Original Research Paper

Volume : 5 | Issue : 12 | December- 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 78.46

DETECTION OF SILICOSIS AMONG STONE MINE WORKERAS IN ANAKAPALLI MANDAL, VISAKHAPATNAM DISTRICT, A.P

Environmental Science

KEYWORDS: : Stone mining, Silica, silicosis, Anakapalli mandal, Occupational health research

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ABSTRACT

The general working conditions in stone mining areas are far from satisfactory and rarely comply with health and safety standards. Stone quarrying and crushing operations give rise to large amount of fine dust containing free silica in the range of 20-70% depending on the nature of stone. The workers are exposed to high levels of free silica which causes silicosis. Silicosis is an occupational disease caused by exposure to silica dust, which cause an inflammation and scarring in the lung. Taking into consideration the prevalence of silicosis disease in stone miners, the present study aims to detect the presence of silicosis among the stone workers in Anakapalli Mandal of Visakhapatnam District, Andhra Pradesh, which comprises of 259 quarries in the nine villages of Anakapalli mandal and also study the impact of the disease in the major quarry located villages.

INTRODUCTION

India is one of the fast growing developing countries where infrastructure development is one of the key factor for its growth. So road metal and building stone is one of the basic ingredients in construction activity. So in order to meet the growing demand of road metal in urban areas due to rapid urbanization, the government is sanctioning the quarry lease to meet its demand(Ref: apmdc.ap.gov.in).

So small scale stone crusher industries are proliferating throughout the country, often in violation of air pollution and zoning guidelines. Many of these units are located in remote area or rural area adjacent to the cities. A large number of persons are employed in this unorganised small scale stone mines and crushing units. Most stone mines are seasonal and operated by small entrepreneurs with daily employment ranging from 5-20 workers though there are mines employing more than 100 persons. Stone quarrying and crushing operations give rise to large amount of fine dust containing free silica in the range of 20-70% depending upon the nature of stone.[1]

In a review article "occupational health research in India" it is suggested that the prevalence of silicosis amongst stone quarry workers was 21% and that in stone crusher was 12%. A report by National Institute of Occupational Health[1999], records more than 3 million people working in various type of mines, ceramics, potteries,foundries, metal grinding, stone crushing, agate grinding, slate pencil industry etc.These workers are occupationally exposed to free silica dust and are at potential risk of developing silicosis.The major occupational diseases/ morbidity of concern in India are: silicosis,musculoskeletal injuries, coal workers' pneumoconiosis, chronic obstructive lung diseases, asbestosis, byssinosis, pesticide poisoning and noise-induced hearing loss. So in an attempt to know about the prevalence of silicosis disease Anakapalli region in visakapatnam district has been selected for the area of the study.

STUDY AREA:

Anakapalli is situated in Visakhapatnam district of Andhra Pradesh, INDIA consisting of 31 villages out of which 9 villages are having maximum number of quarry and crusher units. its geographical coordinates are 17° 41' 0" North, 83° 1' 0" East and its original name (with diacritics) is Anakapalli. Anakapalli is a Municipality city in district of Visakhapatnam, Andhra Pradesh has population of 86,519 of which 43,100 are males while 43,419 are females as per report released by Census India 2011.. Anakapalli is a rich agricultural and industrial belt, close to the national Highway. The quarries operated here are by local contractors and politicians who will take hills on lease all around the agricultural lands and supplies the stone to the local crushers. There are about 259 quarry and crusher units situated in Anakapalli Mandal itself. The More number of these quarry and crusher units producing Road metal and Building stone are concentrated in 9 villages are presented in table 1

TABLE – 1 Distribution of Quarries in Study area

S.No	Name of the Village	No. Of. Quarries
1	Bowlavada	25
2	Kunchangi	50
3	Makavaram	7
4	Mamidipalem	16
5	Marturu	58
6	Seethanagar	13
7	Thummapala	9
8	V.J.Palem	16
9	Vooderu	25

Source: Department of Mines & Geology Anakapalli

Very few epidemiological studies on silicosis are conducted in India showing the prevalence of silicosis as 12-54%.[2] Ref (Saiyad HN, Tiwari Occupational health research in India). This varying prevalence in various sectors is credited to different silica concentration in the work environment and duration of exposure to silica dust. Till date no study has been conducted on stone crusher workers of Anakapalli mandal region in Visakhapatnam district. So an initiation has been made to make awareness about this occupational health status of quarry workers working in both quarry and crusher units of Anakapalli region.

