

OCCUPATIONAL MORBIDITY AMONG CHILDREN EMPLOYED IN BRASSWARE INDUSTRY

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ABSTRACT

Fifty seven male children between ages of 10-16 years engaged in the brassware industry at Moradabad in Northern India were studied for occupational morbidity. The findings were compared with those obtained in the children ($n = 29$) engaged in other ancillary units which did not involve exposure to the metal fumes and dust in their work environment.

The study showed a high prevalence of respiratory morbidity in the children engaged in the main units in comparison to those employed in the ancillary units (40.3 vs 27.6%; $p < 0.05$). This was associated with significantly higher prevalence of pulmonary impairment in the former group (21.0%) particularly demonstrating restrictive ventilatory abnormality (10.5%) followed by bronchial obstruction (7.0%). The high respiratory morbidity may be attributed to chronic exposure to the fumes and dust of the metals such as nickel, chromium and cadmium. The children employed in the ancillary as well as in the main units showed high prevalences of musculo-skeletal disorders (27.6 and 22.8%) which may be caused by sustained faulty posture adopted during work and physical stress.

Key words: Occupational morbidity, Brassware Industry, Heavy metals.

The constitution of India prohibits employment of children below the age of 14 in hazardous occupations(1). Since a validated definition of child labor is presently not available, it may be defined as 'any work done by children in order to benefit their family or themselves economically directly or indirectly at the cost of their physical, mental and social well being'.

The term 'child labor' applies to the working people in the age group 5-16 years. The exact number of children employed in hazardous occupations is not known and only an approximate estimate of it can be made. In the last ten years the number of child workers has gone up from 13.5 million in 1981 to 113 million in 1990(2). The biggest drawback of the present Child Act (The Child Labour [Regulation and protection] Act 1986) is that the way a 'child' is defined, differs from state to state. In Uttar Pradesh a child means a person under 16 years of age(3).

The types and magnitude of the occupation related morbidity in these children is not exactly known. Gupta *et al.*(3) reviewed the health hazards to which child population is exposed during the course of their occupations. It is difficult to give specific morbidity rates as very few studies have been conducted on this aspect. The present work explores the types and magnitude of occupational morbidities among children employed in brassware industry of Moradabad.

Material and Methods

The brassware industries at Moradabad

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in Uttar Pradesh are the household industries which are spread in almost every street of the old city. The industry is an unorganized one and all the processes are done separately in small units in different places. In fact one or two sub-occupations constitute one small unit. For example, process of polishing the brass items is in itself an industry known as polishing industry. Thus, a brass industry has several small units known by the name of its process.

Before taking up the survey, we prepared a list of different units dealing with different occupations. After the identification of the various processes and the preparation of the list, a stratified random sample of the study population representing each sub-occupation was drawn.

Of 86 children (age group 10-16 years), 57 were engaged in the main units (directly employed) while 29 were employed in the ancillary units.

Children employed in the main units were working as sheet makers ($n = 14$), moulders ($n = 7$), grinders ($n = 10$), polishers ($n = 10$), welders ($n = 5$), engravers ($n = 6$) and electroplaters ($n = 5$) while those engaged in the ancillary units were engaged in packaging, labelling and transporting of the finished brass items in separate sheds elsewhere and had no link with the main units. Thus, the children employed in the ancillary units served as controls for this study since they had no known exposure to toxicants present in the work environment of the main units.

A detailed history of each subject in respect of clinical, occupational and personal characteristics was noted on a pretested schedule. A clinical examination of each subject was done to assess the status of cardiovascular, respiratory, gastrointestinal, genito-urinary, musculoskeletal and central nervous systems.

Roentgenograms of the chest in posteroanterior position were taken on a 300 mA X-ray machine. The X-ray plates were read by a panel comprising a radiologist, a chest physician and an expert in industrial medicine. Blood, urine and stool examinations were done where these were considered necessary to confirm or refute a provisional diagnosis.

Lung function testing was done in all the cases using a Vitalograph spirometer (Model-S) following ATs guidelines for spirometry(4). Special tests like bending, straight leg raising, movement of lumber spine and knee flexion were done on all the children for the assessment of musculoskeletal disorders.

Results

The general profile of the study population is given in *Table I*. The directly employed children and the children employed in ancillary jobs were similar in respect of age and smoking habits. *Table II* shows an overall morbidity of 70.9% among the study population. A total of 73.7% of the directly employed children and 65.5% of the children in ancillary jobs were found morbid. The respiratory morbidity was significantly higher among those employed directly than among those employed in ancillary units (40.3 vs 27.6%; $p < 0.05$). No significant differences, in respect of morbidity of other systems, were found between the directly employed and those working in ancillary units.

Table III shows that the chronic bronchitis (10.6%) and lower respiratory tract infections (8.7%) were the chief causes of respiratory morbidity in the directly employed population while pneumonitis (6.9%) and primary complex (6.9%) were commonly observed in the children

TABLE I—Distribution of Subjects According to Age Group

Age	Directly employed children		Children employed in ancillary units	
	No.	%	No.	%
10	3	5.3	1	3.5
11	1	1.8	1	3.5
12	2	3.5	5	17.2
13	2	3.5	2	6.9
14	10	17.5	5	17.2
15	10	17.5	1	3.5
16	29	50.9	14	48.2
Total	57	(100.0)	29	(100.0)
Overall Mean age	14.8		14.3	
	±		±	
SD ±	1.65		2.15	

TABLE II—Prevalence of Morbidity in Exposed and Control Children

Diseases	Directly employed children (57)		Children employed in ancillary units (29)	
	No.	%	No.	%
Respiratory	23	40.3	8	27.6
Musculoskeletal	13	22.8	8	27.6
Gastro-intestinal	2	3.5	Nil	
Ophthalmological	2	3.5	1	3.5
Skin	1	1.7	2	6.9
Others	1	1.7	Nil	
Total	42	73.7	19	65.5

employed in ancillary units. Engravers and sheet makers had a higher rate of morbidity than their fellow workers engaged in other processes. Chronic bronchitis was the commonest ailment among grinders and engravers. Polishers had a higher rate of lower respiratory tract infections than the others.

