

**OCCUPATIONAL TOXICITY OF IRON IN INDUSTRIAL WORKERS OF AJMER CITY
AND THEIR HEALTH IMPACT****¹Dr. Nanik Jethani, ²Subroto Dutta, ³Firoz Khan and ⁴Dr. Priyanka Bansod***¹Professor, Department of Pathology, J.L.N. Medical College and Associated Group of Hospital, Ajmer (Rajasthan).²Professor, Department of Environmental Science, MDS University, Ajmer (Rajasthan).³Research Scholar, Department of Environmental Science, MDS University, Ajmer (Rajasthan).⁴Senior Resident, Department of Pathology, J.L.N. Medical College and Associated Group of Hospital, Ajmer (Rajasthan).***Corresponding Author: Dr. Priyanka Bansod**

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ABSTRACT

Some metals are indispensable part of human life. But anything in excess is dangerous. So is true for these metals. In excess quantities they become toxic to our body as they are accumulated in the body especially soft tissues. Heavy metals tend to enter our human body through various channels like food, water, air or absorption through the skin when they come in contact with the humans in industrial setting, agriculture, pharmaceutical and residential areas. Humans get exposed to these metals from our immediate surroundings at the workplace or from our residential areas. The aim of this study was to investigate the association between the heavy metal iron as a risk factors and workers that work in various industrial field and they are always coming in contact with heavy metal iron.

KEYWORDS: iron, industrial workers, metal toxicity.**INTRODUCTION**

There are about thirty five metals including the various heavy metals that cause occupational or residential exposure. Fascinatingly, in trace amount these elements are actually indispensable element of our diet, but in larger dose they cause toxicity. Iron is one of the most abundant trace mineral in the body. It is indispensable for various physiological activities in human beings. But in excess amount it accounts for toxicity to the cells. Iron is the leading cause of unintentional poisoning deaths in children less than 6 years old.^[1] Since no mechanism exists for excreting iron, toxicity depends on the amount of iron already in the body. Ingestion accounts for most of the toxic effects of iron because iron is absorbed rapidly in the gastrointestinal tract.^[2]

This study focused on the workers that worked in industrial fields like welders, painters, electroplaters, ceramic industry, jewelry making, battery workers and plumbers in Ajmer region and are always exposed to heavy metal iron. If these metals reach our body more than the required quantity, they tend to concentrate in our body and the overdose cause potential health problem to the workers. The occupational exposure through the various routes like inhalation, touching or oral intake puts the workers at health risk. Monitoring of the levels of trace element iron is important from the view point of control and protection of health of individuals exposed to

iron. Usually, urine is a marker of past exposure. High levels of iron in urine marks past long term exposure. A simple, accurate and validate method is need of hour for bio-monitoring of the levels of iron to keep an eye on the potential risk population to avoid the harmful health hazard.

Electro-thermal atomic absorption spectrometry is one of the popular method of determination of trace metals. Atomic absorption spectrometry equipped with graphite furnace is a popular and successful method for detection of metal levels. The advantage of this method is the small quantity of test sample required. Although its disadvantage is the long analysis period.

MATERIAL AND METHOD

This study was conducted on sixty subjects that work in the various fields like welders, painters, electroplaters, ceramic industry, jewelry making, battery workers and plumbers in Ajmer region during August, 2014 to April, 2015. The demographic and clinical data such as age, sex, marital status, medical history and personal history of alcohol, tobacco consumption and smoking were obtained from the subjects under study. Urine samples and blood samples from antecubital vein were obtained and collected in the tube and then centrifuged at 4000 rpm for 10 minutes to obtain serum. The urine and serum iron levels were determined using atomic absorption

spectrophotometer. The value obtained were analysed by using the Graph Pad Quick Calcs Web site: <http://www.graphpad.com/quickcalcs.cfm>.^[3]

RESULT AND DISCUSSION

The result revealed highly significant increase ($p < 0.0030$) in the concentration of serum iron in the symptomatic than in the asymptomatic group (Table 1).

Table 1: Determination of iron in sera symptomatic and asymptomatic group

Group	N	Mean \pm SD
Symptomatic	30	233.84 \pm 223.55
Asymptomatic	30	105.11 \pm 44.2

$p < 0.05$ Significant

$p > 0.05$ Not Significant

The two-tailed P value equals 0.0030. By conventional criteria, this difference is considered to be very statistically significant.

The result revealed highly significant increase ($p < 0.0005$) in the concentration of urine iron in the symptomatic than in the asymptomatic group (Table 2).

Table 2: Determination of iron in urine symptomatic and asymptomatic group

Group	N	Mean \pm SD
Symptomatic	30	70.93 \pm 70.73
Asymptomatic	30	19.53 \pm 28.08

$p < 0.05$ Significant

$p > 0.05$ Not Significant

The two-tailed P value equals 0.0005. By conventional criteria, this difference is considered to be extremely statistically significant.

The result revealed highly significant increase ($p < 0.0008$) in the iron levels as the age advances (Table 3).

Table 3: Determination of iron exposure according to age

Group	Symptomatic	Asymptomatic
< 40 years	19	30
> 40 years	11	0

$p < 0.05$ Significant

$p > 0.05$ Not Significant

The two-tailed P value equals 0.0008. The association between two group is considered to be extremely statistically significant.

CONCLUSION

The environment is polluted with heavy metals specially those in industrial place and the people and workers who live there are exposed to pollute of heavy metals more than general public. Fast analyses of the urine and blood based accurate methods conducted in the clinical laboratory are the need of time for the rapid diagnosis and interpretation of the sources of exposure. Current

workplaces are not protecting workers from unsafe heavy metals exposure. Employers and workers need support by introduction of safer substitutes and better working conditions. In a nutshell, information, education and communication is the need of hour to create awareness about iron toxicity.

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