Original Article

Rapidly Fatal Silicosis Among Jewellery Workers Attending a District Medical College of West Bengal, India

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Abstract

Background. Silicosis is a slowly progressive chronic occupational lung disease, developed after a prolong period of exposure to high concentration of silica dust.

Methods. In this longitudinal study, we enrolled old and new silicosis patients (n=19; 8 jewellery polishers, 11 from other occupations) seen at our Pulmonary Medicine Department from June 2009 to December 2012 to document the course of illness as per their occupational exposure.

Results. Six of the eight jewellery polishing workers had developed silicosis within five years of exposure, while six of the 11 other workers with other occupational exposure had developed silicosis after exposure of 10 years or more. Mean duration of exposure was significantly less among jewellery polishing workers compared to other workers (3.4±1.7 *versus* 9.3±4.1; p=0.001). Mean duration of illness (months) (14.9±5.8 *versus* 28.5±16.5; p=0.040) were significantly less among the jewellery polishing workers compared to other workers. At the end of the study period, all eight jewellery polishing workers with silicosis had died while four of the 11 patients with other occupational exposure had died.

Conclusion. Silicosis among jewellery polishing workers was found to be more severe and progressive compared to silicosis due to other occupational exposures, in our study. **[Indian J Chest Dis Allied Sci 2015;57:165-171]**

Key words. Fatal, Silicosis, Jewellery workers, Survival, Spirometry.

Introduction

Silicosis is the oldest recorded untreatable chronic occupational lung disease caused by silica that kills thousands of people all over the world every year.[1-4] Silicosis is a preventable occupational lung disease caused by inhaling dust containing crystalline silica.[2] Silica (silicon dioxide) is the most abundant compound in the earth's crust where it is mostly found in the crystalline form known as quartz. Quartz may be contaminated with other elements in trace amounts that give it colour and value as ornament gemstones, such as agate, onyx and amethyst.[5] Jewellery making, include jewellery casting, is a unique profession that requires artistic skill as well as understanding of the scientific properties of fine jewels and metals. Lung disorders have become increasingly more common among jewellery workers.[6-8] This disease is irreversible and continues to progresses even when exposure stops. Recent reports indicate that more than 10 million workers are exposed to crystalline silica in India alone.[9] As there is no effective treatment for silicosis available effective control of exposure to crystalline silica in the work-place is crucial.[5] Crystalline silica exposure and silicosis have been associated with work in mining, quarrying, tunneling, sand blasting masonry, foundry work, glass manufacture, ceramic and pottery production, cement and concrete production.[10] Significant respiratory disease may occurs in workers with a work-place exposure of crystalline silica at levels of 0.1 mg/m^3. Silicosis may present as chronic, accelerated or acute forms. Chronic silicosis results from long-term exposure (more than 20 years), accelerated silicosis occurs after exposure to larger amounts of silica over a shorter period of time (four to eight years), and acute silicosis, results from short-term exposure to very large amounts of silica.[11] Though silicosis among jewellery polishing workers is lesser known fact in India, a cluster of cases have been found from Burdwan and adjoining districts over last couple of years in our Pulmonary Medicine out-patient service. Jewellery polishing workers of our study was mainly from different factories of Mumbai, mainly from Zaveri Bazar. There are approximately 80 jewellery polishing factories in Mumbai and in an average 20-25 workers

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work in each factories. This type of factories are also situated in Jaipur, Ghaziabad, Udaipur, Chennai, Bengaluru, and New Delhi. In these factories, 12-15 workers work in a single ill-ventilated room of about 60 square feet without any exhaust vent for 10-15 hours. During jewellery polishing with *reti*, a white mist of silica dust is produced. Reti is a white cake like bar and contains 98%-99% silica, minor amounts of alumina, and iron oxide. For protection from the dust, factory authorities allegedly only provide a cotton face mask once every week for every worker. According to the version narrated by the workers after 2-3 days this mask often gets torn. The mist of silica dust (silicon oxide) produced by the polishing work of jewellery at the work-place enter into the lungs of the workers through respiration. The factory authorities do not even clean the room regularly and the workers usually work in this unhealthy environment everyday with only 2 off days every month. The authorities did not arrange any health-check-ups for the workers to detect the effects of silica exposure. In this background, the present study was conducted to find out the course of illness of silicosis patients according to their occupational exposure.

