
3. Being able to write, read, and understand Thai language

Exclusion criteria:

1. Psychosis disorder
2. Cognitive impairment
3. Memory impairment
4. Hearing problems uncorrectable with a hearing aid or deafness impaired

Variables

Demographics data

Self-reported socio-demographic data included age, gender, duration of work, using mask while working and smoking history.

Silicosis health literacy

A 10-item scale for silicosis health literacy was initially developed from the literature review. Content validity with 5 experts in health literacy and silicosis was performed. The principal components analysis was performed to assess the construct validity and reliability of the scale. All workers were requested to answer a 10-item of silicosis health literacy questionnaire. Then as a multidisciplinary team, we delivered a 15-minute lecture. Finally, the workers took the same questionnaire again. Our multidisciplinary team included chest, occupational medicine, and family medicine professionals.

Statistical analysis

The essential characteristics of the workers were presented as frequencies, percentage, and means \pm SD. The paired t-test was used to compare before and after an intervention. All analyses were performed using SPSS version 22.0 (IBM Corp, Armonk, NY).

Results

A total of 435 silica exposed workers from 9 factories were recruited to participate in the study. The 9 factories included 3 ore dressing, 2 kaolin, 2 mining, and 2 ceramic factories. The workers had a mean age of 40.11 years (SD = 9.10 years), 54% were female. Most of them (74.7%) had never smoked. Only 16.1% were active smokers. Interestingly, 80.9% of the workers wore fabric masks to protect themselves from dust inhalation. Most of them had no underlying disease. A small

number had pulmonary diseases, e.g., asthma (1.4%), chronic obstructive pulmonary disease (0.5%), and old pulmonary tuberculosis (0.5%). All data is shown in Table 1.

The classification categories of the 10-item questionnaire were categorized into 3 levels: inadequate (≤ 6), marginal (7-8), and adequate (9-10). Evaluation of silicosis health literacy among the workers showed that 19.8% of workers had inadequate health literacy on a pre-intervention test. In contrast, only 9.9% had inadequate at post-intervention test (Table 2).

The result showed that the silicosis health literacy score was significantly improved after intervention program implementation, as shown in Table 3. Concerning gender, there were no statistical differences in the level of silicosis health literacy between pre and post-intervention (data not shown). With regards to the age group, the silicosis health literacy score also improved significantly after intervention in all age groups except for those in the age group ranging 60-69 years, as shown in Table 4 and Table 5.

Table 1: Demographic data of all workers (n = 435).

Demographic data	n (%)
Gender	
Male	200 (46)
Female	235 (54)
Age (years), mean \pm SD	
20-29	67 (15.4)
30-39	108 (24.8)
40-49	205 (47.1)
50-59	52 (12)
60-69	3 (0.7)
Duration of work (year)	
<1	25 (5.7)
1-5	77 (17.7)
6-10	56 (12.9)
>10	188 (43.2)
Anonymous	89 (20.5)
Using fabric mask while working	
Yes	352 (80.9)
No	83 (19.1)
Underlying diseases	
Asthma	
Yes	6 (1.4)
No	429 (98.6)
Chronic obstructive pulmonary disease	
Yes	2 (0.5)
No	433 (99.5)
Pulmonary tuberculosis (old)	
Yes	2 (0.5)
No	433 (99.5)
Smoking history	
Active smoker	70 (16.1)
Never smoked	325 (74.7)
Ever smoked	40 (9.2)

Table 2 : Level of silicosis health literacy among workers (n = 435).

Silicosis health literacy questionnaire	Silicosis health literacy level (Score)			p
	Inadequate (≤ 6)	Marginal (7-8)	Adequate (9-10)	
Pre-intervention (%)	86 (19.8%)	233 (53.6%)	116 (26.6%)	< 0.01
Post-intervention (%)	43 (9.9%)	198 (45.5%)	194 (44.6%)	

p-value from Chi-Square test

Table 3: Comparison of silicosis health literacy score among workers between pre and post-intervention (n = 435).

Silicosis health literacy questionnaire	Mean of silicosis health literacy score ± SD	p
Pre-intervention (%)	7.63 ± 1.32	< 0.01
Post-intervention (%)	8.14 ± 1.27	

Table 4: Comparison of silicosis health literacy level among workers between pre and post-intervention categorized by age group (n = 435).

