

INCIDENCE & PREVALENCE OF SILICOTUBERCULOSIS IN WESTERN RAJASTHAN: A RETROSPECTIVE STUDY OF THREE YEARS

Kulbeer Chopra¹, Prabhu Prakash², Suman Bhansali³, Arvind Mathur⁴, P K Gupta⁵

¹Medical Officer, ²Associate Professor, Department of Microbiology, ³Associate Professor Department of PSM, ⁴Prof.&HOD Medicine, ⁵Ex.Prof.&HOD, Department of Tuberculosis & Respiratory Medicine, Dr. SN Medical College, Jodhpur, Rajasthan

ABSTRACT

Silicosis is a form of pneumoconiosis. It results from inhalation of dust containing crystalline Silica particles of size 0.5 - 5 microns in diameter. Prevalence of Pulmonary Tuberculosis in Silicotics is more common when compared to prevalence in general population. This entity is called Silico-tuberculosis. Study was conducted in Kamla Nehru Chest Hospital attached with Dr.SNMC Jodhpur, among 300 stone mine workers of sand stone mines of Jodhpur with clinico-radiological evidence of Silico-tuberculosis. Workers were divided into 3 categories cutter / driller involved in blasting and cutting stones, dresser engaged in fine work by chisel and Labourer - Loading and Unloading of Stones in Mines .All studied patients were males, majority of cases belong to 21-55 years (93%) age group. Among these cases maximum no. of patients belong to 46-50 yr. (18%) age group. This is the most economically productive age group in India. With increase in duration of exposure from (0-20 years) to Silica particles there is increase in the no. of silico-tuberculosis. After 20 year of exposure there is decrease in no. of cases because cases do not survive upto that long period. 137 patients out of 300 cases were confirmed Acid Fast Bacilli positive by smear examination. 123 patients out of 300 cases were bacteriologically confirmed by culture. Out of 123 culture positive cases 66 (53.65%) were typical Mycobacteria & 57 (46.34%) were Atypical Mycobacterium. *M. Kansasii*(28), *M. Scrofulaceum* (9) ,*M. Ulcerans*(1) *M. Fortuitum* (19), When radiological pattern of Typical Mycobacteria cases and Atypical Mycobacterial cases were confirmed compared we found that Cavity with Nodulation, Pleural Reaction, Progressive Massive Fibrosis, Lower Lobe Involvement, Pneumothorax they all were more common in Atypical than Typical Mycobacteria. *M.Kansasii* predominantly grown in mining area all around the world. Prevalence of Pulmonary Tuberculosis in Silicotics is more common when compared to prevalence in general population hence all should use prophylactic measures.

Keywords: Silicotuberculosis, Western Rajasthan, Retrospective Study

INTRODUCTION

In Jodhpur district roughly 2 million workers are engaged in sand blasting, chiselling, mining and mineral extraction in sand mines second only to agriculture, in Rajasthan. Around 50,000 such stone mine workers work in mines around Jodhpur (DMRC 2002, Jodhpur). Studies have documented silica exposure with silicosis after heavy exposure to silica and the symptoms can develop within weeks or as long as 5 years after exposure (DMRC 2002, Jodhpur). Chronic Silicosis occurs after long term exposure (over 10 years) of low concentrations of silica dust.

Tuberculosis is most common infection of lung associated with silicosis and together the entity is known as silico-tuberculosis. (Snider, 1978). There are many predisposing and precipitating factors for pulmonary tuberculosis as genetics, physiological, environmental, toxic, immunological and debilitating conditions. The potentiation of growth of tubercle bacilli by silica is probably due to impaired response of macrophages to intracellular mycobacterium tuberculosis altered in the presence of silica. Mycobacteria tuberculosis grows more rapidly in macrophages that are fed with sub-lethal

doses of quartz particles and bacilli are released more rapidly into surrounding medium. (Allison and Hart, 1968).

MATERIAL AND METHODS

This study was conducted amongst 300 persons engaged in the sand blasting and chiselling of stones in the mines at Soorsagar, Kaliberi, Keru and Balesar etc. near Jodhpur in Rajasthan. Such persons with H/O working in stone mines and radiological evidence of silico-tuberculosis were thoroughly interrogated regarding occupation, nature of work, duration of exposure to dust particles before inclusion in the study.

