SHORT REPORT ON HEALTH SURVEY OF LAL KUAN VICTIMS

SUBITTED BY

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FINAL REPORT OF HEALTH ASSESSMENT OF LAL KUAN SUBJECTS

Background:

The Honourable Chief minister of Delhi summoned a meeting of senior officials on 24 October 2005 to discuss the problems confronting the residents of Lal-kuan, a hamlet near Badarpur. An NGO by the name of PRASAR claimed that the inhabitants residing in the area were suffering from dust related health problems. In past, they worked on stone crushers and quarries in Lal Kuan. According to the NGO, their work and living in the area, has left thousands disabled due to tuberculosis and silicosis. The Principal Secretary Health and the Dean MAMC and other senior officers represented the department of health and family welfare. The Honourable Chief minister directed the Pr. Secy. Health to organize a health survey in Lal-Kuan to assess the health status of affected population. The terms of reference of the survey included "STUDYING THE IMPACT OF DUST ON THE HEALTH OF THOSE WHO EITHER WORKED OR RESIDED IN THE AREA". The services were already being provided to those who had contracted tubercular infection. They were being provided care and drugs by TB Society under RNTCP (DOTS) programme. Pr. Secy. Health directed the Dean MAMC to accept the responsibility of organizing the survey. The Dean MAMC constituted a task force comprising Dr. T.K. Joshi, an expert in Occupational & Environmental Health, Dr KS Baghotia of DHS, and Dr Neeraj Gupta of COEH (Centre for Occupational and Environmental Health) to conduct this survey under the banner of COEH.

Two surveyors were appointed who were trained and provided guidance by the centre in filling up the interview schedules (Questionnaire). Such schedules are often used to collect information during health surveys. An interview schedule based on ATS (American Thoracic Society) Respiratory Disease Questionnaire was used and modified in consultation with V.P. Chest Institute, New Delhi. An eminent chest specialist Prof. Chabra of the institute provided the tips to modify the questionnaire.

Blood & Urine investigations were required for the subjects under study along with the Chest X-Ray. The most convenient facility identified was the NTPC Hospital in Badarpur Thermal Power Plant which only caters for their staff. The Dean MAMC requested the medical advisor NTPC to let the Hospital, in its Thermal power plant Badarpur to do these investigations. Bringing subjects to NTPC hospital for investigations was a challenge, since many of them were old and debilitated. The Center arranged transport facility from its own resources for the task. All the logistics were put in place after considerable difficulty. The COEH has a meager staff. A study design and plan of investigation was developed with the help of Dr. R.K. Gupta, Deputy Director, IRMS under ICMR. Dr. Gupta has considerable experience in biostatistics and has been involved in a number of studies.

Introduction:

Silicosis, one of the oldest occupational diseases, still kills thousands of people every year, everywhere in the world. It is an incurable lung disease caused by inhalation of dust containing free crystalline silica. It is irreversible and, moreover, the disease progresses even when exposure stops. Extremely high exposures are associated with much shorter latency and more rapid disease progression.

Silica dust is released during operations in which rocks, sand, concrete and some ores are crushed or broken. Work in mines, quarries, foundries, and construction sites, in the manufacture of glass, ceramics, and abrasive powders, and in masonry workshops is particularly risky.

Silicosis results in conditions such as lung fibrosis and emphysema. The form and severity in which silicosis manifests itself depends on the type and extent of exposure to silica dusts: chronic, accelerated and acute forms are all recognized. In later stages the critical condition can become disabling and is often fatal. A frequent cause of death in people with silicosis is pulmonary tuberculosis (silico-tuberculosis). Respiratory

insufficiencies due to massive fibrosis and emphysema (respiratory tissue loss is not always present), as well as heart failure, are other causes of death.

The causative agent, i.e., free crystalline silica, SiO_2, is one of the most common minerals in the earth's crust. It is found in sand, many rocks such as granite, sandstone, flint and slate, and in some coal and metallic ores. The three most common forms are *Quartz, Tridymite* and *Cristobalite*. Inhaled crystalline silica (in the form of quartz or crystobalite) from occupational sources is classified by the International Agency for Research on Cancer (IARC) as a Group 1 human lung carcinogen.

Respirable silica dust may be invisible to the naked eye and is so light that it can remain airborne for a long time. It can thus travel long distances in the air and so affect populations not otherwise considered to be at risk.

Work done on silicosis in India

Workers in developing countries are facing high exposure to silica which results in silicosis and other diseases caused by dust exposure. It is necessary to create awareness among the people at risk. A proper evaluation of the problem in our country is yet to be done, though a few studies have been carried out by NIOH. No study on silicosis focused on the adverse cardiac disorders in silica exposed workers.

