

Impact of stone quarry activities on certain respiratory, haematological and nutrition parameters in children 8-15 years of age compared to children of same age living away from quarries

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Abstract

Globalization and rapid industrial growth in last few years has resulted in emergence of occupational health related issues. However agriculture is main occupation in India giving employment to 58% of the people. Growing human population, urbanization and large scale industrialization in the country lead to environmental degradation, pollution and occupation related hazards. The incidence of occupation related morbidity and mortality is very high in India. The present study is therefore designed to evaluate the respiratory effect of occupational exposure to dust in children, residing near stone quarry and to compare the respiratory, hematological, nutritional parameters in the children of same age residing away from stone quarry.

Key Words: stone quarry

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INTRODUCTION

Growing human population urbanization and large scale industrialization in the country have lead to environmental, degradation, pollution and occupational related hazards. Pollution is responsible for health hazards and it is estimated that about 17% of occupational diseases occurring in the world and 18% of death due to occupational diseases takes places in India.¹ Stone quarry workers from an unorganized sector of industry are scattered all over India. Various procedures and

operations are involved like stone cutting, loading and crushing in stone quarry and therefore a very high degree of respiratory morbidity is associated with this industry. Moreover, as the workers are exposed to silica dust over a long term, considerable lung function impairment in this group of workers is reported in the literature.² Due to low socioeconomically status, overcrowding quarry worker tend to develop respiratory manifestation like recurrent URTI, allergic asthma, allergic rhinitis, Tuberculosis and also develop hematological manifestation like nutritional anemia, various vitamin deficiencies, malnutrition in terms of not gaining weight or loss of weight. Rarely the family members are considered in high risk group for occupational health hazards. Only few studies are done in children, of these families who's both the parents or only father is working in quarries. In India in 1973 a study was done on workers who work in quarry areas as they were exposed to large amount of dust and they were at extreme risk of developing silicosis and related respiratory illness.³ This present Case Control Study was designed to evaluate the occupational exposure to dust in children of age 8- 15 years residing near stone quarry and to compare

the Respiratory, Hematological, Nutritional parameters in these children of same age residing away from stone quarries.

MATERIAL AND METHODS

The case control study of 120 patients with analysis of data obtained was conducted at MGM Medical College Navi Mumbai. In this study 60 children were studied and were included in case group and 60 children were in control group. All were evaluated for respiratory, hematological and nutritional parameters. In case and control study group, age of the children were 8 years to 15 years. Both male and female were included. Both group's children was having history of cough more than 2 weeks was kept as common inclusion criteria. In case study group the added inclusion criteria was that the children should be residing in the vicinity of stone quarry or in a surrounding area of 5 kilometers, for more than 5 years. For case group we visited few stone quarries located in Navi Mumbai area, also few health camps were arranged with the help of local NGOs, who is taking care of these children like running school, providing nutritious food for them. According to inclusion and exclusion criteria children were screened and selected. Detailed history noted. Anthropometry taken, Blood test were performed like Complete blood count, Peripheral smear, ESR, Mantoux test etc. Chest x-ray done and PEFR (Peak Expiratory Flow Rate) calculated. The data was collected in proforma, analyzed and regularly entered in MS-Excel spread sheet 2007.

OBSERVATION AND RESULTS

In present case control study the age of the patient was ranging from 8 to 15 years with the average age of 10.16 years in study group and 10.78 in control group. Difference between the height and weight of the patients between the groups were significant but were within normal limits. 56.7 % and 55% of total cases were male in study and control group respectively. In control group 8.3% of cases had fever and in study group 40% had fever which was significantly more than that in study group. 75% of the cases had weight loss which was significantly more as compared to control group which was 35%.

Presenting Symptoms: In control group none of the patient had Hb level below 7 gm% whereas 3.4% of cases from study group had Hb level below 7gm%. In control group 3.3% of the cases had Hb level 7-10gm% whereas in study group it was 13.3% which was significantly more as compared to study group. The ESR level of more than 10mm was observed in 97.1% of male in study group and 78.8% in control group. ESR level of more than 20 was

observed in 84.6% of females in study group and 63% in control group which was significant.

ESR Levels: Proportion of Mantoux test positive in 81.7% in study group and 40% in control group which was highly significant (i.e. P -value is <0.005). 51.7% cases from study group had Eosinophil count more than 5% which was significantly high as compared to control group, which was 18.3% cases

in control group and 60% of the cases from study group.

Mantoux Test Proportion: 48.34% cases from control group shows abnormal chest X-ray findings, which was more in case group but statistically not significant.

