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Original Article

Plumbism (Chronic lead poisoning): A Health Hazard at Ship Breaking Industry

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Abstract

Background: Plumbism which is commonly known as chronic lead poisoning may occur due to prolong use of vermilion, dye and cosmetics containing lead.

Objectives: To determine plumbism by observing the clinical features and problems among the workers of ship breaking industry and to draw attention of the legal authorities to take necessary measures and steps for prevention. Methods: A cross sectional study was conducted at ship breaking industry, Shitakunda, Chittagong in the month of February 2012 among 100 ship breaking workers. Data was collected by direct observation and face to face interview by semi structured questionnaire.

Results: A total 100 respondents, 83% (n=83) were found various features of plumbism, 81.93% (n=68) were male and 18.07% (n=15) were female. Maximum workers developed features of plumbism were after exposure to ship breaking industry within 6 to 9 months and the incidence was 27.72% (n=23). Different types clinical features like facial pallor, anaemia, blue line lead (Burtonian line) in the gum, colicky abdominal pain, constipation, hypertension, paresthesia, menstrual disorders, sterility, history of abortion and various general symptoms stand for 66.26% (n=55), 60.24% (n=50), 48.19% (n=40), 89.15% (n=74), 77.1% (n=64), 30.12% (n=25), 8.43% (n=7), 14.45% (n=12), 9.63% (n=8), 3.61% (n=3), 45.78% (n=38) respectively.

Conclusion: Lack of knowledge and cautiousness most of the workers suffer from various types of medical problems. Plumbism is one of those. Precautionary steps should be taken to prevent lead toxicity among workers in the ship breaking industries are must, such as using personal protecting equipments (mask, moisting device etc.), to establish and follow workers friendly company rules, strict monitoring of onsite lead concentration, maintenances of proper ventilation, periodical heath check up and further exposure should be avoided if clinical features of lead poisoning once appear etc.

Keywords: Plumbism, Blue line lead

Introduction:

Lead poisoning is nearly always of chronic type. It may occur in the industrial environment due to inhalation of lead dust or lead vapor arising from plumbing, ship breaking, glazing, polishing, painting, car wielding, coach building, enameling, diamond cutting etc. It may also occur due to low dose consumption from drinking water supplied through lead pipes, food preserved in tin containers having lead lining, food contaminated with lead in the course of preservation or use of insecticides. Poisoning may occur due to prolong use of vermilion, dye and cosmetics containing lead. Absorption of tetra-ethyl lead through skin is common in people who handle petrol or gasoline.[1-3] Ship breaking is a type of ship disposal involving the breaking up of ships for either a source of parts, which can be sold for re-use or for the extraction of raw materials. It may also be known as ship dismantling, ship cracking and ship recycling or ship disposal. Modern ships have a lifespan of 25 to 30 years before corrosion, metal fatigue and a lack of parts render them uneconomical to run. Ship breaking allows the materials from the ship, especially steel, to be recycled and made into new products. This lowers the demand for mined iron or/ and reduces energy use in the steel-making process. Bangladesh has a long coastal belt of about 710 KM. Shitakunda is one of the Upazilla of