Material and Methods

The study was conducted after the permission from Ethics Review Committee (ERC) of Burdwan Medical College and Hospital, Burdwan, West Bengal, India. During the six month period from June 2009, we screened consecutive patients attending the occupational health clinic, out-patient and in-patient services of the Department of Pulmonary Medicine, Burdwan Medical College and Hospital, Burdwan, satisfying the criteria detailed below for inclusion into the study and followed these till December 2012. Patients above 15 years of age presenting with chest symptoms, like chronic cough for more than three months and/or shortness of breath and had history of working for more than one year in factories causing exposure to silica, like mining, quarrying, tunneling, sand blasting masonry, foundry work, glass manufacture, ceramic and pottery production, cement and concrete production, jewellery polishing were included in the study. Patients with past history of respiratory diseases before entering into the working environment were excluded from the study.

During the screening period, 79 patients residing at Burdwan district of West Bengal, attended the occupational health clinic with history of occupational exposure to silica and chest symptoms. During screening clinical assessment was carried out using a standard proforma that contained questions regarding chest complaints, occupational exposure, working place and environment.

Of the 79 patients screened, 59 had occupational exposure to silica and had chest symptoms. Out of these 59 patients, 20 were from different jewellery polishing factories of Mumbai city and 39 were from other than jewellery polishing factories like sand blasting, mining, tunneling, cement and pottery. Chest radiograph using a 300 mA machine and spirometry with assessment of post-bronchodilator reversibility was done in all of them.

Spirometric evaluation was done by using Spirovit-SP10 (Schillar Health Care Pvt Ltd, Switzerland). The measurement was performed using standard protocols according to American Thoracic Society guidelines.[13] The pulmonary function test values were predicted from the standard prediction equation of the normal subjects in Kolkata.[14] The best of three consecutive measurements was chosen. The criteria that was followed for the categorisation of the lung function impairment (obstructive or restrictive) was based on the ratio of forced expiratory volume in the first second (FEV_1) to forced vital coapacity (FVC) and the categorisation of the severity which was based upon the FEV_1% predicted.[15] We could not test for diffusion capacity of lung for carbon monoxide (DLC_O) and lung volumes due to non-availability of the required equipment in our medical college.

Eight patients (all new patients) among jewellery workers and 11 patients (2 old and 9 new patients) among other occupational exposure workers were diagnosed to have silicosis as per the International Labour Organization (ILO) criteria of characteristic chest radiograph picture with an ILO classification of $\geq 1/0$.[12] All the eight jewellery polishing workers used to work at Zaveri Bazar, Mumbai (a Metropolitan city of Maharashtra State, in Western part of India) in different jewellery polishing factories. Overall 19 patients were diagnosed to have silicosis and advised for change in occupation to avoid further silica exposure and followed up till December 2012. The other 40 workers who did not have silicosis were advised to regularly attend our out-patient service.

During follow-up visits, detailed history regarding chest symptoms and clinical examination was done in all the patients and repeat chest radiographs were obtained in selected patients who complained of worsening of chest symptoms. Spirometry was not done during follow-up visits.

No exposure assessments or work-site visits were done due to non-availability of funds and logistic reasons. Sputum examination by fibreoptic bronchoscopy was performed at the time of first visit in patients diagnosed to have silicosis. Bronchoalveolar lavage (BAL) fluid was sent for acid-fast bacilli (AFB) staining and mycobacterial culture to diagnose associated pulmonary tuberculosis and was also analysed for silica by scanning electron microscopy in the Department of Biology in Burdwan University.

Statistical Analysis

Significance of association between categorical data was analysed using Pearson's Chi-square (χ^2) test.

