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Studies on Ventilation in a group of youngsters attending primary school in the greater Calcutta Metropolitan area

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ABSTRACT

The West Bengal Pollution Control Board recently conducted monitoring programme which showed a noticeable decline in the ambient and traffic air quality in the greater Calcutta area. In the current study, the ventilatory function of two groups of elementary school students is compared, one in the greater Calcutta area (Group A) and the other in allocation with superior air quality (Group B). The findings point to a minimal but statistically significant decrease in lung function in the former group exposed to higher levels of air pollution. The results call for long-term prospective studies to evaluate the likelihood that such youngsters may eventually acquire obstructive lung disease.

Key words: *Greater Calcutta area, Elementary school children, Ventilation*

Introduction

Recent years have seen an unacceptably rapid decline in the air quality in the Calcutta metropolitan region as a result of the city's rapid urbanisation, increasing industrialization, and ongoing population expansion. Insufficient traffic management and road space are other contributing reasons to the air pollution issues brought on by stationary source fuel burning and vehicle emissions in the Calcutta cosmopolitan area. Here the differences between metropolitan areas' environments and health are under studied. Few studies have attempted to establish a connection between exposure to air pollutants and the escalation of respiratory disorders in the population. Through biological monitoring, the authors of the current study evaluated the effects of lead (Pb) and carbon monoxide (CO) occupational exposure on some traffic workers in the Calcutta metropolitan region. However, measuring children's ventilatory function is a valuable way to assess the consequences of air pollution (Mukherjee and Mukherjee, 1998a). In this study, efforts were undertaken to compare the ventilatory function of a group of primary school students from a less polluted location with that of children from a primary school in the Calcutta metropolitan area, which showed air pollution levels significantly beyond the WHO standards.

Showing the air pollutant levels

	Group A	Group B
S.P.M ($\mu g/m^3$)	570.5	173.5
SO_2($\mu g/m^3$)	70	Below detection level
NO_x ($\mu g/m^3$)	87.3	55

Source: (Sikdar *et al.*, 1998)

Materials and Methods

For the purpose of examining the functional state of the lungs, two groups of students were chosen - one (Gr. A) from a known polluted location in Shrirampur, which included 142 children in the 6-12 age range (Male-83, Female-59) and the other from a less polluted location in Greater Sundarban, which included 105 children in the same age range (Male-64, Female-41).

After a standard clinical examination and hemogram, all students underwent a Wright's peak flow meter test to determine their peak expiratory flowrate (PEFR). Three successive judgements were made using the provided norms and the highest reading was considered to be the individual's reading. In each case, the students' height and weight were also recorded.

Results

There was no discernible difference between the two groups' conclusion regarding the physical examination. Sociodemographic research or anthropometric research found that 6.5% of people overall had signs of malnutrition. Several of these groups had some ronchi and occasionally had creps found in their chests, but the differences were statistically insignificant.

Overall, 9% of people had anaemia. Table 2 displays PEFR results for both groups. Overall PEFR in group A ranged from 103 to 232 l/min, but in group B it was between 113 to 243 1/min. Only 8% of the group B's PEFR values were less than 76% expected, compared to more than 21% of the group A's PEFR values (Table 2).

Discussion

Students from severely polluted areas had a minor but statistically significant deterioration of their ability to breathe, according to the current study, but it does not appear to have a substantial impact on their health. Similar researches (Bates *et al.*, 1995; Pershagen *et al.*, 1995; Keiding *et al.*, 1995) conducted in other countries of the world, such as Japan, the United States and England, have demonstrated a connection between geographic variations in air pollution indices and lung function of school going children.

When work exposure, housing changes, or cigarette use are not typically factors in the impacts that are found in children, the PEFR determination is regarded as a valuable tool for measuring the health impact of air pollution in children (Koenig *et al.*, 1993). The extent of the impairment and the number of affected children has been minimal, but when combined with other respiratory issues such recurrent infections and the widespread malnutrition and low socio-economic level in this country, the impacts become more significant and respiratory health is likely to be substantially damaged when cigarette use, industrial exposure, etc. are introduced at a later age and stage. According to certain studies, there is a close connection between the prevalence of symptoms, obstructive airway illness, and ventilatory impairment in adults and their history of respiratory ailments in infancy (Burrows *et al.*, 1977). Our findings appear to support the notion that being exposed to a region with higher air pollution increases the likelihood of having deteriorated lung function. There may be a higher risk of developing obstructive lung disorders in adulthood if there are more cases of acute respiratory infection in children in that area (unpublished observation). Our findings consequently demand long-term prospective research to confirm or refute the potential association.

Table 2. Showing peak expiratory flow rate (PEFR) in school children

	Study	Control	Study		Control	
	Total 142 Mean ± SD	Total 105 Mean±SD	Male 83 Mean ±SD	Female 59 Mean ±SD	Male 64 Mean ± SD	Female 41 Mean±SD
Age (Years)	9 ± 3 (6-12)	10 ± 2 (6-12)	10 ± 3 (6-12)	9 ± 2 (6-12)	11 ± 2 (6-12)	9 ± 3 (6-12)
Height (cm)	115 ± 5 (95-125)	117 ± 3 (97-127)	119 ± 3 (97-125)	117 ± 3 (92-123)	119 ± 2 (100-127)	115 ± 3 (97-124)
Weight (Kg)	21 ± 3 (15-27)	20 ± 3 (16-29)	20 ± 3 (17-27)	21 ± 2 (15-25)	23 ± 2 (17-29)	21 ± 3 (16-27)
PEFR (1/min)	161±10 (103-232)	171±8 (113-243)	165±8 (113-232)	157±10 (103-226)	173±12 (118-243)	164±8 (113-237)

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References

Mukherjee, A. and Mukherjee, G. 1998b. Health effects of Automobile exhaust pollution on the traffic personnel in Calcutta. *Man and Environment.* 9 : I6-24.

Mukherjee, A., Mukherjee, G. and Banerji, U. 1998a. Occupational exposure of the traffic personnel of Calcutta to lead and carbonmonoxide. *Poll. Res.* 17(4): 359-362.

Burrows, D., Knudson, R.J. and Lebowi, M. 1977. The rela tionship of children respiratory illness to adultobstruc tive airway disease. *Am. Rev. Respir. Dis.* I15 : 75.

Bates, D.V. 1995. The effects of air pollution on children. *Environ. Health Perspect.* 193(6) : 49-53.

Koenig. J.Q., Larson, T.V., Hanley, Q.S., Robolledo, V. Dumler, K. and Pierson, W.E. 1993. Pulmonary function changes in children associated with fine particulate matter. *Environ. Res*. 63(1): 26-28.

Keiding. L.M., Rindel, A.K. and Kronbarg, D. 1995. Respiratory illness in children and air pollution in Copenhagen. *Arch. Environ. Health.* 50 : 200.

Sikdar, P.K., Mitra, A., Banerjee, J. and Hait, A.K. 1998. Effect of industrialization and urbanizationon ambient air in and around Sundarban Biosphere Reserve, West Bengal, India. *Journal of Environmental Studies and Policy.* 1 (1) : 45-53.

Pershagen, G., Rylander, E., Norberg. S., Erikson, M. and Nordvall, S.L. 1995. Air pollution involving nitrogen dioxide exposure and wheezy bronchitis in children. *Int J. Epidemiol.* 24 (6) : I147-1153.