OBSERVATIONS AND DISCUSSION

Table 1: Age Distribution of Patients Suggestive of Silico-tuberculosis

Age Group	Sputum Positive	Mean Age	Suspected Cases		Total (%)
			No.	Mean Age	
15-20	0	0.00	7	18.90	7 (2.3)
21-25	6	22.69	8	24.10	14 (4.6)
26-30	9	28.42	12	30.10	21 (7)
31-35	15	34.90	20	33.09	35 (11.6)
36-40	21	37.20	19	38.21	40 (13.3)
41-45	17	44.20	17	43.60	34 (11.3)
46-50	39	48.20	23	49.50	62 (20.6)
51-55	15	54.10	21	54.90	36 (12)
56-60	12	58.20	16	58.60	28 (9.3)
61	7	69.50	14	70.01	21 (7)
Total	143	39.74	157	42.10	300

The detailed history of illness and complete examination was recorded in the Performa. The

Table 3: Correlation of Radiological Pattern of Disease & Work in Sputum Positive Cases

Work	Patients		Radiological Pattern of Disease											
	No.	%	A	B	C	D	E	F1	F2	G	H	I	J	K
Cutter	42	29.3	17	-	8	5	12	33	10	7	3	-	10	1
Dresser	91	63.6	37	-	17	10	8	26	13	5	4	-	19	6
Labourer	10	6.9	6	-	2	1	-	4	1	-	8	-	2	1

It was observed that the mean duration of exposure of studied population is 28.74 years. Out of the 300 patients the maximum no. of patients 88(29.3) had a duration of exposure of 16-20 years, followed by 11-15 years 67 (22.3), 6-10 years 64 (21.3), 21-25 years 40 (13.3%) and 0-5 years 18 (6%). Above 26 years of exposure to silica no. of cases decreases. In duration of exposure to 26-30 years and no. of cases were

selection of cases was done by radiological criteria for diagnosis of silico-tuberculosis as suggested by Barras. The overnight collection of sputum was examined for presence of acid fast bacilli by smear for 3 consecutive days. The Ziehl-Neelsen stain composition, staining method and sputum smear results were followed according to standard protocols. Culture were done on LJ Medium & incubated up to 8 weeks before reporting negative. Any growth on LJ Medium was identified according to Mackie & McCartney Practical Medical Microbiology (1996).

Cough with expectoration comprised of the predominant signs/ symptomatology 243 (80.0), followed by dyspnea 210 (70.0), chest pain 158 (52.6), haemoptysis 129 (43.0), fever 120 (40.0), anaemia 105 (35.0), clubbing 90 (30.0), cyanosis 30 (10.0), odema of feet 27 (9.0), lymphadenopathy 6 (2.0) and hoarseness of voice 3 (1.0). It was observed that a high prevalence of stone workers were smokers (95%) were smokers, (25%) were addicted to Opium and (15%) to alcohol.

Table 2: Analysis of Culture Positive Patients as per American Thoracic Society

Type of Organisms	Specific Species	No. (%)
Typical	M.tuberculosis	66 (53.65)
Atypical		57 (46.34)
Group - I	M.kansasii	28
Group - II	M.scrofulaceum	9
Group - III	M.ulcerans	1
Group - IV	M.fortuitum	19
Total		123

16(5.3%). In duration of exposure of 31-35 years no. of cases were 3(1%) and in 36-40 year of exposure no. of cases were 4(1.3%).

The radiological pattern is self explanatory, where as in 1998 KNCH study the radiological examination of bacteriological positive cases revealed that out of total 156 bacteriological confirmed cases most frequent pattern was

cavitary disease(F1) in 65 cases(41.6%), F2 pattern seen in 41 cases (26.2%), pattern C seen in 19 cases(12.1%), pattern (G) seen in 12 cases(7.6%) and pattern (I) seen in 8 cases (5.1%).A significant finding was pattern(K) seen in 5 cases (3.2%).Pleural involvement and hilar calcification was observed in great number of cases 53(33.9%) and18(11.5%) respectively. Where as in 1998 KNCH study the Radiological patterns of suspected cases of silico-tuberculosis

were as following; F1 pattern was seen in 58 cases (23.7%), F2 pattern was seen in 66 cases(27.04%), pattern D was seen in 115 cases (47.1%), pattern J was seen in 62 cases (25.4%), pattern C was seen in 54 cases (22.13%), pattern A was seen in 20 cases (8.1%), pattern E seen in 8 cases (3.2%), pattern K was seen in only 3cases (1.2%). None of the stone mine workers in our study was aware of safety measures regarding protection from silica dust in mining area.

Table 4: Correlation of Radiological Pattern of Disease and Organism Grown on Culture

Organism Group	Organism	Percentage	Radiological Pattern of Disease												
			A	B	C	D	E	F1	F2	G	H	I	J	K	
Typical M. Tuberculosis	66	53.66	28	-	22	6	6	25	9	3	15	-	18	-	
Atypical															
Group - I	28	22.76	7	-	6	5	7	17	4	4	2	-	7	5	
Group - II	9	7.31	3	-	1	-	1	3	2	1	1	-	1	1	
Group - III	1	0.81	-	-	-	-	-	1	-	-	-	-	-	-	
Group - IV	19	15.44	5	-	4	2	4	10	8	2	1	-	4	2	

CONCLUSION

There should be regular health check up educational programme for all silica mines workers. Smoking should be prohibited in these workers and while working in mines all workers should be advised to put face mask. Any respiratory illness should be taken care immediately.

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