Fisher's exact test was used in a fourfold table, when in any cell an expected cell value was less than 5. Difference between two mean values was tested by Mann-Whitney U test, when the continuous data were not distributed normally. Kaplan-Meier plot with log Rank method was also done for survival analysis of workers. Statistical Package for the Social Sciences (SPSS version 16.0, SPSS Inc, Chicago, IL, USA) was used for statistical analysis. A p-value less than 0.05 was considered as statistically significant.

Results

All the patients were male and did not have any other co-morbid illnesses. Their mean age was 25.4±4.8 years; in both the groups, majority of the workers were in the age group of 20-29 years (Table 1). Jewellery polishing workers were significantly younger compared with workers with other occupational exposure (21.3±2.6 *versus* 28.4±3.6, p=0.0002).

Among jewellery polishing workers, two of the eight were smokers, while 5 out of 11 were smokers among other workers. Two of the eight jewellery workers were illiterate while 4 of the 11 workers with other occupational exposure were illiterate (Table 1). All patients were current or previous smokers. They were being provided a simple cotton face mask that was changed only once-a-week as a preventive measure against work-site silica exposure.

Table 1. Socio-demographic characteristics of silicosis patients (n=19)

Variables	Jewellery Workers No (%)	Workers with Other Occupational Exposure No (%)	Statistical Significance
Age (years)			
<20	3 (37.5)	0 (0)	
20–29	5 (62.5)	7 (63.6)	—
≥30	0 (0)	4 (36.4)	
Smoker			
Yes	2 (25)	5 (45.5)	p=0.633
No	6 (75)	6 (54.5)	
Religion			
Hindu	2 (25)	5 (45.5)	p=0.633
Muslim	6 (75)	6 (54.5)	
Education*			
Illiterate	2 (25)	4 (36.3)	
Literate	2 (25)	2 (18.2)	p=0.939
Primary	2 (25)	3 (27.3)	
Middle school and above	2 (25)	2 (18.2)	

Definition of abbreviations: **SD=Standard deviation**

Fisher's exact test was performed between illiterate and literate (defined as literate + primary + middle school and above) groups

Six out of eight jewellery polishing workers developed silicosis within five years of exposure. All eight jewellery polishing workers had died by the end of the study period. Mean duration of exposure and illness was significantly less among them compared to other workers (Table 2).

Four of the eight jewellery polishing workers had restrictive type of lung function abnormality, followed by mixed defect in two. Obstructive, restrictive, and mixed lesions were noted amongt two, five, and three of the other workers, respectively. Mean FEV_1/FVC% predicted FEV_1, and % predicted FVC was also significantly lower among the jewellery polishing workers (Table 2).

Of the 19 silicosis patients studied, sputum and BAL for AFB stain with mycobacterial culture was positive in two jewellery polishing workers. Those two patients with tuberculosis were cured after treatment with six months of Category I thrice-weekly anti-tuberculosis treatment DOTS (Directly Observed Treatment, short-course), under the Revised National Tuberculosis Control Programme (RNTCP). Silica was detected in BAL samples in all 19 patients by scanning electron microscopy (Figure 1). Radiographic classification of the chest radiographs in both jewellery and other workers with silica exposure is summarised in Table 3.

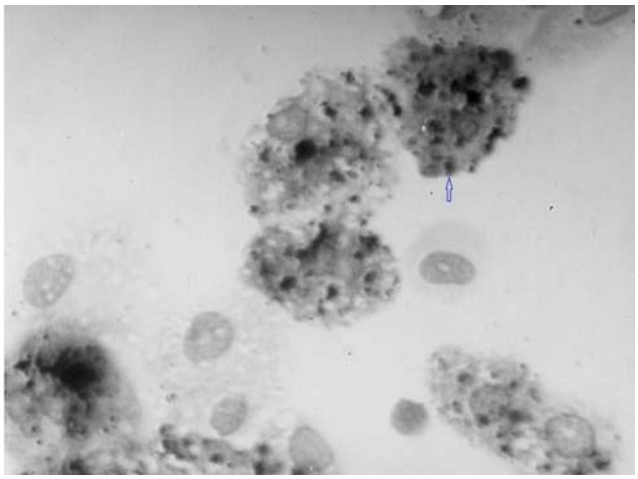

Figure 1. Photomicrograph of bronchoalveolar lavage fluid showing intracellular particles (arrow) of silica in a macrophage (Giemsa×100).