Chittagong district where most of the ship breaking industries are situated.[4] Approximately 70 to 200 ships are dismantled annually in Chittagong. More than 100 companies are engaged in this breaking process[5] but still now they are not under any environmental law. Even the companies are not aware about the health hazards and safety of the workers. The workers of these companies break up various foreign ships without any safety equipments like helmets, goggles, gloves, boots, work suits and even the cheapest facial masks.[6] Lack of cautiousness of the workers and inadequate take care and improper law enforcement from the government the industry is facing several internal and external problems among them the health hazard is most important. Whole process of Ship breaking activities are a series of risky works as they exposed to steel and paint mainly which contain lead, cadmium, arsenic, zinc and chromium and sea salts containing various types of asbestos and several thousand liters of oil (engine oil, bilge oil, lubricant oil and grease).[7] Practically 100% of the ship is recycled. In this regard ship breaking industry is a sound sustainable activity. Ship breaking industry is a major employer in the coastal area of Bangladesh specially Shitakunda, Chittagong where 25,000 persons and indirectly employing another 150,000 in industries such as steel rerolling and reselling salvaged materials.[6] Today most of the merchant fleets' vessels are scrapped by the intensive use of the labor at non developed beaches where workers are easily available at minimum cost as 70% of the ship breakers are internal migrant workers from northern areas of Bangladesh, due to large scarce and irregular employment opportunities there. That's why ship breaking is expanding in our country. Due to the lack of health knowledge all the workers are suffer from various types of medical problems like bronchial asthma, chronic bronchitis, emphysema, fibrosis, silicosis, asbestosis and plumbism which is one of the important common health hazard among the workers of the ship breaking industry. Occupational Safety and Health Administration (OSHA) also identified hazardous work conditions like inadequate worker training, lack of or improper personal protective equipment (PPE) especially facial mask, inadequate fire protection, lack of emergency response and even first aid services8. Moreover the employers conceal the information regarding their workers and they treat them as replaceable instruments9. Among so many problems the workers, plumbism is a burning issue in the ship breaking industries. Features of plumbism include facial pallor, anaemia, blue line lead in the gum, colicky abdominal pain, constipation, hypertension, paresthesia, menstrual disorders, sterility, history of abortion and various general symptoms like weakness, anorexia, dyspepsia, metallic taste in mouth, headache vertigo, irritability, drowsiness, arthralgia etc. The purpose of the study is to determine plumbism by observing the clinical features and problems among the workers of ship breaking industry; to draw attention of the legal authorities to take necessary measures & steps for prevention of plumbism which is commonly known as chronic lead poisoning.

Materials and Methods:

It was a cross – sectional type of study based on ship breaking industry, Shitakunda, Chittagong in the month of February 2012 among workers of the ship breaking industry, Shitakunda, Chittagong. Purposive sampling and sample size was 100 and data were collected by face to face interview. A semi structure questionnaire was used as research instrument. Analysis was done by using SPSS and was presented in tabular forms.

Results:

Total 100 respondents were took part in the study. Most of them 83 (83%) respondents developed various features of plumbism and 17 (17%) were free from any features of plumbism (Table-I).

Table–I: Distribution of the respondents according to presence or absence of Clinical features of plumbism (n=100)

Presence or absence of C/F of plumbism	Number	Percentage (%)
Having features of plumbism	83	83
No features of plumbism	17	17

Table–II shows among 83 positive respondents, 81.93% (n=68) were male and 18.07% (n=15) were female.

Table-II: Distribution of positive respondents according to their Gender (n=83)

Gender	Number	Percentage (%)
Male	68	81.93
Female	15	18.07

Table III shows that among 83 respondents 22.90% (n=19), 44.56% (n=37) & 32.54% (n=27) were working in the ship breaking industry less than 6 months, 6 months to 1 year and more than 1 year respectively.

Table-III: Distribution of the positive respondents on the basis of their duration of employment (n=83)

Period of their employment	Number	Percentage (%)
< 6 months	19	22.90
6-12 months	37	44.56
>12 months	27	32.54

Table–IV shows that among 83 respondents, most of them that is 27.71% (n=23) developed features of plumbism within 6-9 months of their joining. And 8.43% (n=7), 19.28% (n=16), 22.89% (n=19), 24.09% (n=20) developed various features plumbism with 3 months, 3-6 months, 9-12 months and more than 12 months respectively.

Table-IV: Distribution of the positive respondents according to their development of features of plumbism after joining in the current job (n=83).