Level of health literacy	Age									
	20-29		30-39		40-49		50-59		60-69	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Inadequate	12 (17.91%)	6 (8.96%)	14 (12.96%)	7 (6.48%)	44 (21.46%)	22 (10.73%)	13 (25%)	6 (11.54%)	3 (100%)	2 (66.67%)
Marginal	38 (56.72%)	32 (47.76%)	57 (52.78%)	48 (44.45%)	110 (53.66%)	96 (46.83%)	28 (53.85%)	22 (42.31%)	0	0
Adequate	17 (25.37%)	29 (43.28%)	37 (34.26%)	53 (49.07%)	51 (24.88%)	87 (42.44%)	11 (21.15%)	24 (46.15%)	0	1 (33.33%)

Table 5: Comparison of silicosis health literacy score among workers between pre and post-intervention categorized by age group (n = 435).

Age		n	Mean ± SD	p
20-29	Pre-intervention	67	7.68 ± 1.38	<0.05
	Post-intervention	67	8.11 ± 1.46	
30-39	Pre-intervention	108	7.83 ± 1.18	<0.01
	Post-intervention	108	8.25 ± 1.16	
40-49	Pre-intervention	205	7.56 ± 1.38	<0.01
	Post-intervention	205	8.10 ± 1.26	
50-59	Pre-intervention	52	7.55 ± 1.24	<0.01
	Post-intervention	52	8.13 ± 1.18	
60-69	Pre-intervention	3	5.66 ± 0.57	0.478
	Post-intervention	3	6.66 ± 2.08	

Discussion

Silicosis is an occupational lung disease caused by inhaling silica. The most common form is chronic simple silicosis. Most patients with chronic simple silicosis have no symptoms in the early stage. As a result, many patients, as well as doctors, cannot detect the disease if they do not perform chest x-ray. In Thailand, many cases are not only under-diagnosed but also under-reported. Although the disease is incurable, it is preventable. In general, health literacy is positively associated with health outcomes, such as overall health status, receiving health

services, preventing future diseases, access to medical facilities, and health expenditure.⁵ All of these are reasons why silicosis health literacy is vital for silica exposed workers. For example, the workers at risk need to know about the nature of the incurable disease, complications, and the use of appropriate personal protective equipment, etc. At present, there are few reported silicosis health literacy.^{6,7} We develop silicosis health literacy in Thai population in order to prevent this disease in our country.

In this study, the data were analyzed from a questionnaire before and after giving the class about silicosis from 435 silica exposed workers from 9 factories. The questionnaire reached a Cronbach's alfa index (0.71) (data not shown) and was the subject of analysis. The result shows that almost 20% of workers had a below-average point at the pre-intervention stage. However, only around 10% still had the same level at the post-intervention stage. In the same vein, the results demonstrated that approximately 25% and 45% of the workers had a score at the adequate level at pre and post-intervention stage, respectively. The result also shows that a silicosis health literacy score improved significantly after intervention in all age groups, except for those in the age group ranging 60-69. The most probable reason is that there were only 3 workers aged between 60-69 years. Another possibility is that they may think they have worked for a long time and had no symptoms, so the health literacy may not be necessary.

There were two best response answers after the intervention important to workers. Post-intervention, they knew that surgical masks cannot protect them from getting silicosis, and silicosis cannot be cured. One question that the workers were not able to answer correctly was "Does smoking affect silicotic patient's spirometry?", probably due to the question being too complicated to understand. Another possibility is that they may not have been concentrating on answering this question correctly because only 16.1% of the study workers were active smokers. Nevertheless, we need to improve communication and reduce the number of questions for better understanding.

According to one study conducted on stone quarry workers, 69.9% of the workers know the cause of silicosis. Interestingly, only 8.5% realized that the disease is incurable.⁶ In contrast with the present study, 57.7% knew this fact on pre-intervention. After the intervention, 74.7% knew the correct answer (data not shown). Another study demonstrated that less than 30% of stone mine workers had knowledge of the role of protection.⁷

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This result is almost the same as the present study. Our result demonstrated that 28.2% and 48.5% of the workers knew that fabric and surgical masks could not protect them from silica inhalation (data not shown).

Although this is the first study on silicosis health literacy in Thailand, there are a few limitations. Firstly, this is a retrospective study. Our first intention was to propose silicosis health literacy to workers at risk to prevent themselves from silicosis and its complications in our one project. Also, we had a limited amount of time and personnel to perform this project. As a result, some workers might be confused with some questions and answer them incorrectly. The study demonstrated that the workers improved their level of silicosis health literacy significantly at the post-intervention stage. However, we need to improve how to communicate with them to enhance their understanding. In addition, we need to concentrate on particular groups such as old-age workers. We hope that this silicosis health literacy may decrease silicosis incidence, morbidity, and mortality in Thailand soon after we modify some points. As a result, our country will reduce suffering and the economic burden of this incurable disease.

Conclusion

The present study demonstrated that silica exposed workers improved their level of silicosis health literacy significantly after intervention. However, we need to improve a few points of this silicosis health literacy. After enhancing some issues, this silicosis health literacy may prevent many workers from silicosis in Thailand.

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