Characteristics of silicosis patients working in jewellery factories (n=8) are shown in table 4, figures 2 and 3.

During follow-up at three monthly intervals, worsening of their chest symptoms with progression of opacities on chest radiograph was noted. All jewellery polishing workers reported rapid progression of their symptoms during each follow-up visits and were died during the study period due to type I respiratory failure and required admission to the intensive care in our medical college hospital (Table 4). Among the 11 workers with other occupational exposure, six showed worsening of their chest symptoms with chest radiographs during follow-up and four patients (three previously diagnosed patients and one newly diagnosed patient) died from type I respiratory failure during the study period.

Table 2. Exposure history, course of illness and selected lung function parameter among the silicosis patients (n=19)

Variables	Jewellery Workers	Workers with Other Occupational Exposure	Statistical Significance
Duration of Exposure (years)			
<5 [No. (%)]	6 (75)	2 (18.2)	
5-9 [No. (%)]	2 (25)	3 (27.3)	p=0.023*
≥10 [No. (%)]	0 (0)	6 (54.5)	
Duration of exposure [Mean (±SD)]	3.4±1.7	9.3±4.1	p=0.001
Duration of Illness (years)			
<1 [No. (%)]	3 (37.5)	2 (18.2)	
1-3 [No. (%)]	5 (62.5)	7 (63.6)	p=0.602†
>3 [No. (%)]	0	2 (18.2)	
Duration of illness (months) [Mean (±SD)]	14.9±5.8	28.5±16.5	p=0.040
Outcome			
Dead	8 (100)	4 (36.4)	p=0.169
Alive	0 (0)	7 (63.6)	
Spirometric Parameters			
FEV_1/FVC			
>0.7	4 (66.7)	5 (50)	p=0.632
<0.7	2 (33.3)	5 (50)	
FEV_1/FVC [Mean (±SD)]	0.82±0.1	0.94±0.11	p=0.046
Post-bronchodilator FEV_1 (%)			
>80%	0	1 (10)	
0%–80 %	3 (50)	8 (80)	p=0.118‡
<50%	3 (50)	1 (10)	
Post-bronchodilator FEV_1 (%) [Mean (±SD)]	49.67±8.43	69.6±11.89	p=0.003
FVC (%)			
>80%	0	2 (20)	
50%–80%	3 (50)	6 (60)	p=0.029
<50%	3 (50)	2 (20)	
Mean (±SD) FVC (%)	61.3±11.0	75.5±12.2	p=0.036
Spirometric Defect			
Obstructive	0	2 (18.2)	
Restrictive	4 (50)	5 (45.5)	
Mixed (obstructive + restrictive)	2 (25)	3 (27.3)	p=0.637
Could not perform	2 (25)	1 (9)	

***For duration of exposure, 5 – 9 and ≥10 years have been clubbed together for Fisher's Exact test calculation**
† For duration of illness, 1 – 3 and >3 have been clubbed for Fisher's Exact test calculation
‡ In case of FEV_1 (%) and FVC (%), Fisher's Exact test was between <50% and >50% groups

Definition of abbreviations: **SD=Standard deviation, FEV_1=Forced expiratory volume in the first second, FVC=Forced vital capacity, NS=Not significant**

Table 3. Radiographic findings of silicosis patients using the International Labour Organization (ILO) classification[12]

Radiographic Finding	Jewellery Workers No. (%)	Workers with Other Occupational Exposure No. (%)
Small Opacities		
Category 0: 0/2, 0/0, 0/1	1 (12.5)	4 (36.4)
Category 1: 1/0, 1/1, 1/2	2 (25)	4 (36.4)
Category 2: 2/1, 2/2, 2/3	2 (25)	3 (27.2)
Category 3: 3/2, 3/3, 3/1	3 (37.5)	–
Large Opacities		
Type A	2 (25)	3 (27.3)
Type B	1 (12.5)	1 (9)
Type C	–	–

