

# Oral opium: an unusual cause of lead poisoning

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**INTRODUCTION** The number of cases of lead poisoning (LP), a widely known disease with various aetiologies, being reported globally has decreased over the years due to both limited domestic applications of lead and enforcement of stringent safety measures. However, a new presentation of lead poisoning, lead-contaminated opium (LCO), is gradually emerging in our region. This study aimed to determine the prevalence and clinical effects of lead toxicity associated with opium use.

**METHODS** Between November 2006 and December 2007, all patients diagnosed with LP at a central laboratory in Tehran, Iran, were assessed for potential causes of poisoning. Patients with a history of LCO abuse were evaluated and recruited for the study.

**RESULTS** Overall, there were 240 patients with LP, and poisoning from LCO was diagnosed in 25 patients. The duration of addiction was between three months and 40 years, and the duration of symptoms was  $28.1 \pm 17.7$  days. Mean blood lead levels of the patients were  $145 \pm 61$  (range 61–323)  $\mu\text{g/dL}$ . The average creatinine and haemoglobin levels were  $77.4 \pm 8.1$   $\mu\text{mol/L}$  and  $105 \pm 25$   $\text{g/L}$ , respectively. The association between the duration of addiction and levels of lead in blood was not statistically significant ( $r = -0.142$ ,  $p = 0.54$ ). The most common symptoms were gastrointestinal complaints, followed by musculoskeletal complaints with muscle weakness (92%). Anorexia was also a leading complaint.

**CONCLUSION** The results of our study suggest that the possibility of LP should be considered with high suspicion among opium users presenting with acute abdominal symptoms.

Keywords: acute abdominal symptoms, lead poisoning, opium ingestion  
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## INTRODUCTION

Mankind has struggled with lead poisoning (LP) ever since the first description of its signs and symptoms over 2,000 years ago.<sup>(1)</sup> Although the incidence of LP increased in the late 19th and early 20th centuries as a result of its increased application in industrial and household products and due to occupational contamination,<sup>(2,3)</sup> recognition of the disease and limiting the use of lead in paints, along with increasingly stringent safety measures in the working environment, has led to a decrease in the incidence of household and industrial lead contamination being reported over the years.<sup>(4)</sup> However, there is an emerging trend of non-occupational exposure to lead, such as among persons using illegal drugs.<sup>(5)</sup> While a few studies have reported lead contamination from intravenous and inhalant forms of heroin,<sup>(6–8)</sup> LP following the use of oral opiates is a new problem that is now becoming more and more frequent in Iran. To our knowledge, studies on LP as a direct result of contaminated oral opiate abuse are limited and the number of patients studied are few.<sup>(9)</sup>

LP mimics the presentation of many other diseases, and patients with LP can present with an acute abdomen and consequently be scheduled for unnecessary laparotomy procedures that could prove harmful to their management.<sup>(10–12)</sup> Our suspicion of LP was raised following a negative laparotomy in a young adult who had presented with anaemia and acute

intestinal obstruction. Signs and symptoms along with laboratory tests, including blood lead levels, confirmed the diagnosis of LP, although the patient had not reported any household or occupational exposure to lead during history taking. Given the patient's history of oral opiate use, a sample of the used opium was obtained and levels of lead measured in the specimen. As was expected, lead levels were high enough to confirm the diagnosis of LP. Following our suspicion that the source of the poisoning was likely to be an opiate, we traced all patients to the same referral laboratory in Tehran. Altogether, 25 patients were found to have LP following the ingestion of oral opiates.

## METHODS

A descriptive, cross-sectional study was conducted of patients diagnosed with LP following the use of oral opiates in Tehran between November 2006 and December 2007. The laboratory at the Atomic Energy Organization of Iran, which is a national referral centre for measuring blood levels of lead and other toxic metals, uses atomic absorption spectrophotometry as the method of choice for measuring the levels of lead in anti-coagulated venous blood samples obtained from patients. All blood samples are collected in lead-free plastic tubes containing heparin (Vocuette, Geiner Labortechnik, Kremsmünster, Austria) by specially trained

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staff. Consent for participating in the study was obtained from patients by a staff stationed at the laboratory. Patients were questioned for a probable history of oral opium abuse.

Of the 240 patients with LP, 25 patients reported a positive history of oral opium use. These patients were interviewed following informed consent and a questionnaire was handed out to determine the risk factors associated with lead exposure in these patients. Patients with known risk factors of LP, such as occupational exposure, were excluded from the study, but those with no risk factors who admitted to consumption of oral opiates were included. Opium samples were analysed by the same laboratory that tested samples from the 25 patients to confirm the diagnosis.

Patients were screened and evaluated by a trained physician, who filled out the questionnaire after evaluating their symptoms. The questionnaire included questions pertaining to three distinct groups of manifestations or symptoms – constitutional, gastrointestinal and musculoskeletal. Complete physical examination was performed for each patient, including complete blood count, blood urea nitrogen and creatinine levels. Patients were advised to either quit their habit or change the source of opium supply, and they were referred to toxicologists for further treatment. Data were analysed using the Statistical Package for the Social Sciences version 14.0 (SPSS Inc, Chicago, IL, USA).