Table 1:

Parameters	Study Group	Control Group
No. Of Cases	60	60
@Age (Years)		
Mean	10.16	10.78
SD	02.06	02.05
Range	08-15 Yrs	08-15 Yrs
@Weight (Kg)		
Mean	* 27.40	22.30
SD	5.5	6.82
Range	18-40Kg	13-43 Kg
@Height (cms)		
Mean	*130.32	122.43
SD	7.19	11.06
Range	114-146	108-155cms
# Sex (%)		
Male	34 (56.7)	33 (55.0)
Female	26 (43.3)	27 (45.0)

@ By – ANOVA * P < 0.005, # By Chi-Square Test

DISCUSSION

Stone quarry workers from an unorganized sector of industry scattered all over India. In most of the studies workers of the stone quarry and their long standing exposure to the dust were studied. As their children also grow in same or near by area they also get exposed to such polluted air due to high amount of dust present in air due to stone cutting, crushing, drilling and smoking causing indirect ill-effect on them. Khoo Von Teik, D'souza EJ in 1960 studied 52 cases of stone quarry workers, out of which 37 (71.1%) had simple silicosis and 13(24.99 %) had complicated silicosis including 4 deaths and total incidence was 99%.⁴ In the present study group 60 children from 8-15 years were studied which were residing near 5km around stone quarry in Navi Mumbai none of them found to be having silicosis over period of more than 5 years of exposure.

Age Incidence: Children age divided into 2 groups. One group of 8-11years and another is of 12-15 years. The total number of children from both study and control group was 88 (77.33%) and 32 (26,67%) for age group 8-11 years and 12-15 years respectively. Galung Hansen O

et al and Amrane R, Djillali A, L'Hadj M *et al* done a study in which he observed that the incidence of infection rise steadily from birth to the age of 9 years, rises more slowly from age 10-14 years and then rise steeply. The probability of developing infection varies with age. It is highest in children under 1 year of age and declining to reach its lowest level from age 4-9 years⁵. Chakraborty AK *et al*⁶ study done in South India over a period of 23 years suggest that prevalence rate of infection for the age group of 0 -9 years in 1982 was 7.9%, in 1963 it was 7.6%, in 1977 it was 6% and in 1985 it was 5.5 %. For age group 10-14 years the incidence in 1962 was 16.5%, in 1963 16.9%, in 1965 16.1%, in 1977 12.1% and in 1985 it was 9.2%.

Sex Incidence: In this case control study it was observed that 34 (56.66%) were males and 26 (43.34%) were female child in case group, while in control group 36 (60%) males and 24 (40%) female. Male predominance was seen. In contrast Pamra SP and Cynthia *et al.*⁷ and in Hussain *et al.*⁸ were noticed female predominance.

Nutritional Manifestations: Generalized weakness was observed in 51.7% and 58.3% of the cases from study and control group respectively. Weight loss was significantly high (i.e. P -value is <0.005) in study group than control group which was 75% and 35% respectively.

Respiratory Manifestation: Among all the cases from both the groups the presenting complaints was cough and cold whereas none of them presented with breathing difficulty. Pulmonary Tuberculosis may be easily confused with other chest diseases during its initial presentation. In control group 8.3% of the cases had fever and in study group 40% had fever which was significantly more than in control group. The present study included 60 cases among which all children presented with chief complaints of cough and cold among which more than 80% cases were found to be having susceptible infiltrations of Koch's on X-ray and also found to be having high ESR and positive Mantoux test.

Hematological Manifestations: In control group none of the patient had Hb level below 7 gm% whereas 3.4% of cases from study group had Hb level below 7gm%. In control group 3.3% of the cases had Hb level 7-10gm% whereas in study group it was 13.3% which was significantly more as compared to study group. In other studies in developing countries Akitunde EO *et al.* Found that moderately elevated ESR was invariably associated with tuberculosis⁹. Olaniyi *et al.* Found high ESR to be statistically significant¹⁰, while Dosumu EA found a significant drop in ESR value on treatment¹¹. This study also shows proportion of positive Mantoux test level more than 10 mm was 40% in control group while 81.7% in study group which was significant

CONCLUSION

The case control study conducted in one of the teaching hospital with an aim to evaluate the various respiratory, haematological and nutritional manifestation in children residing in quarry area and their comparison with children of same age residing away from quarry area. Out of 120 cases, control and case study group is consisting of 60 children each. Apart from cough for more than 2 weeks added inclusion criteria in case study group was that the children should be residing in the vicinity of stone quarry or in surrounding area of 5 kms for 5 or more than 5 years. All children evaluated for respiratory, hematological and nutritional parameters. Generalized weakness was the commonest complaint and it was observed in 51.7% and 58.3% of the cases in study group and control group respectively. In present study 75% of the cases had history of weight loss which was significantly more than in control group which was 35%. 60% of the cases from study group shows abnormal chest X-ray findings. The ESR level of more than 10mm was observed in 97.1% of male in study group and level of more than 20 was observed in 84.6% of females in study group which was significant. Proportion of Montoux test level was 81.7% in study group which was highly significant. 51.7% cases from study group had eosinophil count more than 5% which was significantly high as compared to control group.

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