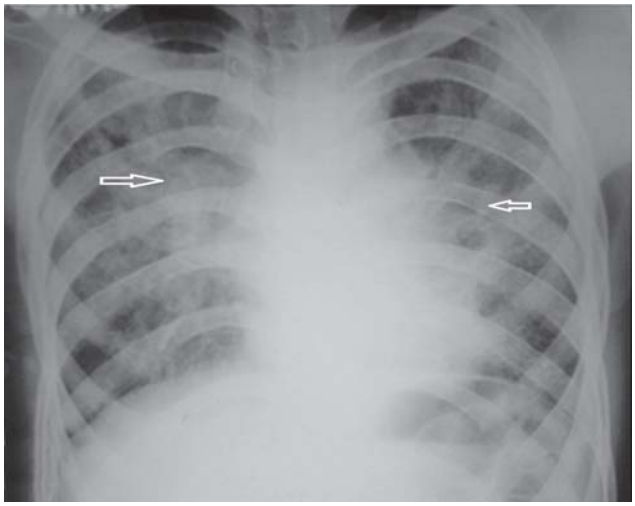

Figure 2. Chest radiograph (postero-anterior view) of patient #1 (Table 4) showing bilateral nodules at mid and lower zones.

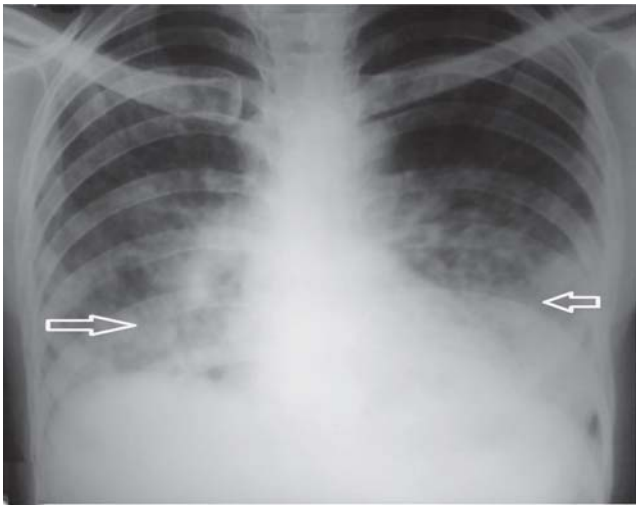

Figure 3. Chest radiograph (postero-anterior view) of patient #3 (Table 4) showing bilateral diffuse mid and lower zone predominant nodular opacities.

Table 4. Characteristics of silicosis patients working in jewellery factory (n=8)