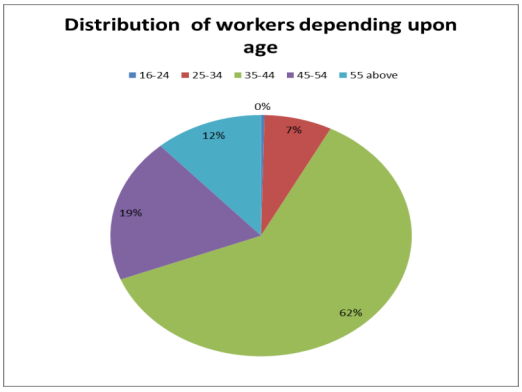
METHODOLOGY:

This is a cross-sectional study conducted for the period from May 20015 to February 2016 to evaluate the health status of the workers exposed to silica dust in their work-place for more than 5 years. Initially, Identification of quarry locations in Anakapalli mandal is obtained from Department of Mines and Geology, Anakapalli. A Preliminary survey has been conducted on the workers working in the quarry as well as in the crusher in the study area, through a structured knowledge questionnaire which was aimed to know the workers working place, site of current job, which has provided, the researcher, a better understanding about the type of exposure, and the awareness in the quarry workers about the silicosis disease so on and so forth. Workers aged between 15 to 75 Years of age where selected for the study regardless of their sex, and who are exposed to stone dust for more than 5 Years. Further distribution of workers with different age groups and job specification were taken in to consideration for the study.

Radiographic assessment is paramount in the diagnosis of silicosis,[3] Particularly the standardised chest x ray film classification. [4] In this study, radiographic examinations were carried out in NTR hospital,

Anakapalli with the consent and with permission taken from hospital authorities. The films used in this radiographs and their viewings were strictly supervised by specialist to ensure proper exposures. Here radiographs of these 50 samples were further sent to radiological experts for further supervision. In this the result of 5 persons were found abnormal and were found to be having nodular opacities.

FIGURE -1 Distribution of Workers depending up on age



RESULTS:

Socio-economic characteristics of stone quarry workers number as per different age groups. The data collected in this survey consists of both inclusion and exclusion criteria as follows

Inclusion criteria:

1. Age of quarry worker
2. Their exposure level
3. Their experience
4. General health
5. Working site (quarry or crusher)

Exclusion criteria:

Quarry or crusher workers who are not willing to participate in this study and the workers who are not available at this time of study were excluded.

As an ethical consideration permission was sought from various departments and also from various bodies that are involved in this study, in the form of verbal as well as written consent to participate in this study. All the individuals' questionnaire has been represented in the form of data useful according to the purposes and objectives of this research study.

Out of these 270 workers, 50 workers came forward to participate for further clinical diagnosis. By using the previously questionnaire sheet, the data included were age, current job, duration of job, site of current job, relevant previous medical history, concentrating on the respiratory and cardio-vascular systems, smoking habits and current compliant (if any).

Demographic profile:

Table: 2 below shows the distribution of men and women across different age groups, who participated in this study. There was significantly lower participation below the age of group of 25 indicating that now-a-days the workers are not allowing their children to pursue this work in the quarries or crushers.

TABLE: 2 Distribution of men and women across different age group

Age group	Male	Female	Total
25 or below	3	0	3
26-40	13	2	17
41-55	20	2	24
56-70	10	0	10
Total	46	4	50

TABLE: 3 Distribution of person according to history of work in stone mines.