The diagnostic criteria for silicosis include chest radiography, Pulmonary Function Testing and Exposure history. The radiographs as per norms were read by:

- Dr. Arthur Frank, Chief of occupational health, Drexel University, Philadelphia, who is internationally known for his work in occupational respiratory diseases.
- Dr. Rahul Mukharjee, MRCP, a respiratory physician in Birmingham Hospital, UK.
- Dr. T.K. Joshi, occupational physician of COEH trained in UK and USA.
- Pulmonary function testing was performed by Dr. Neeraj Gupta of COEH.

Results and Discussion:

1. All in all 165 subjects presented for the study and only 111 turned up for radiological investigation. The results are as follows :

   Approximately 39% of the subjects examined were suffering from Silicosis, or Silico- tuberculosis. The number of subjects with TB was 29%. Thus a *total number* of subjects with silicosis, silico tuberculosis, and tuberculosis was 68%. Silica exposure may lead to tuberculosis as silica has the toxic property of damaging the macrophage. The macrophage plays an important role in defending the lungs. Results are shown in Chart 1.

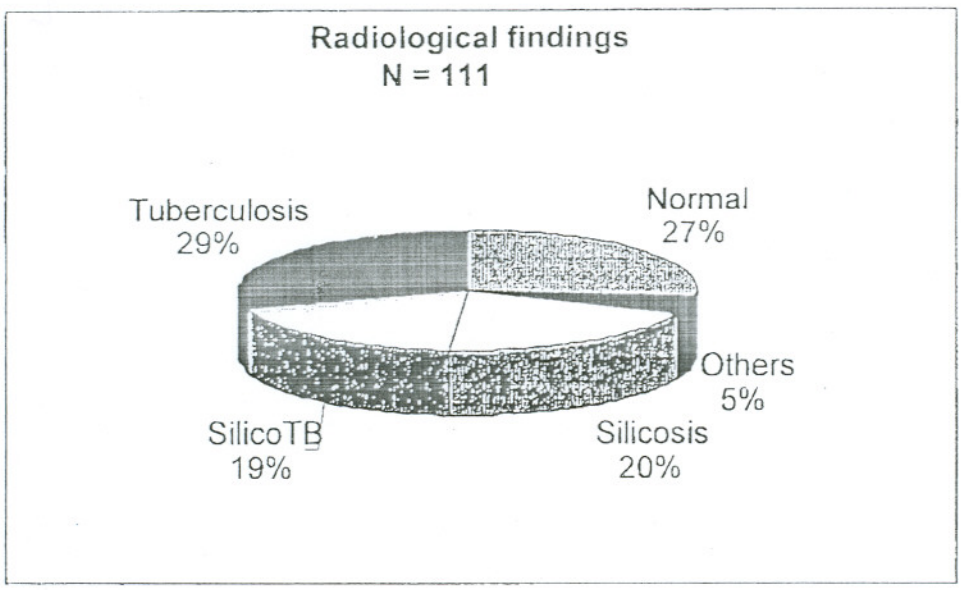

Figure – 1

2. A higher percentage of males suffered from silicosis. This may be due more males working in quarrying and stone crushers. Their dust exposure may have been higher. There is no record of exposures which probably were not undertaken. If the exposure measurements for dust were undertaken, then we could not find records any where. The subjects also stated that they did not use Personal Protective Equipment. The female subjects might have worked in less dusty areas. The comparative results are shown in figure -2.

