CASE REPORT

Chronic lead poisoning in an adult battery worker

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Background
Lead poisoning is a common environmental health hazard in developing countries. Incidences of lead poisoning are seen in all age groups, especially in adults working in lead-based industries, where many still remain unaware of the adverse effects of exposure to unusually high levels of lead.

Methods
We report the case of an adult battery worker, who initially received symptomatic treatment because of clinical misdiagnosis. Later, he was treated with appropriate chelators, which helped to decrease blood lead levels drastically. However, being unable to change his occupation, he continues to be exposed to potentially lethal doses of lead.

Conclusions
A key role for health agencies, besides providing opportunities for diagnosis and therapy, should be to increase public awareness about this widespread environmental hazard through education, documentation and communication.

Key words
Battery worker; blood lead; chelator; chronic lead poisoning.

Case report
A 44-year-old male presented to our hospital with a 5 year history of pain in the joints and epigastrium. He started work at the age of 10 as a child labourer in a battery-recycling unit. Later, he assumed ownership of the unit and subsequently employed two labourers. He admitted to routinely handling molten lead without a mask and having meals in the workplace without washing his hands. Further, he slept overnight in the same place without changing his clothes. On examination, his blood pressure was 160/110 mmHg and lead lines were seen on the gums. He was referred to the National Referral Centre for Lead Poisoning in India (NRCLPI) as lead poisoning was suspected. Screening involved the estimation of blood lead levels and zinc protoporphyrin (ZPP), an indicator of chronic lead exposure.

He was found to have antral gastritis, reflux oesophagitis grade II and duodenitis at endoscopy and moderate hepatomegaly with diffuse hepatic steatosis on ultrasonography of the abdomen. Liver function tests were normal except for raised alanine aminotransferase (ALT) at 75 U/l (normal range 0–65 U/l), haemoglobin at 10.2 g/dl (M: 13–18 g%), ZPP at 149 mg/dl (normal range up to 35 mg/dl) and blood lead of 160.2 mg/dl (acceptable limit up to 10 mg/dl).

The patient was treated with two courses of chelation therapy, the first using dimercapto succinic acid (DMSA) [1] for 19 days and the second using an alternate chelator, penicillamine (see Table 1). The patient was advised to change his occupation. However, due to economic constraints, lack of employment opportunities and social conditions, the patient currently continues in the same work and with symptoms suggesting ongoing chronic lead poisoning [2].

Discussion
The patient was totally unaware of the ill-effects of being exposed to lead from the age of 10 years and continuously thereafter for 34 years, resulting in chronic lead poisoning.

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poisoning. For a long period of time, he remained asymptomatic. He was initially treated for his symptoms before the root cause of the problem was diagnosed. Subsequent investigations revealed a case of chronic lead poisoning [3]. Mild elevation in ALT and mild hepatomegaly (as reported by ultrasonography) further indicated involvement of the liver as a result of chronic lead exposure [4].

The most important factor in the management of such cases is to prevent exposure to lead. In India, lead-based cottage industries, which employ adults as well as children, are housed in small and overcrowded premises. These units are not covered under the ‘Indian Factories Act and Employees State Insurance Scheme’ (ESIS). Only minimal precautions are taken to ensure the safety, health and hygiene of workers.

There is a strong need for widespread education and awareness related to lead hazards and poisoning, available in local languages, for the safety of workers in small-scale industrial units.

As members of NRCLPI, one of our major activities is to disseminate relevant information on lead poisoning to government authorities, NGOs and small-scale cottage industries. We also undertake frequent visits to places of possible hazardous lead exposure. Education, communication, documentation, the media and out-reach programmes must be extensively used in this effort.

Table 1. ZPP and lead before and after chelation therapy

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Normal range</th>
<th>Before chelation</th>
<th>After first chelation</th>
<th>After second chelation</th>
<th>Six months after discontinuing chelation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZPP</td>
<td>Up to 35 mg/dl</td>
<td>149</td>
<td>58</td>
<td>10</td>
<td>43</td>
</tr>
<tr>
<td>Blood lead</td>
<td>Acceptable up to 10 mg/dl</td>
<td>160.2</td>
<td>41.2</td>
<td>18.2</td>
<td>45.2</td>
</tr>
</tbody>
</table>

Figure 1. Our visit to the lead acid battery reconditioning outlet, along with Prof Scott Clark, an environmental health expert from the USA, to monitor environmental lead.

Figure 2. A battery reconditioning unit where children are employed.

Figure 3. A backyard smelter, where secondary lead smelting is carried out.
References