Characteristics	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Age (years)	19	22	25	18	20	24	23	19
Sex	Male	Male	Male	Male	Male	Male	Male	Male
Smoker	No	No	No	Yes	No	Yes	No	No
Duration of exposure	2 years	5 years, 5 months	1 year, 5 months	2 years	3 years, 5 months	6 years	3 years	4 years
Duration of illness (months)	26	9	18	10	16	18	12	10
Presenting symptoms	Cough, dyspnoea	Cough, dyspnoea, chest pain	Cough, dyspnoea, fatigue	Cough, dyspnoea	Cough, dyspnoea, chest pain	Cough, dyspnoea	Cough, dyspnoea, chest pain	Cough
Chest radiograph	Bilateral nodules at mid and lower zones (Figure 2)	Diffuse nodules in the lower zones of the lungs	Bilateral diffuse mid and lower zone predominant nodular opacities (Figure 3)	Bilateral reticulo-nodular opacities	Bilateral nodular opacities in upper and mid zones of lung	Bilateral mid to lower zone nodular opacities	Diffuse nodules in the upper and mid zones of the lungs	Bilateral reticulo-nodular opacities
HRCT thorax	Bilateral diffuse nodular opacities and areas of massive fibrosis with traction bronchiectasis in right upper lobe	Areas of coalescence of nodular predominant opacities more lower lobes	Bilateral nodular opacities with areas of fibrosis	Diffuse nodular predominant with patchy areas of fibrosis in lower lobes	Not done	Not done	Areas of coalescence of nodular predominant opacities more in upper lobes	Diffuse nodular predominant with patchy areas of fibrosis in lower lobes
Spirometry defect	Mixed	Restrictive	Could not perform	Restrictive	Mixed	Could not perform	Restrictive	Restrictive
FEV_1/FVC	0.69	0.89		0.83	0.69		0.92	0.87
%predicted FEV_1	52%	44%		40%	46%		64%	52%
%predicted FVC	75%	49%		48%	67%		69%	60%
Associated tuberculosis	No	No	Yes	No	No	No	Yes	No
Follow-up	Progression of chest symptoms reported at 24 months of follow up and got admitted in ICU at 26 months	Progression of chest symptoms reported at 6 months of follow up and got admitted in ICU at 9 months	Progression of chest symptoms reported at 15 months of follow up and got admitted in ICU at 18 months	Progression of chest symptoms reported at 9 months of follow up and got admitted in ICU at 10 months	Progression of chest symptoms reported at 15 months of follow up and got admitted in ICU at 16 months	Progression of chest symptoms reported at 12 months of follow up and got admitted in ICU at 18 months	Progression of chest symptoms reported at 9 months of follow up and got admitted in ICU at 12 months	Progression of chest symptoms reported at 9 months of follow up and got admitted in ICU at 10 months
Outcome	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead

Definition of abbreviations: HRCT=High resolution computed tomography, FEV_1=Forced expiratory volume in the first second, FVC=Forced vital capacity; ICU=Intensive care unit

Kaplan-Meier survival analysis showed that the survival probability between jewellery and other workers were different [log rank (Mantel-Cox)=5.259; df=1; p<0.0002] (Figure 4). Median survival time for jewellery polishing workers was 18 months which varied from as low as 14 months to as high as 21 months and it was much lower compared to that observed in workers with other occupational exposure [54 months, confidence interval 34.09-73.91). Silicosis among jewellery workers was rapidly fatal. All the silicosis patients were advised to stay away from their work-place and their families were also counseled against silicosis.

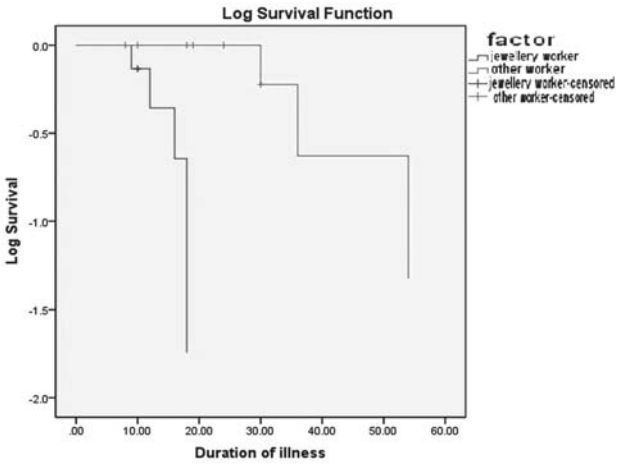

Figure 4. Kaplan-Meier analysis showing survival of silicosis patients.

Discussion

In our study, silicosis among jewellery polishing workers had lower zone predominant opacities, which was rapidly progressing with time with confluence of patches, corroborating with acute silicosis. Usually acute silicosis that develops over months in response to exceedingly heavy exposures as in sand blasting or dry drilling is characterised by appearances suggestive of pulmonary oedema.[16-20] In this study, we found that jewellery workers with silicosis had a more rapid downhill course of illness than others. The increased fatality and rapidity of progression may be due to increased concentration of silica at the work-place with excessive working hours.

