


*Research Article***ASSESSMENT OF THE EFFECT OF HEAVY METALS IN SMALL SCALE INDUSTRIES OF MORADABAD DISTRICT****Abid M\*, Mohit K, Rupali, Islam G, Khan NA**

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<p><b>*For Correspondence:</b>  <b>Mohammed Abid</b>          Department of Pharmacology and Clinical Research          School of Pharmaceutical Sciences, IFTM University          Lodhipur Rajput, Delhi Road, Moradabad-244 001          E-mail: fromabid@yahoo.comr Contact No: +919219101624</p>	<p><b>ABSTRACT</b>          The aim of this work was to find out the prevailing diseases that would likely to be caused harmful effects of the ingestion of heavy metal particles in the small scale industries of the Moradabad district. As numbers of metal industries are on a hike with the globalization, sources of metal pollution are also increasing in the parallel way. With this increment in metal pollution health of the workers working there is at stake. Poisoning of metals is causing serious damages to the workers and the persons living around these industries. The study may effectively reveal the ill effects of metal poisoning that are prevailing in workers.</p>
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**INTRODUCTION**

Human evolution has led to immense scientific and technological progress. Global development, however, raises new challenges, especially in the field of environmental protection and conservation (Bennett et al., 2003). Nearly every government around the world advocates for an environment free from harmful contamination for their citizens. However, the demand for a country's economic, agricultural and industrial

development outweighs the demand for a safe, pure, and natural environment. Ironically, it is the economic, agricultural and industrial developments that are often linked to polluting the environment (Ikhuoria and Okieimen, 2000). There are documented cases of many different metals causing toxicity issues. The world's most polluted places threaten the health of more than 10 million people in many countries, according to a report released by a U.S. environmental action group (Environment News Service 2006). According to report, the Chinese city of Linfen, located in

the heart of the country's coal region is as an example of the severe pollution faced by many Chinese cities; Haina, Dominican Republic, is the site of a former automobile battery recycling smelter where residents suffer from widespread lead poisoning; the Indian city of Ranipet, where some 3.5 million people are affected by tannery waste, contains hexavalent chromium and azo dyes. Their presence in the atmosphere, soil and water, even in traces can cause serious problems to organisms. Heavy metals bioaccumulation in the food chain especially can be highly dangerous to human health. The most common route of human exposure to heavy metals is through ingestion from both food and water sources (Pickering and Owen, 1997).

The aim of this work was to find out the prevailing diseases in the worker, working in small scale metal industries that would likely to be caused harmful effects of the ingestion of heavy metal particles in the Moradabad district. As numbers of metal industries are on a hike with the globalization, sources of metal pollution are also increasing in the parallel way. Poisoning of metals is causing serious damages to the workers and the persons living around these industries. Hence the people working in these industries should take some preventive measures to get rid of such complications and the authority may also go for routine counseling of the workers.

## **MATERIALS AND METHODS**

The study was conducted on 200 small scale industry workers of different age groups in the district of Moradabad (U.P.) India. A well designed questionnaire was prepared on the basis of clinical observations and symptoms of the metal poisoning. It included the dietary habits, personal habits, 13 questions related to symptoms and clinical observations. For each question two choices were given (yes or no).The respondents were advised to give the

answers on the basis of symptoms they experienced.

The Performa of the questionnaire is described below:-

### **Personal information:**

- Name of the worker:
- Working hours:
- Job description:
- Age:                      weight:                      sex:
- Dietary habits: personal habits:

### **Clinical observations:**

- Tarry face: \_\_\_\_\_
- Blue line along gums: \_\_\_\_\_
- Bluish black edging to teeth: \_\_\_\_\_
- Slurred speech: \_\_\_\_\_

### **Questions:**

- Any problem experienced after taking up the job?
- Do you frequently have vomiting or Hematemesis?
- Have you had jaundice after taking up the job?
- Do you have gastrointestinal diseases/pain in abdomen/ulcers after taking up the job?
- Do you have frequent problems of liver and kidneys?
- Do you feel sleepy or fatigue or weakness in muscles in normal days?
- Do you have chest congestion or any respiratory disease after taking up the job?
- Experienced any problem of heart after taking up the job?
- Do you have pain in bones normally?
- Any problem related to blood/anemia?
- Any learning or behavioral disorders like confusions, short term memory loss or not able to concentrate after taking up the job?
- Any preventive measures adopted in the factory to get saved?
- Do you know any person who had died off any disease that would likely to get caused in the factory?

