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ORIGINAL ARTICLE **OPEN ACCESS**

Vital System Analysis for Occupationally Exposed Workers in Foundry Industry at Nunihai Industrial Area, Agra

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ABSTRACT
The problem of occupational exposure at workplace is not new for us. From ancient time when industry was not organized, the workers were in very bad conditions of working and living. Industrial areas were always dirty and unsuitable to health. The problem remains same at the present time when industries are organized. However, if we study a system properly to analyze harmful effects, we can put a voice in front of population and government to take necessary steps. However, the information on the effects of foundry emissions on the biochemistry of foundry workers at industrial area Nunihai has not been reported so far. The present investigation certainly recollect the health problems of workers professionally exposed to these industries as well as the public residing around this area, so as the necessary precautions may be adopted and applied for the safety measures. The Present study has been conducted on the workers and staff employed in the iron foundries at Nunihai, Agra.
Keywords: Industry, Foundry workers, Blood Biochemistry

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INTRODUCTION

The sizeable number of studies made in India by anthropologists, sociologists, psychologists, psychiatrists etc to study the nature if medical profession, structure and function of health organizations and hospitals, doctor-patient relationship, health awareness and social dimensions of health, hygiene and medicine in tribal and rural communities, social aspects and consequences of drug abuse aspects of ethno-medicine, role of traditional health analysis of people towards modern/traditional medicine culture components of disease, economic aspects of treatment and hospitalization etc. all these studies are of recent origins. However, if we take retrospectively, the studies done by scientists in the area of nutrition occupational disease, coal miners, tannery workers, foundry workers, etc provide rich data about the socio-economic aspects of health and disease in the country [1].

Pollutants emitted from foundry work cause so much damage to blood which carries oxygen to the organs of the body; very innocently carries the harmful chemicals and gases to the various organs. Substances have been shown to produce harmful effects on the blood, bone marrow, spleen and lymph nodes, since blood cells are constantly being replenished, with new ones entering the circulation as mature cells are lost the blood system is especially vulnerable to the toxins. However, the information on the effects of foundry emissions on the biochemistry of foundry workers at industrial area Nunihai has not been reported so far. The present investigation will certainly recollect the health problems of workers professionally exposed to these industries as well as the public residing around this area, so as the necessary precautions may be adopted and applied for the safety measures.

MATERIALS AND METHODS

Present study has been conducted on the workers and staff employed in the iron foundries at Nunihai, Agra. For the present investigation India Casting Co., D-42 Foundry Nagar, Agra has been selected which have about 125 employees. The life of the majority of the employees is beset by the problems caused by the direct involvement of the furnace, poverty, illiteracy, disputed life style, unwholesome housing and working conditions, lack of basic sanitation and onset of disease. A small number of employees, however, is well off but the people belonging to this strata may also suffer from the disease which can be aptly related to affluence. The employees under investigation have been distributed in following groups:

Group A- Consisting of molders
Group B- consisting of ladle men, furnace operators
Group C- Consisting of sandmixer, coremaker
Group D- Consisting grinding men, shot blast, welder, electrician
Group E- Consisting pattern maker, painter, labour, water women, maintenance fitter
Group F- Consisting laboratory incharge, mechanical-testing, quality inspector, quality controller, production incharge, dispatch incharge, supervisor, accountant, computer operator, store keeper, marketing manager, gate keeper.

Further, on the basis of age the workers of factory have been divided into following groups-

1. 18-30 years
2. 31-40years
3. 41-50years
4. 51-65years

Collection of blood for analysis

The blood samples from the volunteer workers have been collected separately in different vials. The hemolysis was avoided by using EDTA containing vials. The following precautions have been adopted to avoid the hemolysis-

1. Dry sterilized syringes and needles were used to draw the blood from the arms of the workers.
2. minimum amount of constriction was applied to the arm at the time of drawing of blood
3. the blood flow was maintained at a slow and steady speed and transferred into vial after removing the needle
4. The vials used, were kept clean and dry containing anticoagulant. Blood was allowed to mix with anticoagulant by gentle rotation
5. Separation of plasma or serum was done by slow centrifugation. The serum was also allowed to come out after the clot has firmly contracted.

Separation of serum

Freshly collected blood was transferred slowly and carefully from the plastic syringe to the sterilized dry centrifuge tube. The tubes were left undisturbed in a slanting position for about 1hour to enable clotting. When the clot retraction started, centrifugation was done at 2500rpm for 30minutes to get rid of suspended red blood corpuscles. Supernatant serum was carefully separated from the clot by a fine glass pipette, transferred into air tight glass vials and stored below 8^0C until used. However, serum was brought to room temperature before performing biochemical tests. The blood sugar has been calculated by the enzymatic GOD-POD kit method. The blood urea was calculated by DAM kit method.

RESULTS AND DISCUSSION

Results are tabulated in Table-1 and Table-2.

Table-1: Blood sugar (mg/dl) in various groups of India Casting Co., Agra

Group	18-30	31-40	41-50	51-65
A	116.0	73.0	91.0	142.0
B	98.2	91.4	83.4	134.3
C	83.0	74.0	87.0	99.5
D	83.0	92.4	97.0	64.5
E	88.6	88.4	92.0	67.4
F	78.8	87.0	84.0	141.0

Table-2: Serum urea (mg/100ml) in various groups of India Casting Co., Agra

Group	18-30	31-40	41-50	51-65
A	29.8	19.1	24.6	39.9
B	31.0	30.7	39.8	41.5
C	16.4	28.4	39.1	42.4
D	29.2	30.8	36.3	38.5
E	24.9	22.8	31.0	34.4
F	29.1	19.1	20.0	39.8

Blood sugar level exhibited a progressive and labour dependent increase. It was found at the starting points of the normal values in all age groups viz. group A, group B, group C, group D, group E and group F, where it exhibited the increasing pattern alongwith the increase in age. However, it was found beyond the normal values in the last age group (i.e. 51-65) which may be due to the age factor. Present observations also confirmed with those the findings of Lander and Ronne [1]; Krieger [2] and Carbonell *et al.* [3]. Blood urea level exhibited the variable values depending up on the trades and age groups of the foundry workers. However, values were beyond normal viz. 40.2mg/100ml in group B age group 41-50; in group C, 45.0mg/100ml, 41.5mg/100ml and 43.0mg/100ml in age grous 31-40, 41-50 and 51-65 respectively. In group D, the values were 42.0mg/100ml, 42.0mg/100ml and 41.5mg/100ml in age groups 18-30, 41-50 and 51-65 respectively; in group E, the high value i.e. 40.8 was found in age group 51-60 only. The present observations have been supported by the findings of Xu *et al.* [4], Clavel *et al.* [5] among pesticide exposed farmers and by Iorrizo *et al.* [6] and Parron *et al.* [7] among green house sprayers.

CONCLUSION

Blood sugar and serum urea level depicts two ends of complete metabolism as one is product of metabolism and the other is byproduct. Assessment of these two ends can be used for keeping eye on metabolic system. The above study revealed that the environment of foundry is not upto standards for human health and affect the biological system by unwanted materials which are toxic to human's vital system. One has to efforts for maintaining systematic improvement of working environment for better health of workers.

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