A study conducted in Italy[6] showed talcum-like powder containing 60% to 80% crystalline silica, commonly called "gypsum", inappropriately labelled, was used for casting and polishing work at jewellery industries. Jewellery polishing workers of our study were also using cakes made up of white dust like material containing 98% to 99% silica with minor aluminium and iron oxide, locally known as *reti*. All of them had radiologically similar presentation consistent with fatal accelerated silicosis. Two of them were found to have sputum positive tuberculosis during the course of the illness. There is high risk of pulmonary tuberculosis among silica exposed workers or silicosis patients, so early detection of pulmonary tuberculosis improves the survival and morbidity of those workers.[21]

A two-year study[7] from China's Shenzhen, Huizhou, Shanwei and Guandong areas, revealed that although the normal incubation period for silicosis is around eight years, many of the sick workers identified had contracted the illness only after one or two years of working in the industry as work-site dust levels exceeded 56% of the maximum legal limit, in some cases by as much as eight times.

In our study we found jewellery polishing workers developed acute silicosis after a mean period of 3.4 years exposure. Non-smoker and former smokers are at a higher risk of developing clinical silicosis.[22] Silicosis may occur after a short duration and low levels of occupational exposure though longer duration and higher levels of exposure are associated with increased risk.[23] According to Chinese news report on the disease, "At present, there is no effective cure for silicosis anywhere in the world, and the illness often proves fatal. Those who contract silicosis are in effect placed under a suspended death sentence".[8] So, silicosis needs to be prevented by proper work-site preventive measures and regular health check-ups to protect workers exposed to silica at work-place.

Conclusions

Silicosis among jewellery polishing workers was found to be severe and progressive compared to silicosis due to other occupational exposures and develops with short duration of occupational exposure. Our study emphasises that work-place of the jewellery polishing factories needs strict compliance of safety measures to prevent that deadly disease.

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References

1. Mittleman RE, Welti CV. The fatal cafe coronary: foreign-body airway obstruction. *JAMA* 1982;247:1285–8.
2. Elmes PC. Inorganic dusts. In: Raffle PAB, Adams PH, Baxter PJ, Lee WR, editors *Hunter's Diseases of Occupations*. Boston: Little, Brown, and Co.; 1994:pp421–8.
3. Leitch AG. Functions of lungs. In: Seaton A, Seaton D, Leitch AG, editors *Crofton and Douglas's Respiratory Diseases*. London: Blackwell Science Ltd; 2000:pp26–62.
4. Kimura K, Nakano I, Ohtsuka Y, Okamoto K, Usami I, Onishi K, *et al*. Today's occupational respiratory disease—from our recent investigations. *Hokkaido Igaku Zasshi* 2010;85:27–30.
5. Chaudhury N, Phatak A, Paliwal R, Raichaudhari C. Silicosis among agate workers at Shakarpur: an analysis of clinic-based data. *Lung India* 2010;27:221–4.