## RESULT

### Workers Age Groups:

From the survey of 200 workers it was found that the percentage of workers in the age limit

**Table 1: Study related to No. of workers**

S.NO.	AGE LIMIT	NO. OF WORKERS	%
1	21-30	70	35.00
2	31-40	76	38.00
3	41-50	54	27.00

### Personal habits:

Studies are also done to compare the workers according to their personal habits (alcohol intake, smoking and tobacco intake). The total alcohol intake was 82% & non alcoholics were only 18%. Table no.3 represents the division of workers on the basis of their personal habits.

**Table No 3: Study of personal habits**

S.NO	AGE LIMIT	PERSONAL HABITS (ALCOHOL INTAKE & SMOKING)			
		YES	%	NO	%
1	21-30	56	34.14	14	38.88
2	31-40	64	39.02	12	33.33
3	41-50	44	26.82	10	27.77
	TOTAL	164		36	

### Dietary Habits:

The dietary habits of the workers were divided as bad, average and good. Workers with bad dietary habits do not take proper diet even once in a day. Average dietary habit worker do take their proper diet once or two times a day. Workers with good dietary habit have their diet properly in the whole day. The division of number of workers according to the dietary habits is expressed in table 2.

**Table 2: Study related to dietary habits on the basis of age groups**

S.NO	AGE LIMIT	DIETARY HABITS (NO. OF WORKERS)					
		BAD	%	AVERAGE	%	GOOD	%
1	21-30	14	41.17	4	11.76	52	39.39
2	31-40	6	17.64	12	35.29	58	43.93
3	41-50	14	41.17	18	52.94	22	16.66
	TOTAL	34		34		132	

### Clinical observations:

The metal poisoning was also correlated to certain clinical observations like tarry face, blue line along gums, bluish black edging to the teeth and slurred speech. The workers were also analyzed for these clinical observa-

tions. Among the 200 workers 81% were having tarry face, 49% workers were having blue line along the gums, 37% were having black edging to the teeth and 8% were having slurred speech seen in table 4.

**Table No.4 Study of clinical observations**

S. No.	AGE GROUP	TARRY FACE	%	BLUE LINE ALONG GUMS	%	BLACK EDGING TO TEETH	%	SLURRED SPEECH	%
1	21-30	52	32.09	20	20.40	12	16.21	4	25.00
2	31-40	60	37.07	46	46.93	34	45.94	2	12.50
3	41-50	50	30.86	32	32.65	28	37.83	10	62.50
	TOTAL	162		98		74		16	

**Physical conditions:**

From the survey, it was reported that the workers were having various types of physical deformities which would likely to be caused out of ingestion of heavy metal particles exposed to them. Various diseases like frequent vomiting, jaundice, GI disorders, liver & kidney

problems etc were reported in the workers. It was found that most of prevalent disease was the GIT disorders followed by fatigue & muscle weakness followed by liver and kidney disorders etc. amongst the workers see results in table 5.

**Table No.5 Study of Diseases in different age groups**

S.N	DISEASES	21-30	%	31-40	%	41-50	%	TOTAL	%
1	Vomiting	38	54.28	56	73.68	46	85.18	140	70
2	Jaundice	30	42.85	40	52.63	34	62.96	104	52
3	GI diseases	58	82.85	70	92.10	44	81.48	172	86
4	Liver & Kidney diseases	38	54.28	64	84.21	38	70.37	140	70
5	Fatigue & muscle weakness	50	71.42	54	71.05	46	85.18	150	75
6	Respiratory distress	14	34.28	24	31.57	26	48.14	64	32
7	Heart problem	6	8.57	10	13.15	14	25.92	30	15
8	Pain in bones	24	34.28	28	36.84	38	70.37	90	45
9	Blood problems	52	74.28	44	57.89	24	44.44	120	60
10	Behavioral disorders	30	42.85	32	42.10	28	51.85	90	45

**Study of comparison of diseases in alcoholics and non-alcoholics:**

In this study, it was observed that workers having bad habits like alcoholic and smoking etc,

most frequently suffering the diseases in all the age groups and most frequent disorders was found to be vomiting followed by GIT disorders etc. see in table 6.