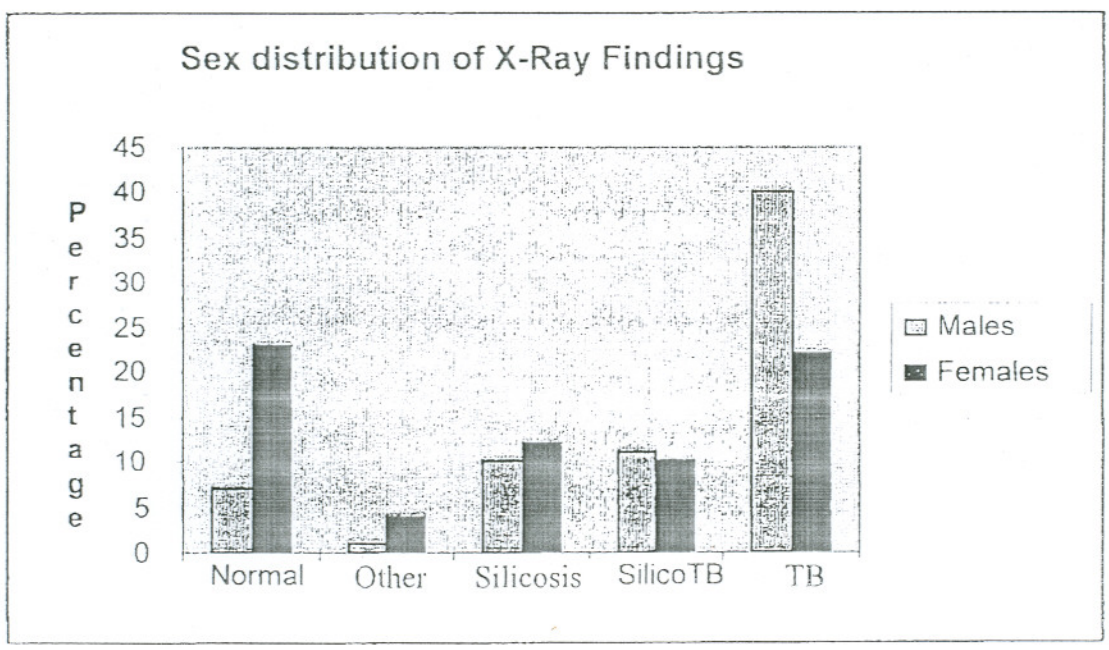

Chart 2

3. Occupational history could be elicited in 104 subjects only who came for radiological investigations. Out of 98 subjects with a history of working in stone crushers, 41 were found to be having silicosis. Only one case of silicosis did not have exposure. It appears that the exposure to dust was associated with silicosis in about 45% of those who worked on stone crushers.

4. The pulmonary function testing revealed that a large number of subjects had severe and moderate restrictive lung disease. A few had a picture of obstructive lung disease. There are scores of causes of restrictive lung disease including exposure to dust rich in silica. Silica exposure leads to smaller, shrunken lungs due to fibrosis. A number of studies have also shown that in later stages of silicosis, an obstructive pattern of pulmonary function results. However PFT testing has some limitations as it is a subjective test and there are chances of subjective error. The results of Pulmonary Function Testing are shown in Table No. 1.

S.No.	PFT Pattern	No. of Subjects	Percentage
1.	Normal	7	4.6%
2.	Mild Restriction	24	15.9%
3.	Moderate Restriction	38	25.2%
4.	Severe Restriction	34	22.5%
5.	Very Severe Restriction	32	21.2%
6.	Not Calculated	16	10.6%

Table No. 1: N= 151

5. The Nutritional status was assessed by Hemoglobin estimation. This revealed that 82% subjects had low hemoglobin levels i.e., Anemia. This should be of serious

concern as the debilitated and malnourished ones may further fall prey to Tuberculosis. The findings are presented in Table 2.

S. No.	Hemoglobin (in gm %)	No. of subjects	Percentage
1.	<8	37	26.1%
2.	8-10	10	7.0%
3.	10-13	70	49.3%
4.	>13	25	17.6%

Table No. 2: N= 142

6. Out of 112 subjects, 48 had hearing loss while working on the crushers. This may be the result of high levels of noise which stone cutting and crushing machines may have generated.

7. ECG examination revealed that of 27 subjects suffering from silicosis, 17 had abnormal ECG findings suggestive of Cor Pulmonale, i.e. secondary heart involvement.

8. Nearly 50% of the subjects reported they worked for eight hours a day, while 22% said that they worked for 10 hours/day. Another 30% stated that they worked 12 hours/ day.

9. Nearly 70% of the workers gave a history of injury which caused them to remain away from work for different time periods. Such injuries are frequent in quarrying and stone crushing unless strict safety measures are adopted.

10. Majority of subjects recalled exposure to heat, dust, noise and diesel smoke as the main hazards.

11. Every one asserted that they were not informed about the hazardous nature of silica dust and the harms it creates.

12. More than 80% subjects have today an income of less than Rs. 1500 per month as stated by the victims. They also complained that their living conditions were unsatisfactory as more than 80% had 4 or more members living in crowded conditions.

13. Some people are still working in the crushers operating in the nearby states.

Conclusions:

1. The study revealed that the work on stone crushers in Lal Kuan region has been associated with Silicosis, Silico-tuberculosis, and Tuberculosis.

2. The percentage of such workers is close to 68% including Tubercular infection.

Recommendations:

1. The survey revealed a high prevalence of silicosis, silicotuberculosis and tuberculosis and a further comprehensive study may be considered.

2. Since the disease is incurable, supportive treatment may be provided. Silicosis also predisposes to tuberculosis; therefore, surveillance for tuberculosis should continue in this population.

3. The socioeconomic condition of most is unsatisfactory. The damage to their lungs can not be reversed; therefore, rehabilitation measures may be considered.