6. Zanin F, Lievore F, Zanon P, Piz C. Acute silicosis in jewelry casting. *G Ital Med Lav Ergon* 1999;21:266–70.
7. China Labour Bulletin. December 2005. The silicosis epidemic among guangdong jewellery workers and the defects of china's occupational illnesses prevention and compensation system: deadly dust. *CLB Research Series*: No.1.
8. Yanhong T. Dust from stone-cutting engenders stubborn illness – guangdong's jewellery processing industry under the dark shadow of silicosis. *Zhongguo Jingying Bao (China Business News)*, August 29, 2004. *China Labour Bulletin*, December 2005.
9. World Health Organization. Global Occupational Health Network. Elimination of silicosis. *GOHNET Newsletter 12*. Geneva: World Health Organization Global Occupational Health Network; 2007.
10. Jindal SK. Silicosis in India: past and present. *Curr Opin Pulm Med* 2013;19:163–8.
11. Cowie RL, Murray J, Becklake MR. Pneumoconioses and other mineral dust–related diseases. In: Mason RJ, Broaddus VC, Martin TR, King TE Jr, Schraufnagel DE, Murray JF, Nadel JA, editors *Murray and Nadel's Textbook of Respiratory Medicine*. Philadelphia: Saunders; 2010:pp1554–86.
12. International Labour Office (ILO). *Guidelines for the Use of ILO International Classification of Radiographs of Pneumoconioses. Revised edition*. Geneva, Switzerland: International Labour Organization; 2000.
13. Laszlo G. Standardisation of lung function testing: helpful guidance from the ATS/ERS Task Force. *Thorax* 2006;61:744–6.
14. Chatterjee S, Saha D, Chattopadhayay BP. Pulmonary function studies in healthy non-smoking men of Calcutta. *Ann Hum Biol* 1988;15:365–74.
15. Pellegrino R, Viegi G, Brusasco V, Crapo RO, Burgos F, Casaburi R, *et al.* Interpretative strategies for lung function tests. *Eur Respir J* 2005;26:948–68.
16. Buechner HA, Ansari A. Acute silico-proteinosis: a new pathologic variant of acute silicosis in sandblasters, characterized by histologic features resembling alveolar proteinosis. *Dis Chest* 1969;55:274–8.
17. Suratt PM, Winn WC Jr, Brody AR, Bolton WK, Giles RD. Acute silicosis in tombstone sandblasters. *Am Rev Respir Dis* 1977;115:521–9.
18. Xipell JM, Ham KN, Price CG, Thomas DP. Acute silicoproteinosis. *Thorax* 1977;32:104–11.
19. Zimmerman PV, Sinclair RA. Rapidly progressive fatal silicosis in a young man. *Med J Aust* 1977;2:704–6.
20. Banks DE, Bauer MA, Castellan RM, Lapp NL. Silicosis in surface coalmine drillers. *Thorax* 1983;38:275–8.
21. Rees D, Murray J. Silica, silicosis and tuberculosis. *Int J Tuberc Lung Dis* 2007;11:474–84.
22. Brown T. Silica exposure, smoking, silicosis and lung cancer—complex interactions. *Occup Med* (Lond) 2009;59:89–95.
23. Tiwari RR, Sharma YK. Respiratory health of female stone grinders with free silica dust exposure in Gujarat, India. *Int J Occup Environ Health* 2008;14:280–2.

400 workers occupied the streets of Pindwaraâ€™s RIICO to demand freedom from the fatal Silicosis disease caused by silica-rich stones used for constructing temples.Â The workers had one rallying cry â€“ freedom from the occupational disease of Silicosis. According to the Sirohi districtâ€™s health department, over 1,650 of these temple-building workers are dying due to a fatal, untreatable lung disease. Even this number is an under-estimation, given that Silicosis screening began only three years ago in this area. Ironically, factory owners call this work bhagwan ka kaam (Godâ€™s work). On May Day, the Sangathan sent a strong message to the employers asserting that this holy work must become safe and dignified. Silicosis in Pindwara, Indiaâ€™s foremost temple-buil Conclusion- silicosis among jewellery polishers is rapidly fatal comparing with other silicosis cases. Concerned authorities must ensure environmental safety norms strictly at those factories. Acute respiratory failure.Â You are going to email the following Rapidly fatal acute silicosis among young imitation jewellery workers in india. Message Subject (Your Name) has sent you a message from European Respiratory Society. Message Body (Your Name) thought you would like to see the European Respiratory Society web site. Your Personal Message. Rapidly Fatal Silicosis Among Jewellery Workers Attending a District Medical College of West Bengal, India. Article (PDF Available) Â· July 2015 with 214 Reads. How we measure 'reads'.Â silicosis among jewellery polishing workers is lesser. known fact in India, a cluster of cases have been found. from Burdwan and adjoining districts over last couple. of years in our Pulmonary Medicine out-patient service. Jewellery polishing workers of our study was mainly.Â District Medical College of West Bengal, India. Prabodh Panchadhyayee1, Kaushik Saha2, Indranil Saha3, Rupam Kumar Ta2, Santanu Ghosh2, Arnab Saha4, Pratik Barma2 and Mrinmoy Mitra5. Department of Pulmonary Medicine, Medinipore Medical College and Hospital1, Burdwan; Department of.