**Table No.6 Study of comparison of diseases in alcoholics and non-alcoholics**

S. N	DISEASES	21-30 (%)		31-40 (%)		41-50 (%)	
		WITH	WITHOUT	WITH	WITHOUT	WITH	WITHOUT
1	Vomiting	57.14	42.85	78.12	50.00	81.81	100
2	Jaundice	46.42	28.57	53.12	50.00	68.18	40.00
3	GI diseases	82.14	85.71	90.62	100	81.81	80.00
4	Liver & Kidney diseases	57.14	42.85	81.25	100	72.72	60.00
5	Fatigue & muscle weakness	67.85	85.71	68.75	83.33	86.36	80.00
6	Respiratory distress	39.28	14.28	34.37	16.66	54.54	20.00
7	Heart problem	7.14	14.28	12.50	16.66	22.72	40.00
8	Pain in bones	35.71	28.57	40.62	16.66	72.72	60.00
9	Blood problems	71.42	85.71	62.50	33.33	45.45	40.00
10	Behavioral disorders	39.28	57.14	37.50	50.00	54.54	40.00

## DISCUSSION

In the recent study, severe results were observed as the concentration of heavy metal particles in the body has reached to that level which has started affecting the human biological system and producing toxic effects. Drastic effects of the metal poisoning were observed. Among 200 workers, most of them were having positive signs of toxic effects of metals poisoning e.g. about 81% workers of them were having tarry face which is possibly caused by poisoning of copper metal (<http://www.amazon.com>), 49% workers had blue line along the gums, 8% workers were having slurred speech, these may be due to the effect of chronic lead poisoning (Pearce, 2007), 37% of the workers had black edging to the teeth which would be caused by ingestion of aluminum metal particles ([en.m.wikipedia.org](http://en.m.wikipedia.org)). On the basis of the symptoms investigated in this study, it was

found that the ingestion of heavy metals in body are causing more toxic effects like vomiting, GI diseases which is likely to be caused by various metal poisoning like mercury, lead and aluminum ([www.wellnesswatchersmd.com](http://www.wellnesswatchersmd.com)). Other prevailing diseases were found to be fatigue and weakness in muscles in almost 75% workers which would be caused by ingestion of the particles of mercury, lead, nickel, aluminum ([www.kidney-restore.com](http://www.kidney-restore.com)), about 70% workers had Liver and kidney diseases may be due to mercury, nickel, lead, arsenic, cadmium, and aluminum poisoning ([www.lef.org/protocols](http://www.lef.org/protocols)). About 60% workers were suffering from anemia may be caused by poisoning of mercury and copper metal (<http://www.patient.co.uk>). About 57% workers were found to be suffering from jaundice it would be due to the poisoning of iron metal (<http://www.patient.co.uk>) and about 45% workers were facing dementia which may like-

ly to be caused by lead, mercury, copper, aluminum metal ([www.naturalnews.com](http://www.naturalnews.com)). In the study conducted on the workers it was shocking that most of the effect of metal poisoning was observed in workers. It was found that none of the workers were spared from the poisoning effect of the heavy metals whether alcoholic worker or non-alcoholic worker. From among the prevalent diseases i.e. GI diseases, liver and kidney disorders, fatigue and muscle weakness, frequent vomiting and anemia about 82.14% of the alcoholic workers were having GI diseases as compared to 85.71% of the non-alcoholic workers in age group 21-30. Comparison of the diseased condition in the alcoholic & non-alcoholic workers showed that in age group 21-30, 57.14% of alcoholic workers were suffering from liver and kidney disorders & 42.85% non-alcoholic workers had these diseases.

## CONCLUSION

The present study revealed that the health of the workers in the small scale industries of Moradabad district is at stake due to the effect of increasing heavy metal poisoning. In the study it was found that none of the industry was occupied with any safety device for the protection of the workers. None of the workers were using any preventive measure like mask to protect him from the particles of heavy metals.

Moreover it was also found in the study that there were few deaths due to the effect of heavy metal poisoning. The fumes from the furnaces, the small particles of the heavy metals, long working hours & exposure to metal particles, alcohol intake, poor diet all conclude for the ill effects in the workers. Measures must be taken and definitely should be done something for the workers of Moradabad.

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