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Survey of Chemical (Mostly Metals) Poisoning Cases as Reflected in Hospital Admissions in Urban Zimbabwe

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Exposure to heavy metals is mainly an occupational hazard such as in metal mining and refining, in the mechanical and chemical industry. Metals are also used as pesticides (copper and arsenic) and as therapeutic agents (Lithium carbonate, mercurial diuretics), Nylander et al 1987. Amalgams are used in dental treatment and various metals as implants in medicine, (Aronsson et al 1989, Goldwater, 1991). In some various cases the high natural occurrence of metals in food and /or drinking water can be a source of exposure (Gossel and Bricker, 1984). Sometimes the leaching of metals from eating utensils and/or cooking vessels may be a source of exposure. Environmental pollution caused by industrial emission, metals in fossile fuels or metal waste are additional sources of exposure, (Elinder, et al, 1983; Vanter and Lind, 1986). A number of countries now utilise lead-free fuels but in Zimbabwe lead is still blended in motor vehicle fuels and environmental pollution may exist.

In Zimbabwe, the heavy metals which have been associated with toxic exposure are lead, which is ubiquitous in exhaust fumes of motor vehicles, in the lead battery industry, in the glass industry and in the paint making industry; copper, arsenic, and mercury are found in the mining and metal refining industry and as components of insecticides. Cadmium is associated with general pollution and industrial exposure while selenium interacts with heavy metals in causing health effects. The present study is a ten year, (1980-1989), retrospective analysis of heavy metal poisoning hospital admissions as recorded at six of Zimbabwe's major urban hospitals.

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METHODS AND MATERIALS

Data for the study was collected from the hospital medical records departments, (1982 to 1989), the Natioanl Archives, (1980 to 1981) and the Government Analyst Laboratories, where some poisoning incidences are analyzed and recorded. The information extracted from these sources included the age of the patient, sex, type of metal, circumstances of poisoning, occupation of the patient and treatment administered.

RESULTS AND DISCUSSION

In all 40 recorded cases of heavy metal poisoning were analyzed. Nine different metals were associated with poisoning, (table 1), with the majority (70%) of the cases due to copper, antacids (mainly aluminium hydroxide), cyanide and arsenic in that descending order.

Table 1. Chemicals associated with poisoning.

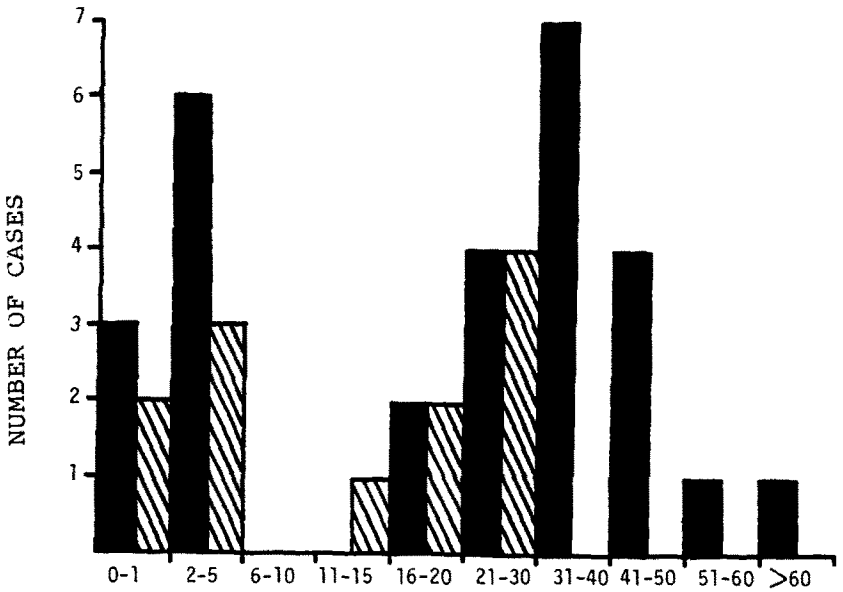
Chemicals	Number of cases	% Total (N=40)
copper	11	27.5
antacids*	8	20.0
cyanide	5	12.5
arsenic	4	10.0
lead	3	7.5
iron	3	7.5
chromium	3	7.5
mercury	2	5.0
lithium	1	2.5
Total	40	100 %

* Possible poisoning due to aluminium and magnesium hydroxide.

The distribution of the poisoning cases according to age and sex is as shown in figure 1.

The majority of the cases, 70% are found within the working age group (18 to 60 years), thus pointing to the occupational exposure nature of metal poisoning. All the cases among the children (<6 years) were accidental. Table 2 shows that accidental cases account for 75& of the incidences and these include occupational poisoning in adults and "accidental" cases in children under the age of 6 years.

FIGURE 1



DISTRIBUTION OF METAL POISONING HOSPITAL ADMISSION CASES, BY AGE AND SEX.

Parasuicides and suicides account for 7.5% (3 cyanide cases) and 12.5% (4 arsenic and 2 cyanide cases) of the cases respectively. Only 2 cases were of unknown nature.

Table 2. Metal poisoning by circumstances.

	Number of cases	% Total
males	28	70
females	12	30
accidental cases	30	75
parasuicides	3	7.5
suicides	5	12.5
unknown nature	2	5.0

Table 3. Outlines the different treatment regimens prescribed for the different metal poisoning cases.

Table 3. Chemical poisoning and treatment prescribed.

Metal	Treatment prescribed
copper	nystatin, paracetamol; i.v. fluids; ipecacaunha syrup; gastric lavage; atropine, magnesium trisilicate.
antacids	metronidazole; gastric lavage; i.v. fluids; pethidine; Benslpenicillin
cyanide	amylnitrate; sodium thiosulphate; magnesium trisilicate
arsenic	amytriptylline; paracetamol; vitamin B Complex magnesium trisilicate.
lead chromium	pethidine; danthron syrup
mercury	aluminium hydroxide; phenergan; magnesium trisilicate.
lithium	oxygen; penicillamine; ampicillin; toxigonin

With the exception of cyanide where amylnitrate and sodium thiosulphate were used as antidotes, treatment of poisoning by the other metals was symptomatic, for pain (paracetamol, pethidine), for infection prevention /prophylaxis, (ampicillin, metronidazole, benzlpenicillin nystatin), to empty the stomach, (ipecacuanha syrup, gastric lavage), to correct the electrolyte balance, (i.v. fluids) and in some cases irrational, (atropine, toxigonin, vitamin B complex). It could be that the specific antidotes for these metals were not available, not indicated or were not known.

The usual recommended treatment regiments for some of the chemicals discussed in this study are; copper, lead, mercury, chelation with penicillamine (dimethyl), (Meredith and Vale); lithium, primarily supportive with resort to diazepam for convulsions, (Goulding); Arsenic, a course of dimercaprol by injection is recommended, (Goulding). No major pathological findings were recorded in

association with these chemical poisoning. However, alkalosis was recorded in association with aluminium and magnesium hydroxide poisonings.

The forty cases for metal poisoning analyzed and studied in this constitute 0.7% of all poisoning cases recorded at the six hospitals over a period of ten years. This seems like a small number but it should be noted that these 40 cases are only hospital admission cases, many more might not reach the hospitals at all. Also metal poisoning is usually a chronic manifestation and fatality may occur before a definitive diagnosis is reached since the underlying medical condition is these chronic cases is metal-poisoning related diseases such as kidney, lung or other organ disease, (Goulding, 1981). A regular monitoring exercise of workers at specific metal mining or metal-chemical industries, is desirable to adequately define the epidemiology of toxic metal poisoning in Zimbabwe.

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