## RESULTS

Of the 240 patients diagnosed with LP, 25 patients admitted to opium use. There were 24 (96%) men and one (4%) woman in the group, with an average age of  $41.8 \pm 13.5$  years. The duration of addiction to oral opiates differed widely (range three months to 40 years). Although the patients were not aware of the duration of use of the contaminated opiate, their mean duration of symptoms was  $28.1 \pm 17.7$  days. Blood levels of lead were  $145 \pm 61$  (range 61–323)  $\mu\text{g}/\text{dL}$ . The average creatinine and haemoglobin levels were  $77.4 \pm 8.1$   $\mu\text{mol}/\text{L}$  and  $105 \pm 25$   $\text{g}/\text{L}$ , respectively. Pearson's chi-square test, which was used to determine the association between the duration of addiction and blood lead levels in patients using opiates, did not show any statistical significance ( $r = -0.142$ ,  $p = 0.54$ ).

The most common complaints were anorexia ( $n = 24$ , 96%), abdominal pain ( $n = 23$ , 92%), weight loss  $> 10\%$  within a two month period ( $n = 21$ , 84%), constipation ( $n = 22$ , 88%) and nausea ( $n = 14$ , 56%). The most common musculoskeletal complaint was muscle weakness ( $n = 23$ , 92%). Other complaints included wrist drop ( $n = 1$ , 4%), pain in the extremities ( $n = 22$ , 88%), paraesthesia ( $n = 14$ , 56%), and reduced vision ( $n = 5$ , 20%) and hearing ( $n = 2$ , 8%). Three (12%) patients who initially presented with acute abdomen (bowel obstruction  $n = 2$ ; peritonitis  $n = 1$ ) underwent laparotomy prior to the diagnosis of LP. The patients were divided into two groups – those that were operated on and those who did not undergo surgery. The levels of lead in blood in these two groups of patients were  $99 \pm 33$   $\mu\text{g}/\text{dL}$

and  $152 \pm 66$   $\mu\text{g}/\text{dL}$ , respectively. The Mann-Whitney  $U$  test, which was used to investigate the relationship between the blood lead levels and presentation of acute abdomen, did not demonstrate any statistical significance ( $p = 0.16$ ). An analysis of findings based on the patients' residence revealed no significant difference in the degree of air pollution or occupational exposure to lead among 20 of the 25 patients living in four areas located in the central and northern parts of Tehran.

## DISCUSSION

Our results indicate that contaminated oral opiates could be a source of LP. Lead, a heavy metal with a high atomic mass and low melting point, was discovered over 6,000 years ago and has been used in products ever since.<sup>(1,2)</sup> Although its special characteristics made it indispensable in the making of many products, such as pipes, solder, brass fixtures, crystal paint, ceramics and batteries, individuals involved in these industries face elevated risks of LP due to occupational exposure to lead.<sup>(2,9)</sup>

While lead compounds have a sweet taste, an attribute that is related to the high rates of LP seen in children when these compounds are used in paints on toys, lead in its pure metallic form does not have a specific taste. Dealers of opiates add lead to these drugs due to its heavy weight, thus increasing the value of the sold product,<sup>(9)</sup> and because lead can be easily obtained from used batteries.<sup>(13)</sup> As would be expected, none of the patients who admitted to using opiates in our group reported any changes in the taste of the substance being used. LP symptoms have a wide spectrum and are nonspecific, ranging from nausea, vomiting, constipation, abdominal pain, extremity pains, headache, paraesthesia, muscle weakness and anaemia.<sup>(14)</sup> Lead is easily absorbed by the gastrointestinal and respiratory systems and into the blood, bone and soft tissues.<sup>(2)</sup> The rate of lead absorption from the gastrointestinal tract is also increased in malnutrition and iron deficiency states.<sup>(15)</sup> As lead accumulates in the bodies of patients insidiously, the associated intoxication and connection with symptoms often goes unnoticed in patients. This was mirrored in our study group as well, with none of the patients relating their symptoms to the use of opiates. Moreover, it is likely that symptoms of LP in users of lead-contaminated opium may mimic withdrawal symptoms, thus prompting a vicious cycle of increased opium use.

The abuse of opiates causes gastrointestinal symptoms, including changes in bowel habits and constipation, and may be the reason for the high prevalence of gastrointestinal symptoms in our patients. As was seen in a patient in this study, LP symptoms can mimic an acute surgical abdomen, and in the absence of an appropriate index of suspicion of LP, the symptoms can be mistaken for a crisis of sickle cell anaemia, cholecystitis or nephrolithiasis.<sup>(10,11)</sup> The higher rate of laparotomies (12%) seen among our patients also reflects the fact that surgeons may be primarily concerned with ruling out surgical problems in patients presenting with a history suggestive of an acute abdomen. No significant difference was seen between the levels of air pollution

in the areas of Tehran where our patients resided and areas that had no cases of LP. As LP is known to exhibit a regional distribution, it is imperative that physicians include it in the differential diagnosis when confronted with patients from a certain area where similar cases have been reported.

Although this study had a larger number of patients compared to other studies,<sup>(9,14)</sup> it is not without limitations. We did not study the correlation between the severity of symptoms in our patients and the amount of lead ingested, as we could not obtain samples of the opium used to analyse the presence of lead. With the exception of a few patients, this was not feasible due to legal and social hurdles for our group of patients. We were also unable to ascertain the duration for which our patients had been using contaminated opiates. Given our findings of high rates of LP in patients using oral opiates, we recommend that a high index of suspicion for LP be exercised in patients presenting with symptoms of an acute abdomen who may be addicts.

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