Years of work	Male	Female	Total
5 years or below	4	0	4
6-10	14	0	14
11-20	14	3	17
21-30	11	1	12
>30 years	3	0	3
Total			

Proportions of participants with history of exposure to free silica were categorized as less than 5 years, 6-10 years, 11-20 years, 21-30 years and >30 years. The minimum duration of exposure was 3 years while max was 40 years was found in this study.

TABLE : 3 Shows the socio-economic status of the workers working in the quarry

Education level	No. of workers
Primary education	22
Secondary education	10
No education	18
Total	50

DIAGNOSIS BY RADIOGRAPHIC EXAMINATION:

The same sample of 50 persons was then sent to radiographic examinations. Full systematic clinical examination concentrating on the chest was done for all included workers and the results were reported in their individual sheets.

The chest radiographs of these 50 subjects were evaluated as per ILO classification of Radiographs of Pneumoconiosis, 2000 under standardized condition. These radiographs were classified for film quality, type of opacities, and profusion of opacities, extent and other abnormalities. The findings were noted in a standardized radiograph reading sheet. The radiograph of chest was normal in 40 patients, while 10 patients with abnormality. The study revealed that out of 50 clinical findings among our sample, 12% of the persons were found to be having bronchitis without having family history, while 6 % of the persons were found to be with abnormal findings having ill- defined opacities or subtle bronchovascular markings.

TABLE-4 RADIOLOGICAL FINDINGS

Radiological findings	Age	Experience	Exposure
1. silicosis	60 years	35 years	24 hour
2. silicosis	45 years	10 years	24 hour
3. silicosis	42 years	20 years	24 hour
4. Pulmonary koch	69 years	25 years	24 hour

The above table shows that above 40 years are prone to this type of silicosis disease. Although experience plays a major role, the individual resistance also plays a vital role for the development of disease.

DISCUSSION:

Silicosis is an occupational lung disease attributed to the inhalation of crystalline form of sio2 or free silica dust. Despite that the etiology is well recognized and workers at risk are fairly defined, this serious disease remains prevalent all over the world 5,6 Unfortunately, in India, very few epidemiological studies had been conducted in this field. The current study was carried out to outline the morbid effect of occupational exposure to silica dust on the respiratory system of the workers employed in the quarrying zone of AKP mandal. Since Silicosis affects mainly the parenchyma of the lung & in advanced cases the terminal bronchioles, so it is regarded as a restrictive or a

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combined disorder 7,8 . The present study showed that 6% stone and quarry workers were having the silicosis disease. These quarry workers don't know the real cause of silicosis because of lack of proper education and awareness about this silicosis disease. So regarding the management of this disease, the initial stage of the disease, the worker is suspecting as a lung infection and tries to treat with local remedies. If response is not satisfactory they are approaching to the private health practitioner. Those health practitioners treat them with some antibiotic and combination of medicines on the basis of experiences and complaints of the patient. And the practitioners are not suggesting for further diagnosis. So the persons are not identified with this type of disease and also added with that in India there is no record of death certificate mentioning about the real cause of death. In this process, more than 90% of patients were delaying for their correct diagnosis and appropriate medical aid for the silicosis.

Crusher and quarry workers were not using wet drilling as a most appropriate method to stop floating silica in the air which making holes through drilling. Regarding use of mask as a personal protection, expressed difficulty in breathing while chocking holes of mask with silica so frequently, removing and putting mask also was inconvenient at the time of smoking, taking water, tea, meal etc.9

CONCLUSIONS

We The stone and quarry workers in Anakapalli Mandal area are not implementing mine safety rules in the mines. So there is an urgent need to give attention on the problem by everyone. Silicosis is an internal disease and disease progression will be without any symptoms. So one cannot assess the magnitude of this problem. So government should focus on health education, awareness about personnel protection that needs to be carried out among the workers of stone and quarry workers to improve the health life span of these workers and the government should take the responsibility of compensation as they are under socio-economic group.

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