Duration of time to develop C/F of Plumbism after joining	Number	Percentage (%)
Within 3 months	7	8.43
3-6 months	16	19.28
6-9 months	23	27.71
9-12 months	19	20.89
>12 months	20	24.09

Table–V shows that different types clinical features of plumbism like facial pallor, anaemia, blue line lead in the gum, colicky abdominal pain, constipation, hypertension, paresthesia, menstrual disorders, sterility, history of abortion and various general symptoms stand for 66.26% (n=55), 60.24% (n=50), 48.19% (n=40), 89.15% (n=74), 77.1% (n=64), 30.12% (n=25), 8.43% (n=7), 14.45% (n=12), 9.63% (n=8), 3.61% (n=3), 45.78% (n=38) respectively

Table-V: Distribution of the positive respondents on the basis of clinical features (n=83)

Clinical features	Number	Percentage (%)
Facial Pallor	55	66.26
Anaemia	50	60.24
Blue lead line in the gum	40	48.19
Colicky Abdominal pain	74	89.15
Constipation	64	77.10
Hypertension	25	30.12
Paresthesia	7	8.43
Menstrual Disorders	12	14.45
Sterility	08	9.63
History of Abortion	3	3.61
General Symptoms	38	45.78

Discussion:

This cross sectional study was conducted in the month of February, 2012 to determine the clinical features and problems of plumbism among the workers of ship breaking industry to draw attention of the legal authorities to take necessary measures and steps for prevention of plumbism. Diagnosis of chronic lead poisoning was confirmed by puncted basophilia cells (basophilic stippling) more than 200/cu mm of blood. Normal blood level of lead is 0-50 µg/dl. In case of children > 55 µg/dl & adult > 80 µg / dl is diagnostic. Toxicity appears when the level is more than 80µg/ dl. Normal level of lead in urine is 80-100 µg / litre, more than 100 is diagnostic.[1,3] Total 100 respondents were took part in the study. Most of them 83% (n=83) respondents developed various features of plumbism and 17% (n=17) were free from any feature of plumbism. Under 83 positive respondents 81.93% (n=68) were male and 18.07% (n=15) were female. Among 83 respondents 20.9% (n=19), 44.56% (n=37) & 32.54% (n=27) were working in the ship breaking industry less than 6 months, 6 months to 1 year and more than 1 year respectively. Out of 83 respondents most of them 27.72% (n=23) developed features of plumbism within 6-9 months of their joining. And 8.43% (n=7), 19.28% (n=16), 22.89% (n=19), 24.09% (n=20) developed various features plumbism with 3 months, 3-6 months, 9-12 months and more than 12 months respectively. Different types clinical features of plumbism like facial pallor, anaemia, blue line lead in the gum, colicky abdominal pain, constipation, hypertension, paresthesia, menstrual disorders, sterility, history of abortion and various general symptoms stand for 66.26% (n=55), 60.24% (n=50), 48.19% (n=40), 89.15% (n=74), 77.10% (n=64), 30.12% (n=25), 8.43% (n=7), 14.45% (n=12), 9.63% (n=8), 3.61% (n=3), 45.78% (n=38) respectively. Plumbism is a crucial issue in ship breaking industry which necessitates taking various steps to save the workers.[10] Precautionary steps should be taken to prevent toxicity among workers in the lead industries are must, such as using personal protecting equipment (mask, moisting device), to establish and follow workers friendly company rules,[11] strict monitoring of onsite lead

concentration, periodical heath check up,[12] maintenance of proper ventilation and further exposure should be avoided if clinical features of lead poisoning once appear. Another study revealed that among 100 lead workers from different industries were found with various features of lead poisoning and were categorized in three stages- I. a presymptomatic state of lead exposure (n=37), II. a state of mild symptoms or mild anaemia (n=45), and III. frank lead poisoning with severe symptoms and signs (n=18).[13]

Conclusion:

A good number of populations earn their livelihood by working in the ship breaking industry of Shitakunda, Chittagong. Due to lack of health knowledge most of the workers suffer from various types of medical problems such as bronchial asthma, chronic bronchitis, emphysema, fibrosis, silicosis, asbestosis and plumbism, which is one of the important and common health hazard among the workers of ship breaking industry. Maximum of the employers do not ensure any type of safety & security measures for the workers. The workers under study were highly exposed to high lead concentration in the working area. Personal protecting equipments in such working area are not adequate to fully protect them from dust as well as lead inhalation. It is important to find out on-site lead concentrations and take necessary measures & steps to help the workers of ship breaking industry.

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