Musculoskeletal disorders were slightly higher among the children employed in

ancillary units than among the directly employed children though the differences were not statistically significant. However, bodyache was more frequently found among the directly employed children, specially the moulders. Moulders, as such, had a much higher rate of musculoskeletal disorders than the children employed in ancillary units or the other workers in the brassware industry (*Table IV*).

TABLE III—Prevalence of Respiratory Diseases among Children Employed in Different Suboccupations

	Sheet makers		Moulders		Grinders		Polishers		Welders		Engravers		Electro-platers		Total		Children employed in ancillary unit	
	(14)	(7)	(10)	(10)	(5)	(6)	(5)	(5)	(57)	(29)	n	%	n	%	n	%	n	%
LRTI	1	7	1	14.3	1	10	2	20	—	—	—	—	—	—	5	8.7	1	3.4
Pulm-TB	2	14	1	14.3	—	—	—	—	—	—	—	—	—	—	3	5.3	1	3.4
URTI	2	14	—	—	—	—	—	—	1	20	1	16.7	—	—	4	7	1	3.4
Br. asthma	—	—	—	—	—	—	1	10	1	20	—	—	—	—	2	3.5	—	Nil
Pneumonitis	1	7	—	—	—	—	—	—	—	—	—	—	—	—	1	1.7	2	6.9
Chr. Bronchitis	—	—	3	30	1	10	—	—	—	—	2	33.3	—	—	6	10.6	—	Nil
Pri. Complex	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	6.9
Others (nasal cat.)	1	7	—	—	—	—	—	—	—	—	1	16.7	—	—	2	3.5	1	3.4
Total	7	50	2	28.6	4	40	4	40	2	40	4	66.7	—	—	23	40.3	8	27.6

TABLE IV—Prevalence of Musculoskeletal Problems in Different Suboccupational Groups

	Sheet makers		Moulders		Grinders		Polishers		Welders		Engravers		Electroplaters		Total		Children employed in ancillary units (29)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Backache	1	7	1	14.3	2	20	—	—	—	—	—	—	—	—	4	7	2	10.3
Bodyache	—	—	3	42.8	—	—	1	10	—	—	—	—	—	—	4	7.0	1	3.4
Pain in lower limbs	1	7	—	—	1	10	1	10	—	—	—	—	—	—	3	5.3	2	6.9
Pain in joints	—	—	—	—	1	10	—	—	—	—	—	—	—	—	1	1.7	2	6.9
Myalgia	1	7	—	—	—	—	—	—	—	—	—	—	—	—	1	1.7	—	—
Total	3	21.4	4	57.1	4	40	2	20	—	—	—	—	—	—	13	22.8	8	27.6

n = number of musculoskeletal cases.

The children employed in the main units showed significantly higher prevalence of respiratory impairment in comparison to those employed in the ancillary units (21.0 vs 6.8%; $p < 0.05$). The former group primarily suffered from restrictive ventilatory abnormality (10.5%) followed by obstructive airways disorders (7.0%).

Discussion

The morbidity survey conducted on the children employed in various occupations in the brass industry showed quite high prevalence of respiratory diseases and musculoskeletal disorders which could be attributed to occupational exposure to the fumes and dusts of a variety of heavy metals such as nickel, chromium and cadmium used in this particular industry while musculoskeletal disorders might have developed due to sustained faulty posture adopted by the children during work(5). The study showed that the chronic bronchitis which mainly affected engravers, grinders and polishers was primarily responsible for high respiratory morbidity. The study confirms the earlier reports that exposure to metal fumes may lead to development of chronic bronchitis as a result of chronic irritation of epithelial lining of the respiratory tract(6,8).

Secondly, lower respiratory tract infections were quite common among the children employed as sheet makers, moulders and grinders. These children were more prone to air borne pathogenic microbes than other children since they worked in small dingy congested areas. Similar findings have been reported earlier in the child labor engaged in glass(9), carpet(10,11), silver foil industries(12,13). An epidemiological health survey conducted in agate industry revealed that 51.4% of children

suffered from respiratory morbidity(14). Children employed in saw mills also suffered from high prevalence of respiratory diseases like chronic bronchitis and upper respiratory tract infections(15).

Children employed as moulders in brassware industry suffered more from musculoskeletal disorders. This could be due to a particular sitting posture adopted by the workers for doing the strenuous moulding job which resulted in undue physical and ergonomic stress on the various lower body joints causing aches and pain in them.

To conclude this study revealed a high prevalence of respiratory morbidity and musculoskeletal disorders among the children employed in various occupations in brassware industries. Notable among the respiratory diseases were the chronic bronchitis and lower respiratory tract infections. The high respiratory morbidity was associated with increased prevalence of pulmonary functional abnormalities mainly of restrictive type in the study population. The high prevalence of musculoskeletal morbidity was associated with sustained faulty posture adopted by the children during their occupation.

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NOTES AND NEWS

SYMOSIUM ON SMALL FOR DATE BABIES

A symposium on Small for Date Babies is being organized on *25th February, 1992* at St. John's Medical College Hospital, Bangalore, 560 034.

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